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Mindfulness Meditation Impairs Task Motivation but Not Performance

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ABSTRACT

A state of mindfulness is characterized by focused, nonjudgmental awareness of the present moment. The current research experimentally investigated how state mindfulness influences task motivation and performance, using multiple meditation inductions, comparison conditions, tasks, and participant samples. Mindfulness inductions, relative to comparison conditions, reduced motivation to tackle mundane tasks (Experiments 1–4) and pleasant tasks (Experiment 2). Decreased future focus and decreased arousal serially mediated the demotivating effect of mindfulness (Experiments 3 and 4). In contrast to changes in motivation, inducing a state of mindfulness did not affect task performance, as seen in all experiments but one (Experiments 2–5). Meta-analyses of performance experiments, including unreported findings (i.e., the file drawer), supported these conclusions. Experiment 5's serial mediation showed that mindfulness enabled people to detach from stressors, which improved task focus. When combined with mindfulness's demotivating effects, these results help explain why mindfulness does not alter performance.

1. Introduction

> "The idea that mindfulness would improve productivity is kind of an odd notion on the face of it, […] I think dogs have access to it by default. At any moment when I re-claim my doghood, I'm just sitting here dumb and happy. I'm not motivated, for better or for worse." U.S. meditation instructor Kenneth Folk[1] (quoted in Gershon, 2016, p.1).

Mindfulness meditation is a practice that cultivates non-judgmental awareness of experience in the present moment (Brown & Ryan, 2003). Corporate CEOs have spoken publicly about the personal benefits of practicing meditation (Carlock, 2014; Lockhart & Hicken, 2012). In order to manage the stresses they face at work, 13% of U.S. employees report engaging in mindfulness-enhancing activities (Olano et al., 2015). Mindfulness's popularity has shot up so rapidly that the *Harvard Business Review* concluded that it is "close to taking on cult status in the business world" (Brendel, 2015, p. 1).

Popularity in the corporate world mirrors a sharp uptick in scholarly interest, which overwhelmingly has focused on mindfulness's benefits (for reviews, see Good et al., 2016; Sutcliffe, Vogus, & Dane, 2016). Multiple investigations have tied mindfulness to desirable workplace outcomes. Several weeks of mindfulness training increases job satisfaction (Hülsheger, Alberts, Feinholdt, & Lang, 2013) and improves workers' sleep quality (Wolever et al., 2012). Trait mindfulness, a chronic disposition towards focusing on the present moment in a nonjudgmental and accepting fashion, predicts leadership outcomes (Reb, Narayanan, & Chaturvedi, 2014), ethical and prosocial behaviors (Gu, Zhong, & Page-Gould, 2013; Reb, Narayanan, & Ho, 2015; Ruedy & Schweitzer, 2010), and low levels of retaliatory and abusive tendencies (Liang et al., 2016; Long & Christian, 2015; see also Yu & Zellmer-Bruhn, 2018).

While the myriad advantages of mindfulness are well-established (Glomb, Duffy, Bono, & Yang, 2011; Kudesia, in press), its boundaries and limitations are only beginning to be uncovered (Dane, 2011). When a construct's documented effects are largely positive or negative, much theoretical traction can be gained by investigating effects in the opposing valance. That rationale, along with calls by mindfulness scholars to uncover the relationships among mindfulness, motivation, and performance (Choi & Tobias, 2015; Dane, 2015; Good et al., 2016), stimulated the current investigation on whether a state of mindfulness can harm goal motivation.

1.1. State mindfulness

A single 8–15 min session of meditation, aimed at invoking the situational state of mindfulness, can produce affective, cognitive, and

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[1] Wired magazine called Kenneth Folk a "power player in the mindfulness movement" who "popularized the notion of open source enlightenment, winning adherents in Silicon Valley" (Shachtman, 2013, p.1).

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behavioral changes thereafter. A single mindfulness induction can increase empathy (Winning & Boag, 2015) and improve reading comprehension (Clinton, Swenseth, & Carlson, in press) and negotiation outcomes (Reb & Narayanan, 2014; cf. Grapendorf, Sassenberg, & Landkammer, 2017). State mindfulness can impede the impact of potentially undesirable situational influences. Mindfulness inductions, compared to neutral states, boost resistance to the sunk cost bias (Hafenbrack, Kinias, & Barsade, 2014), prevent distraction (Mrazek, Smallwood, & Schooler, 2012), and encourage resilience in the face of distressing images (Arch & Craske, 2006).

State mindfulness inductions are found in studies using experimental design, wherein people are randomly assigned to perform a meditation or comparison exercise. The use of random assignment to condition gives credence to the interpretation that state mindfulness, which is able to be cultivated in a short enough time period to be amenable to the workplace, can evince changes in organizationally-relevant outcomes (Hafenbrack, 2017). Accordingly, in order to understand the psychological processes that follow from a mindfulness experience, we too used experimental design. This approach allows for greater confidence interpreting effects as being due to state mindfulness as opposed to unmeasured differences between people, as can be the case with trait mindfulness findings.

1.2. Could mindfulness reduce task motivation?

There is an inherent tension between being accepting of one's present experience and motivated to achieve something new. A main aim of mindfulness is to get people to be content with their current state (Bishop et al., 2004), whereas task motivation could be cast as being the opposite of that (Locke & Latham, 2006). That is, motivation is about attaining a future state that is different (often better) than the current one. Laboratory research suggests that motivation could be reduced to the extent that people concentrate on the present moment. Compared to people who had been instructed to compare their current state to a desired future state, people who considered only the current situation reported being less motivated to work (Oettingen et al., 2009). These ideas suggest that to the extent that mindfulness draws attention away from the future and promotes acceptance of the status quo, it may interrupt goal-achievement processes. Hence, one key reason why state mindfulness could impair task motivation is by reducing future focus.

Reducing future focus may lead to reduced arousal. Arousal, being the physiological and emotional feeling of energy (Schachter & Singer, 1962; Smith & Ellsworth, 1985), may seem an inherent consequence of anticipating future events, and there is evidence in support of that idea. People experience heightened arousal before performing challenging tasks such as negotiating (Brooks & Schweitzer, 2011), giving a speech, or singing in public (Brooks, 2014). Moreover, a recent experience sampling study found that thoughts focused on the future were associated with concomitantly higher levels of subjective arousal (Baumeister, Hofmann, & Vohs, 2015). We therefore sought to test whether one of the key consequences of mindfulness, reduced future focus, also could impair state arousal.

A state of mindfulness could then impair task motivation through reductions in arousal. As arousal is an indicator of energy that can be directed towards accomplishing upcoming tasks (Brooks, 2014), it is known to increase motivation (Brehm & Self, 1989; Buck, 1985; Schupp et al., 2000)—and indeed some scholars even use the words arousal and motivation interchangeably (Humphreys & Revelle, 1984). Physiological arousal is a central component of motivational effects (Gendolla, Brinkmann, & Silvestrini, 2012). Since mindfulness can reduce arousal (Sutcliffe et al., 2016), it may influence how much energy people feel they have to devote to upcoming tasks. This rationale led us to expect that inducing a state of mindfulness would reduce arousal and, consequently, task motivation.

In summary, we predicted that an induction of mindfulness meditation, compared to a non-meditative state, would reduce future focus, arousal, and task motivation. We further predicted that the psychological states of reduced future focus and arousal would account for the conditional effect on task motivation in a serial fashion. That is, we predicted:

Hypothesis 1.. The mindfulness condition would reduce task motivation.

Hypothesis 2.. The effect of the mindfulness condition on task motivation would be serially mediated by reduced future focus leading to reduced state arousal.

1.3. Mindfulness and task performance

While motivation is an important workplace outcome (Ryan & Deci, 2000; Hackman & Oldham, 1976; Herzberg, 1966), task performance, arguably, is just as or more important. To that end, we measured task performance as well.

The motivation to perform well on a task often is a strong and positive driver of performance (Ajzen, 1991). The literatures on expectancy theory (Porter & Lawler, 1968; Vroom, 1964) and goal-setting theory (Latham & Locke, 1979), bolstered by support from more than 400 studies (Locke & Latham, 2006), point to the prediction that motivation influences performance. Scholars generally accept that a reduction in task motivation ordinarily also reduces performance on that task. These rationales suggest that if mindfulness reduces task motivation, mindfulness would also reduce task performance. Our initial prediction therefore was:

Hypothesis 3a.. The mindfulness condition would impair task performance.

Next we considered the combined effects of mindfulness on motivation and performance outcomes. There are several reasons to predict that a state of mindfulness may impair task performance less than it impairs task motivation. A single session of mindfulness training may weaken the relation between motivation and behavior, as seen in a recent study (Papies, Pronk, Keesman, & Barsalou, 2015). We theorized that mindfulness may produce countervailing psychological processes on task performance. As reflected in Hypothesis 3a, one pathway would be mindfulness's reduction in task motivation, which would be expected to harm task performance.

Yet at the same time, there are reasons to think that mindfulness could nonetheless aid task performance. Mindfulness allows people to psychologically detach from stressors, such as concerns, problems, and obligations (Hülsheger, Feinholdt, & Nübold, 2015; Hülsheger et al., 2014). Off-task concerns and worries can impair performance on cognitive tasks (Mikulincer, 1989) and tests of intelligence and knowledge (Ramirez & Beilock, 2011; Steele & Aronson, 1995). Attention to the present moment during meditation reduces mind-wandering during subsequent tasks (Mrazek et al., 2012), which is germane because mind-wandering has been found to be a source of error in a variety of tasks (Smallwood & Schooler, 2015). To the extent that detaching from stressors allows people to focus more fully on the task, these consequences of mindfulness may help task performance. These rationales led to two additional predictions about performance:

Hypothesis 3b.. The mindfulness condition would have a stronger (negative) effect on task motivation than on task performance, as seen in an interaction between the mindfulness condition (between participants) and motivation versus performance outcomes (within participants).

Hypothesis 4.. The mindfulness condition would reduce concerns over stressors, which then would increase task focus, resulting in a serial mediation pathway between the mindfulness condition and task performance.

1.4. Overview of the present research

Five experiments and two meta-analyses tested the relationships among state mindfulness, task motivation, and task performance. Experiment 1 demonstrated the demotivating effect of state mindfulness (H1). Experiment 2 tested whether state mindfulness would impair motivation and performance (H3a and H3b). Experiment 2 found that motivation was diminished after a mindfulness induction, whereas performance was not. Experiments 3 and 4 conceptually replicated the prior experiments and tested the mediating path of reduced future focus and reduced state arousal (H2). Meta-analyses, including unreported experiments from the file drawer, further supported Hypotheses 1 and 3b, which predicted that a mindfulness meditation condition would impair task motivation but not performance. Experiment 5 found that mindfulness allowed people to detach from stressors, which further allowed them to better focus on the task (compared to the non-mindfulness condition). The total effect was a sequential mediation model that helps to explain the relationship between the mindfulness condition and task performance (H4).

Unless otherwise noted, we aimed for sample sizes of 50 participants per cell. The average cell size in recent state mindfulness experiments is 51.7 (Hafenbrack et al., 2014; Long & Christian, 2015; Wilson, Mickes, Stolarz-Fantino, Evrard, & Fantino, 2015), with which our sample sizes are consistent.

The tasks used to track motivation and performance were mostly neutral and required cognitive effort (e.g., word puzzles, brainstorming) or motor performance (e.g., retyping text). Our aim was to mimic tasks that might be done in the workplace in order to enhance external validity. More than 67% of U.S. employees report being not engaged in their jobs, according to Gallup polls over the past 15 years (Mann & Harter, 2016), hinting at the tedium of workplace duties. Nonetheless, work tasks can be enjoyable. To that end, Experiment 2 used a task that was framed as pleasant to test whether the demotivating effect of mindfulness held. It did.

2. Experiment 1

Experiment 1 was an initial test of the effect of state mindfulness on task motivation (H1). The outcome in Experiment 1 was reported motivation to complete anagram word puzzles. This task was chosen because anagrams are challenging for most people but do not require specialized knowledge, and are often used in experiments on goal setting and motivation (e.g., Erez & Judge, 2001; Locke, Shaw, Saari, & Latham, 1981).

Experiment 1 tested mindfulness meditation against a mind-wandering comparison condition. The mindfulness instructions were focused breathing exercises, chosen because they are one of the most common forms of mindfulness practice (Hanh, 1999). Previous research has validated the opposing nature of state mindfulness and mind-wandering (Mrazek et al., 2012) and mind-wandering inductions have been used as a comparison condition in prior research (Arch & Craske, 2006; Kiken & Shook, 2011; Long & Christian, 2015).

We ensured that the mindfulness and mind-wandering manipulations shared key features, so as to systematically test only the difference between states of mind. All participants heard recordings to induce the desired state, which were approximately equal in duration and included oral instructions and reminders at similar intervals throughout the recordings.

2.1. Method

2.1.1. Participants

One hundred and nine adults (49 female, M_{age} = 34.88 years, SD = 11.91, $range_{age}$ = 18–65) were recruited on the Amazon Mechanical Turk survey platform whose location was set to the United States. They took part in exchange for $1.50.

2.1.2. Procedure

Participants were recruited for a study on “Tasks and Temporal Feelings” and randomly assigned by the survey software to listen to a 15-min focused breathing mindfulness meditation or mind-wandering comparison induction. Participants then indicated how motivated they were to engage in an anagram word puzzle task. Afterwards, participants were debriefed.

2.1.2.1. Mindfulness meditation manipulation. Participants listened to a recorded focused breathing meditation induction created by a professional mindfulness meditation instructor (Hafenbrack et al., 2014). In it, participants were led through a meditation exercise that repeatedly instructed them to bring their awareness to the physical sensations of breath entering and leaving their body, adapted from Arch and Craske (2006).

2.1.2.2. Mind-wandering comparison condition. In the mind-wandering comparison condition, participants also listened to a recording that featured the same speaker. It repeatedly instructed them to think of whatever came to mind.

2.1.2.3. Task motivation. After the manipulation, participants were told that they would soon be asked to complete anagram word puzzles. The instructions explained that anagrams are words or phrases made by rearranging a string of letters, and provided two examples (Danesi, 2009). The description stated “[t]his is an extremely difficult task that requires a lot of effort and persistence.”

Participants were told they would be given 10 anagram word puzzles to solve. Before doing so, they indicated how motivated they were to complete the task (1 = very slightly or not at all; 5 = extremely) and how much time, in minutes, they were willing to spend on the word puzzles (integer options between endpoints of 0 and 20 min). Both items were standardized and summed to create the composite measure of motivation (r = .501, p < .001).

2.1.2.4. Manipulation check. Participants used two Likert scales to report the extent to which they were currently focused on the present moment and focused on their breathing (1 = very slightly or not at all; 5 = extremely). These two items were averaged (r = .517, p < .001).

2.2. Results

2.2.1. Manipulation check

Participants in the mindfulness condition reported greater focus on the present moment and their breathing (M = 3.81, SD = 0.87) compared to participants in the comparison condition (M = 3.28, SD = 1.02), $t(107)$ = 2.885, p = .005, d = 0.56. A state of mindfulness was successfully induced.

2.2.2. Hypothesis test

2.2.2.1. Task motivation. We hypothesized that state mindfulness would weaken motivation on the anagram task, relative to state mind wandering. This prediction was supported. Participants in the mindfulness condition reported lower motivation to perform the anagram task (M = −0.41, SD = 1.64) compared to participants in the mind-wandering comparison condition (M = 0.37, SD = 1.75), $t(107)$ = 2.390, p = .019, d = 0.46.

2.3. Discussion

Experiment 1’s participants were randomly assigned to engage in a mindful breathing or a mind-wandering exercise, and then told their next task was to complete difficult word puzzles. Mindfulness participants reported that they were not as motivated, compared to their mind-wandering counterparts, which supported H1.

3. Experiment 2

Experiment 2 aimed to replicate and extend the results of Experiment 1. It again tested the demotivating effect of state mindfulness (H1). Experiment 2 used a task in which participants edited two cover letters of a job seeker.

Whereas Experiment 1's participants reported their motivation for a task described as difficult, Experiment 2 systematically altered the task framing to be pleasant versus unpleasant. This design change allowed us to test whether state mindfulness would alter motivation towards tasks that are framed as pleasant, as well as to attempt to replicate the results of Experiment 1 showing that state mindfulness weakened motivation for challenging tasks.

Experiment 2 included a behavioral measure of task performance to investigate whether state mindfulness would change performance, and in particular whether performance change would be similar to or less than the change in motivation (H3a & H3b). Performance was operationalized as the quality of the cover letter edits that participants made.

Two changes in participant population were implemented so as to add to generalizability. One, whereas Experiment 1's participants were based in the US, Experiment 2 was conducted in France. Two, whereas Experiment 1 had been conducted with participants from an online workforce, Experiment 2's participants held employment in a traditional (i.e., brick-and-mortar) workplace.

3.1. Method

3.1.1. Participants

One hundred sixty eight adults residing in France took part in exchange for 7€. We collected as many participants as possible during two weeks of lab time. The pre-screening criteria listed included that participants must have employment. Sixteen participants self-reported in the demographic section that they did not currently hold employment, and were removed before analyses. Four of the remaining participants did not follow instructions (i.e., they closed the survey web browser) and were removed before analyses. The remaining one hundred and forty eight participants (92 female, M_{age} = 23.04 years, SD = 2.99, $range_{age}$ = 18–31) were included in analyses.

3.1.2. Procedure

Participants were informed that they would take part in a study on attentional focus and career advice, and sat in private cubicles with a computer and headphones. Participants listened to either a focused breathing mindfulness meditation or mind-wandering recorded induction. They then indicated their motivation to work on a task framed as pleasant or unpleasant.

Afterwards, participants were instructed to edit two cover letters and then complete manipulation check and demographic measures. We had a pre-established time limit for the editing task (30 min), and participants still editing the cover letters at the end of that period were instructed to move on to the rest of the survey.

3.1.2.1. Mindfulness meditation manipulation and mind-wandering comparison condition. Participants were randomly assigned to either a focused breathing mindfulness meditation or mind-wandering comparison condition. These versions of the inductions were professionally translated to French from the English-language scripts (Arch & Craske, 2006; Hafenbrack et al., 2014) and recorded specifically for this research by a French professional mindfulness instructor.

3.1.2.2. Cover letter editing task. The cover letter editing task was adapted from Grant et al. (2007). The instructions stated that we were working with a career center in the area to solicit feedback on cover letters for job seekers. Participants were informed that they would edit the cover letters of a student seeking a summer job and instructed to make as many changes "focusing on rewording, restructuring, revising, and reorganizing" as necessary in order to benefit him.

3.1.2.3. Task framing manipulation. The concluding sentence of task instructions in the pleasant condition read, "Some people have reported that this is a pleasant and enjoyable task." The concluding sentence in the unpleasant condition read, "Some people have reported that this is an unpleasant and unenjoyable task."

3.1.2.4. Task motivation. In the same manner as in Experiment 1, participants indicated how motivated they were to complete the editing task (1 = very slightly or not at all; 5 = extremely) and how much time in minutes they were willing to spend to complete the cover letter editing task (integer options between endpoints of 0 and 30 min). Responses were standardized and summed to create the composite measure of motivation (r = .295, p < .001).

3.1.2.5. Task performance. Two French speakers who were blind to conditions and hypotheses rated participants' edits of the cover letters. Raters made four evaluations of how helpful, professional, grammatically accurate, and thorough the edits were (1 = not at all; 7 = extremely). These four items were averaged within raters (α_{rater1} = .894, α_{rater2} = .928) then between raters (α = .707, r = .624, p < .001). This index formed the measure of task performance. Due to technical difficulties, 41 participants' edits were not recoverable for analysis. These participants did not differ from the others in terms of age, gender, or reported motivation (ps > .41).

3.1.2.6. Manipulation check. Participants completed three manipulation check items. They reported the extent to which they were currently focused on their breathing, focused on physical sensations, and in touch with their body (1 = very slightly or not at all; 5 = extremely; α = .726). Responses were averaged.

3.2. Results

3.2.1. Manipulation check

Participants in the mindfulness condition (M = 3.13, SD = 0.78) reported greater focus on their breath and body than did participants in the comparison condition (M = 2.84, SD = 0.86), t(146) = 2.144, p = .034, d = 0.35. This result indicated that a state of mindfulness was successfully induced.

3.2.2. Hypothesis tests

3.2.2.1. Task motivation. An Analysis of Variance (ANOVA) predicting the composite motivation measure showed two significant main effects (mindfulness condition F(1, 144) = 4.94, p = 0.028; task framing conditions F(1, 144) = 4.12, p = 0.044). The interaction between the mindfulness and task framing conditions was not significant, F(1, 144) = 0.00, p = 0.970.

As predicted, participants in the mindfulness condition (M = −0.26, SD = 1.76) reported less motivation than did participants in the comparison condition (M = 0.28, SD = 1.40), t(146) = 2.05, p = .042, d = .34. Supporting the task framing manipulation, participants in the pleasant task framing condition (M = 0.24, SD = 1.63) reported somewhat greater motivation than did participants in the unpleasant task framing condition (M = −0.25, SD = 1.56), t(146) = 1.840, p = .068, d = .30, Fig. 1.

3.2.2.2. Task performance. An ANOVA tested whether mindfulness and task framing conditions affected performance. They did not. The main effects on task performance of the mindfulness induction (F(1, 103) = 0.35, p = 0.557) and task valence framing (F(1, 103) = 0.44, p = 0.509) and the interaction between mindfulness condition and task

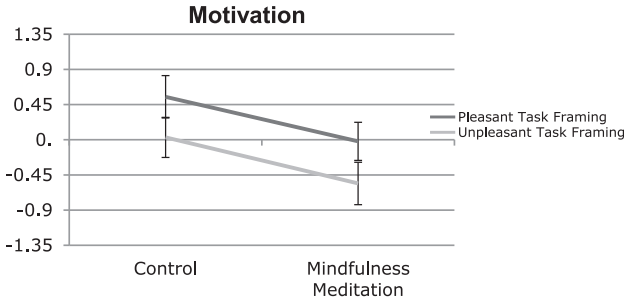

Fig. 1. Task motivation as a function of mindfulness condition and task valence framing condition in Experiment 2. Error bars indicate standard errors.

valence framing ($F(1, 103) = 0.10$, $p = 0.758$) were not significant.

Participants in the mindfulness condition ($M = 4.55$, $SD = 1.05$) and participants in the comparison condition ($M = 4.41$, $SD = 1.28$) performed similarly on the task, $t(105) = 0.625$, $p = .534$. This result does not support Hypothesis 3a, which predicted that state mindfulness would impair task performance. Likewise, participants in the pleasant task framing condition ($M = 4.55$, $SD = 1.12$) had similar performance on the task as did participants in the unpleasant task framing condition ($M = 4.40$, $SD = 1.21$), $t(105) = 0.691$, $p = .491$.

3.2.2.3. Did mindfulness differentially affect motivation versus performance?. We compared the effect of mindfulness condition on task motivation versus task performance. First we computed standardized scores of the task motivation and task performance variables. A General Linear Model test computed an interaction term between the predictor and the within-subjects factor of outcomes (motivation versus performance). The interaction effect showed that the state mindfulness condition's effects were significantly different on motivation versus performance ($F(1, 105) = 3.949$, $p = 0.0495$). This finding supported Hypothesis 3b, which predicted that state mindfulness would have a stronger negative effect on task motivation than on task performance.

3.3. Discussion

Experiment 2 found that state mindfulness reduced motivation (supporting H1) towards tasks framed as pleasant or unpleasant, suggesting that the valence of how a task is framed does not moderate the demotivating effect of state mindfulness. Mindfulness condition did not affect performance on the same task, which failed to support H3a. This experiment also found that state mindfulness decreased motivation more than it impacted behavioral task performance (supporting H3b).

4. Experiment 3

Experiment 3 again tested the demotivating effect of state mindfulness (H1) and behavioral task performance (H3a & H3b). A key addition to Experiment 3 was to investigate the potential mediating roles of future focus and state arousal, both of which we predicted would be lower among participants in the mindfulness condition and would go on to mediate, in a serial manner (from reduced future focus to reduced arousal, H2), the conditional effect on motivation.

Experiment 3 also changed aspects of the operationalizations of the mindfulness and comparison conditions. First, Experiment 3 used two novel comparison conditions. One condition had participants simply read text whereas the other had them write an account of their activities. Both are tasks that employees do in the workplace (Boczkowski, 2010; Gallo, 2013). Second, the mindfulness condition was a body scan meditation, which is another form of mindfulness meditation used in prior work (e.g., Diaz, 2013; Mirams, Poliakoff, Brown, & Lloyd, 2013).

4.1. Method

4.1.1. Participants

Two hundred and twenty five workers on Amazon Mechanical Turk whose location was set to the United States participated in exchange for $1.33. We aimed for 75 participants per cell because the body scan and comparison condition materials had not been validated in previous research, and therefore we wanted more statistical power. Twenty six participants were removed from analyses because they did not follow instructions (e.g., their anagram responses included letters that were not in the given words or they gave answers that were not actually words)[2], leaving 199 participants (107 female, $M_{age} = 32.96$ years, $SD = 10.29$, $\text{range}_{age} = 20–66$) in analyses.

4.1.2. Procedure

Participants were informed that they would take part in a study on "Tasks, Feelings, and Time." Participants were randomly assigned by the survey software to engage in a 14-min task (mindfulness meditation, writing about their activities in the past month, or reading). Participants then indicated how motivated they were to work on anagrams and proceeded to attempt as many anagram word solutions as possible in five minutes. Afterwards, participants completed manipulation checks and items assessing future-focus and arousal.

4.1.2.1. Mindfulness meditation manipulation. Participants listened to a recorded body scan meditation induction (Burch, 2008). The recording instructed them to bring their awareness to the current physical sensations in different parts of their body.

4.1.2.2. Writing comparison condition. Participants in the writing condition wrote about what they had been doing in the past month.

4.1.2.3. Reading comparison condition. Participants in the reading condition were asked to open a new web browser and read news stories on the aggregator site Google News (Google Inc., 2016).

4.1.2.4. Task motivation. Participants next were told that they would soon be asked to complete a difficult anagram word puzzles task with 10 items. Before doing so, they responded to four items tapping motivation: how motivated they were to complete the task, how much effort they intended to spend to complete the task, how much they wanted to complete the task, and how much they felt like doing the task (1 = very slightly or not at all; 5 = extremely; $\alpha = .903$). They then reported how much time they were willing to spend to complete the task (integer options with endpoints of 0 and 20 min). These five items were standardized and summed to create the composite measure of motivation ($\alpha = .886$).

4.1.2.5. Task performance. Participants were instructed that they had five minutes to complete as many of 10 anagrams as possible (Appendix A). After five minutes had passed, the online survey software automatically advanced to the next page. The dependent variable was the number of anagrams participants solved correctly

[2] Including these participants in the analyses did not change the overall results: Participants in the mindfulness condition ($M = -0.91$, $SD = 4.86$) reported less motivation than in the two comparison conditions collapsed together ($M = 0.39$, $SD = 3.75$; $t(2\,2\,2) = 2.202$, $p = .029$, $d = .30$) and participants in the mindfulness condition ($M = 3.09$, $SD = 2.01$) solved more word puzzles than in the two comparison conditions collapsed together ($M = 2.27$, $SD = 1.78$; $t(2\,2\,2) = 3.137$, $p = .002$, $d = .44$). The sequential model of the mindfulness meditation condition leading to reduced future focus, then reduced state arousal, resulting in reduced task motivation was significant (estimate = -.131, bias-corrected 95% confidence interval = [-0.315, -0.002]). The interaction test showed the effects of condition on motivation versus performance were significantly different from one another ($F(1, 222) = 14.533$, $p < 0.001$).

during the five minute period. Participants could only answer each anagram once.

4.1.2.6. Future focus. Participants next completed three rating items. They reported the extent to which they had been absorbed in the future, their thoughts were focused on the future, and they were mostly thinking about the future at the end of the manipulation task (1 = very slightly or not at all; 5 = extremely). Responses were averaged (α = .954).

4.1.2.7. State arousal. Participants reported how they felt at the end of the manipulation task on the items alert, active, excited, interested, and lethargic (1 = very slightly or not at all; 5 = extremely). The first four were indicators of high arousal, whereas the last indicated low arousal (Russell, 1980; 2009) and therefore was reverse-coded. Responses were averaged (α = .791).

4.1.2.8. Manipulation checks. Participants reported how they felt at the end of the manipulation task (1 = very slightly or not at all; 5 = extremely). Physiological awareness was measured by three items: how much participants reported they had been focused on their breathing, focused on physical sensations, and in touch with their body (α = .904). Present moment focus was measured with three items: how much they had been absorbed in the present moment, focused on the present moment, and mostly thinking about the present moment (α = .903). Responses were averaged.

4.2. Results

4.2.1. Manipulation checks

The mindfulness task aimed to bring attention to the body's current sensations, hence it should have produced greater present focus and greater physiological awareness compared to the other two conditions. Participants in the mindfulness condition reported greater physiological awareness (M = 3.56, SD = 1.15) than in the comparison conditions collapsed together (M = 1.91, SD = 0.90), $t(179) = 10.731$, $p < .001$, d = 1.59. The two comparison conditions reported similar levels of physiological awareness (p = .841).

Participants in the mindfulness condition reported greater present moment focus (M = 3.68, SD = 1.03) compared to the writing comparison condition (M = 2.96, SD = 1.07), $t(125) = 3.852$, $p < .001$, d = 0.69, but not compared to the reading comparison condition (M = 3.51, SD = 0.92), $t(122) = 0.949$, p = .344. The results suggest that a state of mindfulness was successfully induced by the mindfulness condition, and that the reading condition induced present moment focus as well.

4.2.2. Hypothesis tests

4.2.2.1. Task motivation. An ANOVA showed significant differences among the three conditions on the composite measure of task motivation ($F[2, 196] = 3.897$, p = .022, η_p^2 = .038), Fig. 2. Relative to the two comparison conditions collapsed together (M = 0.60, SD = 3.63), participants in the mindfulness condition (M = −1.07, SD = 4.76) reported significantly less motivation, $t(197) = 2.777$, p = .006, d = 0.39.

T-tests showed that participants in the mindfulness condition (M = −1.07, SD = 4.76) reported significantly less motivation compared with the writing (M = 0.73, SD = 3.44; $t(135) = 2.498$, p = .014, d = 0.43) and reading comparison conditions (M = 0.48, SD = 3.84; $t(132) = 2.040$, p = .043, d = 0.36). The two comparison conditions reported similar levels of motivation ($t(125) = 0.388$, p = .699). These results supported Hypothesis 1, that state mindfulness would reduce task motivation.

4.2.2.2. Task performance. An ANOVA showed significant differences in task performance among the conditions ($F[2, 196] = 3.745$, p = .025, η_p^2 = .037), Fig. 3. Relative to the two comparison conditions collapsed together (M = 2.39, SD = 1.79), participants in the mindfulness condition (M = 3.13, SD = 1.97) solved significantly more anagrams, $t(197) = 2.672$, p = .008, d = 0.40.

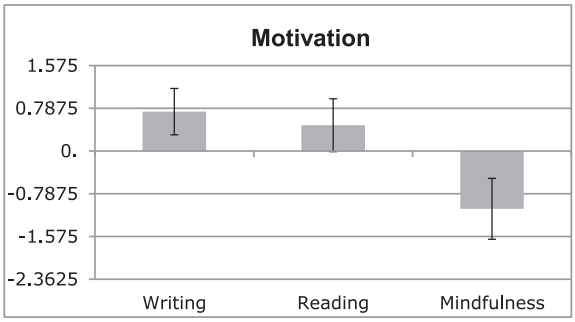

Fig. 2. Task motivation as a function of mindfulness, writing, or reading condition in Experiment 3. Error bars indicate standard errors.

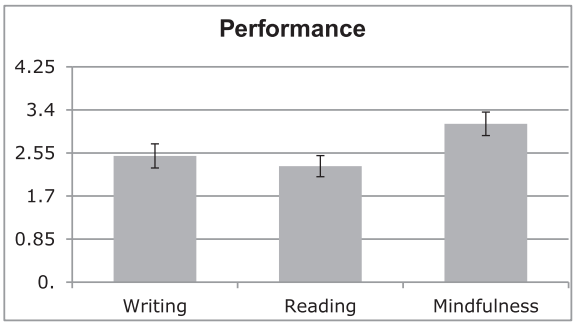

Fig. 3. Task performance as a function of mindfulness, writing, or reading condition in Experiment 3. Error bars indicate standard errors.

T-tests revealed that participants in the mindfulness condition (M = 3.13, SD = 1.97) solved significantly more anagrams ($t(132) = 2.637$, p = .009, d = 0.46) compared with the reading comparison condition (M = 2.29, SD = 1.64) and somewhat more anagrams compared with the writing comparison condition (M = 2.49, SD = 1.92; $t(135) = 1.899$, p = .060, d = 0.33). There was no significant difference in performance on the anagrams between the two comparison conditions ($t(125) = 0.635$, p = .526). These results failed to support – and demonstrated a reversal relative to – Hypothesis 3a, which predicted that state mindfulness would impair task performance.

4.2.2.3. Future focus. A univariate ANOVA did not show significant differences in future focus by condition ($F[2, 178] = 1.951$, p = .145, η_p^2 = .021). Compared to the two comparison conditions collapsed together (M = 2.10, SD = 1.09), participants in the mindfulness condition (M = 1.79, SD = 1.01) reported being somewhat less focused on the future, $t(179) = 1.926$, p = .056, d = 0.30.

T-tests revealed that participants in the mindfulness condition (M = 1.79, SD = 1.01) had weaker future focus ($t(122) = 1.906$, p = .059, d = 0.34) compared with the reading comparison condition (M = 2.15, SD = 1.08), whereas mindfulness condition participants reported similar levels of future focus ($t(125) = 1.416$, p = .159) compared with the writing comparison condition (M = 2.05, SD = 1.11). There was no significant difference in future focus between the two comparison conditions (p = .658).

4.2.2.4. State arousal. An ANOVA showed significant differences in state arousal among the three conditions ($F[2, 179] = 13.362$, $p < .001$, η_p^2 = .130). Relative to the two comparison conditions

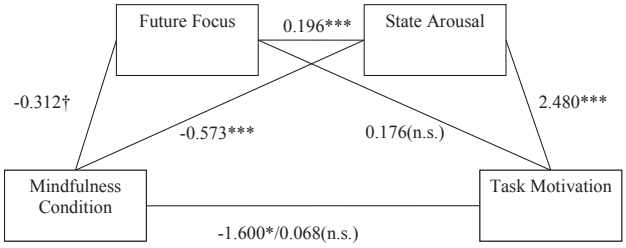

Fig. 4. Future focus and state arousal sequentially mediate the effect of mindfulness on task motivation, relative to both comparison conditions collapsed together in Experiment 3. The values are based on unstandardized regression coefficients. $^{\dagger}p < .10$, $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$.

collapsed together ($M = 3.24$, $SD = 0.74$), participants in the mindfulness condition ($M = 2.61$, $SD = 0.86$) reported significantly less arousal, $t(180) = 5.178$, $p < .001$, $d = 0.78$.

T-tests revealed that participants in the mindfulness condition ($M = 2.61$, $SD = 0.86$) reported significantly less arousal ($t(125) = 4.205$, $p < .001$, $d = 0.76$) compared with the writing comparison condition ($M = 3.22$, $SD = 0.74$) as well as significantly less arousal ($t(123) = 4.361$, $p < .001$, $d = 0.79$) compared with the reading comparison condition ($M = 3.26$, $SD = 0.75$). There was no significant difference in arousal between the two comparison conditions ($p = .813$).

4.2.2.5. Mediation analysis. A two-step bootstrapping mediation test (Hayes, Preacher, & Myers, 2011) supported a sequential model of the mindfulness meditation condition leading to reduced future focus, then reduced state arousal, resulting in reduced task motivation (point estimate = −.152, bias-corrected 95% confidence interval = [−0.365, −0.005]), Fig. 4. This result supported Hypothesis 2, which predicted that future focus and state arousal would serially mediate the demotivating effect of mindfulness.

We also tested two alternative mediation models. One, we entered the two putative mediators into a simultaneous bootstrapping mediation test (Preacher & Hayes, 2008). The results showed that state arousal (point estimate = −1.573, bias-corrected 95% confidence interval [−2.397, −0.899]) was a significant mediator, whereas future focus was not a significant mediator (point estimate = −.055, bias-corrected 95% confidence interval [−0.283, 0.070]). Two, we used a two-step mediation test, as we did to test Hypothesis 2, above, but reversed the order of the mediators, such that state arousal preceded future focus. The results of this model showed no support for this reversed sequential model (point estimate = −.040, bias-corrected 95% confidence interval = [−0.161, 0.065]). Our hypothesized sequential model therefore was a better fit to the data than the alternative models.

4.2.2.6. Did mindfulness differentially affect motivation versus performance?. We compared whether condition assignment differentially affected task motivation versus task performance. First we computed standardized scores of the task motivation and task performance variables. Then a General Linear Model test computed an interaction term between the predictor (mindfulness condition versus the reading and writing comparison conditions collapsed together) and the within-subjects factor, which reflected the outcomes (motivation versus performance). The interaction test showed they were significantly different from one another ($F(1, 197) = 15.573$, $p < 0.001$). This result supported Hypothesis 3b, that mindfulness would have a stronger negative effect on task motivation than on task performance.

4.3. Discussion

This experiment found once again that mindfulness weakened task motivation (supporting H1). It also found that mindfulness did not impair behavioral task performance – in fact, mindfulness partially improved task performance – and thus this finding refuted H3a. Comparing the strength of the two effects, the mindfulness manipulation had a stronger deleterious effect on task motivation than on task performance (supporting H3b), where it had a beneficial effect. The negative effect of the mindfulness manipulation on motivation was serially mediated by reductions in future focus and arousal (supporting H2).

That the writing comparison condition had participants write about their activities during the past month may account for why it reduced future focus, similar to the mindfulness condition. We are reluctant to conclude much on the basis of the benefits of state mindfulness on task performance, as we did not hypothesize that effect and this experiment was the only one to find it. A meta-analysis (reported below) also showed that mindfulness manipulations did not affect performance.

In addition to the focused breathing meditations used in Experiments 1 and 2, Experiment 3 showed that body scan meditation can also decrease task motivation. This result suggests that the demotivating effect of state mindfulness is unlikely to be an artifact of the specific type of meditation used to induce mindfulness.

5. Experiment 4

Experiment 4 again tested the effect of state mindfulness on task motivation (H1) and made several improvements on the preceding experiments' designs. In the preceding experiments, participants did not have an incentive to perform well. Given that financial incentives are positively correlated with how hard people work (Jenkins, Mitra, Gupta, & Shaw, 1998) and given our aim to test mindfulness's effect on motivation and performance, we included a financial incentive as a strong test of its possible effects.

Experiment 4 again assessed motivation and a behavioral measure of task performance, which consisted of copying text. The two outcome measures allowed us to test whether state mindfulness has a stronger (predicted negative) effect on task motivation than performance (H3b). As in Experiment 3, Experiment 4 investigated the mediating path of reduced future focus and reduced state arousal in the demotivating effect of state mindfulness (H2).

We shortened both the induction and performance task durations, while keeping the induction condition duration in line with prior mindfulness tasks (Mrazek et al., 2012). These changes aimed to address the alternative explanation that state mindfulness may have been too short-lived in Experiments 2 and 3 to influence performance on comparatively longer tasks. We thus sought to create a sensitive setting to increase the odds of being able to detect a negative overall effect of mindfulness on performance (H3a) if it were to exist.

5.1. Method

5.1.1. Participants

One hundred and forty nine Amazon Mechanical Turk workers whose location was set to the United States took part in exchange for $0.90 and a chance to win one of three $10 bonuses. We aimed to use two versions of mindfulness inductions, varying by condition, but the second mindfulness task wholesale failed to induce mindfulness as revealed by the manipulation checks. Therefore the data from these participants (n = 52) were not used in hypothesis testing analyses.[3]

[3] In the exploratory third condition, participants listened to an educational speech, which sought to induce a Western variant of mindfulness (Weick & Putnam, 2006). This method was used because of claims that tasks other than meditation can induce mindfulness (Grant, 2015) and that learning can orient attention to the present moment (Langer & Moldoveanu, 2000). However, this western mindfulness condition failed both manipulation checks (*ps* > .36).

Seven additional participants were removed because they did not complete motivation ratings or the text copying task. The remaining 90 participants (67 female, M_{age} = 40.06 years, SD = 13.27, $range_{age}$ = 20–69) were included in analyses.

5.1.2. Procedure

Participants were informed that they would take part in a study on "Tasks and Temporal Feelings." Participants were randomly assigned by the survey software to listen to a focused breathing mindfulness meditation or mind-wandering comparison induction. Participants then indicated how motivated they were to engage in a text copying task. Next, they retyped as much as they could from a passage we gave them. Afterwards, participants reported their future focus and state arousal at the end of the induction task.

5.1.2.1. Mindfulness meditation manipulation and mind-wandering comparison condition.. Participants listened to 8-min shortened versions of the focused breathing mindfulness meditation or mind-wandering recordings described in Experiment 1.

5.1.2.2. Task. Participants were told that they would be asked to copy text from the legal terms and conditions of a software application and that some people have reported that this is an unpleasant task. They were told that the top 25% of performers would be entered into a lottery for one of three $10 bonuses.

5.1.2.3. Task motivation. Participants rated their motivation using the same motivation and intended persistence (in time) items as in Experiments 1 and 2. Responses to these two items were standardized and then summed to create the composite measure of motivation (r = .396, p < .001).

5.1.2.4. Task performance. Participants were presented with an excerpt from "Cookies and Other Technologies" (iTunes Privacy Policy; Apple Inc., 2014). Participants were instructed to retype as much of the text passage as possible in two minutes, after which the software automatically advanced to the next page. Number of words typed and errors were the performance measures. We also subtracted errors from words typed, which formed our composite performance measure.

5.1.2.5. Future focus. As in Experiment 3, participants next reported the extent to which they had been absorbed in the future, their thoughts were focused on the future, and they were mostly thinking about the future at the end of the first task they had done (all items: 1 = very slightly or not at all; 5 = extremely). Responses were averaged (α = .944).

5.1.2.6. State arousal. As in Experiment 3, participants reported how they had been feeling at the end of the manipulation task (alert, active, excited, interested, and lethargic; 1 = very slightly or not at all; 5 = extremely). The first four were indicators of high arousal, whereas the last indicated low arousal (Russell, 1980; 2009) and was reverse-coded. Responses were averaged (α = .733).[4]

5.1.2.7. Manipulation checks. As in Experiment 3, participants answered two three-item manipulation checks with regard to how they felt at the end of the manipulation (1 = very slightly or not at all; 5 = extremely). One set of items measured physiological awareness. Participants reported how much they were focused on their breathing, focused on the physical sensations of their breath, and in touch with their body (α = .908). The other set measured present moment focus. Participants reported how much they were absorbed in the present moment, their thoughts were focused on the present moment, and they were mostly thinking about the present moment (α = .935). Responses were averaged.

5.2. Results

5.2.1. Manipulation checks

Participants in the mindfulness condition reported greater physiological awareness (M = 3.63, SD = 0.78) than in the comparison condition (M = 2.56, SD = 1.25), $t(88)$ = 4.949, p < .001, d = 1.02. Participants in the mindfulness condition reported greater temporal focus on the present moment (M = 3.71, SD = 0.80) than in the comparison condition (M = 3.06, SD = 1.14), $t(88)$ = 3.182, p < .001, d = 0.66. These results indicated that a state of mindfulness was successfully induced.

5.2.2. Hypothesis tests

5.2.2.1. Task motivation. Participants in the mindfulness condition were less motivated to engage in the task (M = −0.33, SD = 1.66) compared to participants in the mind-wandering comparison condition (M = 0.43, SD = 1.60), $t(88)$ = 2.191, p = .031, d = 0.47. This result supported Hypothesis 1, which predicted that state mindfulness would reduce task motivation.

5.2.2.2. Task performance. There were no conditional differences in performance, measured using number of words, errors, or the composite measure of the two. Participants in the mindfulness condition (M = 59.14, SD = 26.97) and comparison condition (M = 55.92, SD = 22.68) copied a similar number of words, $t(88)$ = 0.599, p = .550, and made a similar number of errors (mindfulness: M = 3.00, SD = 1.87; comparison condition M = 2.64, SD = 1.68), $t(88)$ = 0.944, p = .348. Participants in the mindfulness condition (M = 56.08, SD = 26.60) and in the comparison condition (M = 53.46, SD = 22.59) also had similar overall performance on the composite measure, $t(88)$ = 0.493, p = .623. These results failed to support Hypothesis 3a, that state mindfulness would impair task performance.

5.2.2.3. Future focus. Participants in the mindfulness condition (M = 1.90, SD = 0.97) reported being less focused on the future than in the comparison condition (M = 2.71, SD = 1.26), $t(88)$ = 3.451, p = .001, d = 0.72.

5.2.2.4. State arousal. Participants in the mindfulness condition (M = 2.69, SD = 0.72) reported feeling less aroused than in the comparison condition (M = 3.08, SD = 0.73), $t(88)$ = 2.478, p = .015, d = 0.53.

5.2.2.5. Mediation analysis. A two-step bootstrapping mediation test (Hayes et al., 2011) supported a sequential model of mindfulness meditation condition → reduced future focus → reduced arousal → reduced task motivation (point estimate = −.105, bias-corrected 95%

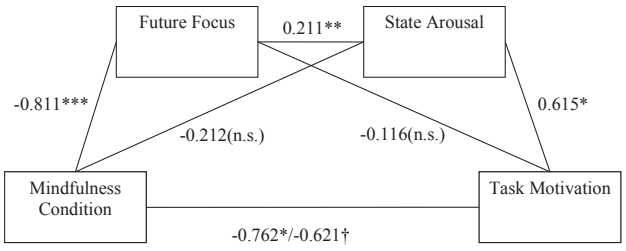

Fig. 5. Future focus and state arousal sequentially mediate the effect of mindfulness meditation on task motivation in Experiment 4. The values are based on unstandardized regression coefficients. $^{\dagger}p$ < .10, $^{*}p$ < .05, $^{**}p$ < .01, $^{***}p$ < .001.

[4] We also collected five pleasant and five unpleasant emotion items to see whether affective valence mediated the effect of mindfulness on motivation. It didn't. See the supplementary materials for methods and results.

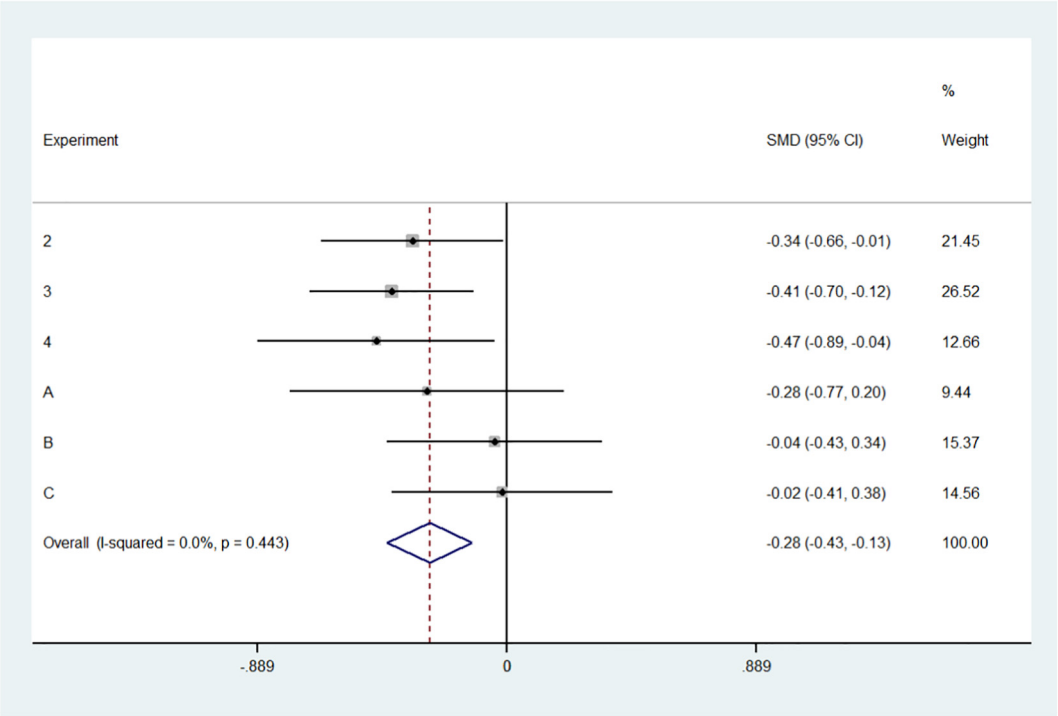

Fig. 6. Meta-analysis of the effect of mindfulness meditation on composite measures of task motivation.

confidence interval = [−0.270, −0.008]), Fig. 5. This result supported Hypothesis 2, that future focus and state arousal would serially mediate the demotivating effect of mindfulness.

We also tested the same two alternative mediation models as in Experiment 3. One, we entered the two putative mediators into a simultaneous bootstrapping mediation test (Preacher & Hayes, 2008). The results showed that state arousal (point estimate = −.238, bias-corrected 95% confidence interval [−0.631, −0.030]) was a significant mediator, whereas future focus was not (point estimate = .095, bias-corrected 95% confidence interval [−0.149, 0.453]). Two, we used a two-step mediation test, as we did to test Hypothesis 2, above, but reversed the order of the mediators, such that state arousal preceded future focus. The results of this model showed no support for this reversed sequential model (point estimate = .022, bias-corrected 95% confidence interval = [−0.517, 0.107]). Our hypothesized sequential model therefore was a better fit to the data than the alternative models.

5.2.2.6. Did mindfulness differentially affect motivation versus performance?. We compared the extent to which the mindfulness condition had a negative effect on task motivation versus on task performance. First we computed standardized scores of the composite task motivation and task performance variables. Then a General Linear Model test computed an interaction term between the predictor and the within-subjects factor, which reflected the outcomes (motivation versus performance). The interaction test showed a weak difference ($F(1, 88) = 3.063$, $p = 0.084$). This result only somewhat supported Hypothesis 3b, that state mindfulness would have a stronger negative effect on task motivation than performance.

5.3. Discussion

Experiment 4 replicated the motivation findings of Experiments 1–3 (supporting H1). It did so using a financial performance incentive, a shorter mindfulness induction, and a shorter performance task. This result is notable given that the mindfulness induction in this experiment was only 8 min long (similar to Mrazek et al., 2012). State mindfulness did not impair behavioral task performance, as seen in Experiments 2 and 3, even though it did reduce motivation towards the same task. The effect of state mindfulness was however only moderately larger on task motivation than performance (relevant to H3b). Experiment 4 again found that the demotivating effect of state mindfulness was serially mediated by reductions in future focus and arousal (supporting H2).

6. Meta-Analyses

We emptied our file drawer and conducted two meta-analyses to allow for the clearest test of the overall effects of state mindfulness on task motivation and performance. Methodological and data details of the meta-analyses and file-drawer experiments are in the Supplementary Online Material. Meta-analyses included both reported and file-drawer experiments.

One meta-analysis concerned the effects of the mindfulness condition on task motivation across the six experiments (n = 745) we conducted which also measured performance. The weighted average of the standardized mean difference (SMD, which is an aggregation of *d*, Cohen, 1988) effect sizes of the mindfulness condition on composite task motivation measures was −0.276, 95% confidence interval = (−0.426, −0.126), test of SMD = 0: $z = 3.60$, $p < 0.001$, Fig. 6. These results supported Hypothesis 1, that the mindfulness meditation condition would reduce task motivation.

The other meta-analysis concerned the effects of the mindfulness condition on task performance across the 14 experiments (n = 1588) we conducted which measured performance. The weighted average of the SMD effect sizes of mindfulness condition on task performance was 0.074, 95% confidence interval = (−0.029, 0.177), test of SMD = 0: $z = 1.41$, $p = 0.159$, Fig. 7.[5] These results indicated that the

[5] When only experiments that contained composite motivation questions were included in the *meta*-analysis, the weighted average of the SMD for the effect of mindfulness condition on task performance measures was 0.090, 95% confidence interval = (-.065, .244), test of SMD = 0: $z = 1.14$, $p = 0.255$.

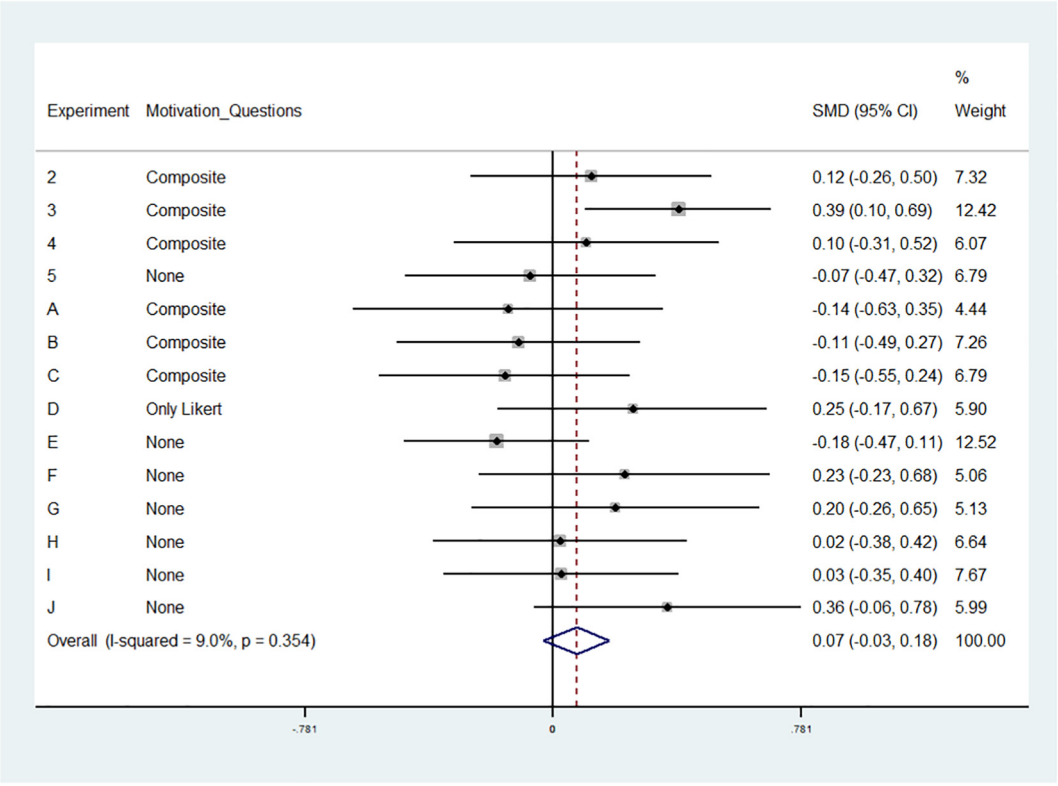

Fig. 7. Meta-analysis of the effect of mindfulness meditation on task performance.

mindfulness condition did not harm task performance (failing to support Hypothesis 3a).

For task motivation, the 95% confidence interval for task motivation is below and does not include 0 whereas for task performance the 95% confidence interval does include 0. This pattern supports Hypothesis 3b, which states that the mindfulness meditation condition would have a stronger negative effect on task motivation than on task performance. In sum, mindfulness meditation impaired task motivation but not performance.

7. Experiment 5

The meta-analyses confirmed the overall conclusion that state mindfulness reduces task motivation but does not affect task performance. Why those two outcomes diverge remains unaddressed. While it is usually theoretically uninteresting to interpret an indirect effect in the absence of a statistically significant main effect, the current diverging effects are unusual insofar as they deviate from what would be expected based on existing literature that shows that motivation and performance are tightly linked (Ajzen, 1991; Locke & Latham, 2006; Vroom, 1964). Therefore, Experiment 5 tested the existence of suppressor variables (Hayes, 2009; MacKinnon, Krull, & Lockwood, 2000; Shrout & Bolger, 2002) that could help explain why mindfulness fails to impair task performance despite reducing task motivation. The suppressor variable we centered on is reduced concerns about life stressors.

Mindfulness is an excellent way to mentally disengage from the problems, concerns, uncertainties, and unfinished business that can preoccupy the mind (Mrazek, Franklin, Phillips, Baird, & Schooler, 2013; Hülsheger et al., 2014; 2015; Hülsheger, Walkowiak, & Thommes, in press; Sutcliffe et al., 2016). To the extent that people can let go of distracting ruminative thoughts, they should be able to focus on current tasks, thereby suggesting a facilitating effect on performance. This rationale is supported by findings that a brief exercise of mindfulness, compared to a neutral task, can improve performance after it had been weakened by a prior task (Friese, Messner, & Schaffner, 2012; see also Kudesia, 2017). Hence, we predicted that mindfulness would allow people to mentally detach from life stressors, which further would enable them to focus on the task. In the aggregate, then, these expectations amount to a sequential mediation pattern, whereby mindfulness reduces concerns about life stressors, which increases task focus, which improves task performance (Hypothesis 4). Given the reduced motivation effect shown in all the previous studies (not measured here), the combined effect would be no effect of mindfulness on task performance.

7.1. Method

7.1.1. Participants

One hundred and one Amazon Mechanical Turk workers whose location was set to the United States took part in exchange for $1.35 each. Two participants' data were not able to be analyzed because they did not complete the brainstorming task. The remaining 99 participants (49 female, M_{age} = 38.45 years, SD = 13.07, $range_{age}$ = 19–73) were included in analyses.

7.1.2. Procedure

Participants were informed that they would take part in a study on "Tasks, Feelings, and Time." Participants were randomly assigned by the survey software to listen to a focused breathing mindfulness meditation recording or mind-wandering comparison induction. Participants subsequently engaged in a brainstorming task.[6]

[6] We also collected a 30-item state self-control capacity measure (α = .983: 1 = very slightly or not at all; 10 = extremely) which combined two validated scales (full scale from Ciarocco, Twenge, Muraven, & Tice, 2007; 5 items from Yam, Chen, & Reynolds, 2014) before the brainstorming task. This measure was not differentiated across conditions (t (97) = 1.180, p = .241) and did not mediate the relationship between mindfulness and task performance as the only mediator in a bootstrapping test (estimate = .139, bias-corrected 95% confidence interval = [-0.062, 0.512]). Neither of the prospective two-step sequential mediation tests that included state self-control capacity were significant,

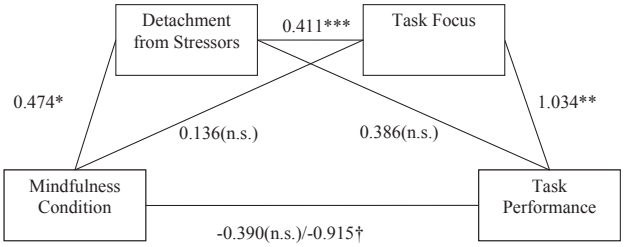

Fig. 8. Detachment from stressors and subsequent task focus sequentially mediate the null effect of mindfulness meditation on task performance (defined as number of uses) in Experiment 5. The values are based on unstandardized regression coefficients. $^{\dagger}p < .10$, $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$.

Next, they reported how much the recording enabled them to mentally detach from stressors. Afterwards, participants reported how much their minds were focused on the brainstorming task.

7.1.2.1. Mindfulness meditation manipulation and mind-wandering comparison condition.. Participants listened to the same 8-min shortened versions of the focused breathing mindfulness meditation or mind-wandering recordings used in Experiment 4.

7.1.2.2. Task performance. Participants were instructed to think of as many creative uses for a brick as possible. After two minutes, the survey software automatically moved to the next page. As in prior research (Lu, Hafenbrack, et al., 2017; Ronay, Greenaway, Anicich, & Galinsky, 2012), the number of uses generated was a measure of task performance. A second measure of task performance used a coding scheme by Vohs, Redden, and Rahinel (2013). Two independent raters, blind to hypotheses and conditions, rated each use on creativity using a 3-point scale (1 = low; 2 = medium; 3 = high). The ratings were summed within raters and averaged across raters ($\alpha = .944$, $r = .974$, $p < .001$) to form an overall creativity measure of task performance.[7]

7.1.2.3. Detachment from stressors. Detachment from stressors was measured with a 16-item scale (Appendix B). It included the eight items of the relaxation and detachment subscales of the Recovery Experience Questionnaire (Sonnentag & Fritz, 2007) adapted to be about how they felt during the recording (e.g., "The recording was a relaxing thing."). It also included eight items that rephrased some of the detachment items from the Recovery Experience Questionnaire scale to frame them in terms of problems, obligations, and concerns (1 = very slightly or not at all; 5 = extremely; sample item, "The recording was a break from the problems in my life"). Responses were averaged ($\alpha = .977$).

7.1.2.4. Task focus. Participants next completed six rating items (adapted from Mrazek et al. (2013)). Three items directly measured task focus: the extent to which they were able to focus completely on, were totally absorbed in, and were totally immersed in the brainstorming task. The other three items measured task-unrelated thought and therefore were reverse-scored: the extent to which their mind wandered away from the brainstorming task, they were distracted from the brainstorming task by unrelated thoughts, and they daydreamed about something else during the brainstorming task. Responses were given on a five-point scale (1 = very slightly or not at all; 5 = extremely) and were averaged ($\alpha = .906$).

7.2. Results

7.2.1. Hypothesis tests

7.2.1.1. Task performance. There was no conditional effect of mindfulness on creative performance. Participants in the mindfulness condition ($M = 5.87$, $SD = 2.48$) and the comparison condition ($M = 6.26$, $SD = 3.05$) produced a similar number of uses, $t(97) = 0.701$, $p = .485$. Additionally, being in the mindfulness condition ($M = 7.98$, $SD = 4.24$) and in the comparison condition ($M = 7.69$, $SD = 3.73$) led to equivalent levels of overall creativity, $t(97) = 0.357$, $p = .722$.

7.2.1.2. Detachment from stressors. Participants in the mindfulness condition reported detaching from stressors ($M = 3.84$, $SD = 0.91$) more so than did participants in the comparison condition ($M = 3.36$, $SD = 1.00$), $t(97) = 2.472$, $p = .015$, $d = 0.50$.

7.2.1.3. Task focus. Participants in the mindfulness condition ($M = 4.12$, $SD = 0.73$) reported somewhat greater task focus than in the comparison condition ($M = 3.79$, $SD = 1.03$), $t(97) = 1.861$, $p = .066$, $d = 0.37$.

7.2.1.4. Mediation analysis. We report mediation results first using the number of uses generated as the dependent variable. A two-step bootstrapping mediation test (Hayes et al., 2011) supported a sequential model of mindfulness meditation condition → increased detachment from stressors → increased task focus → increased number of uses (point estimate = .201, bias-corrected 95% confidence interval = [0.028, 0.485]), Fig. 8. This result supported Hypothesis 4, that detachment from stressors and enhanced task focus would serially mediate the relationship between mindfulness and task performance.

We tested the same two alternative mediation models as in Experiments 3 and 4. One, we entered the two putative mediators into a simultaneous bootstrapping mediation test (Preacher & Hayes, 2008). The results showed that task focus (point estimate = .342, bias-corrected 95% confidence interval [0.027, 0.926]) was a significant mediator, whereas detachment from stressors was not (point estimate = .183, bias-corrected 95% confidence interval [−0.036, 0.630]). Two, we used a two-step mediation test, as we did to test Hypothesis 4, above, but reversed the order of the mediators, such that task focus preceded detachment from stressors. The results of this model showed no support for this reversed sequential model (point estimate = .061, bias-corrected 95% confidence interval = [−0.021, 0.228]). Our hypothesized sequential model therefore was a better fit to the data than the alternative models.

Similar results were found for overall creativity as the dependent variable. A two-step bootstrapping mediation test (Hayes et al., 2011) supported a sequential model of mindfulness meditation condition → increased detachment from stressors → increased task focus → improved creativity (point estimate = .300, bias-corrected 95% confidence interval = [0.043, 0.712]), Fig. 9. This result also supported Hypothesis 4, that detachment from stressors and enhanced task focus would serially mediate the relationship between mindfulness and task performance.

We tested the same two alternative mediation models again. One, we entered the two putative mediators into a simultaneous bootstrapping mediation test (Preacher & Hayes, 2008). The results showed that task focus (point estimate = .510, bias-corrected 95% confidence interval [0.018, 1.312]) was a significant mediator, whereas detachment from stressors was not (point estimate = .136, bias-corrected 95% confidence interval [−0.247, 0.747]). Two, we used a two-step mediation test, as we did to test Hypothesis 4, above, but reversed the order of the mediators, such that task focus preceded detachment from stressors. The results of this model showed no support for this reversed

(*footnote continued*)
not with detachment from stressors as step one and state self-control capacity as step two (estimate = .066, bias-corrected 95% confidence interval = [-0.057, 0.264]) nor with self regulation as step one and task focus as step two (estimate = .079, bias-corrected 95% confidence interval = [-0.051, 0.303]).

[7] We included the second task performance measure in the *meta*-analysis, although including the first task performance measure instead did not change the significance pattern of that *meta*-analysis.

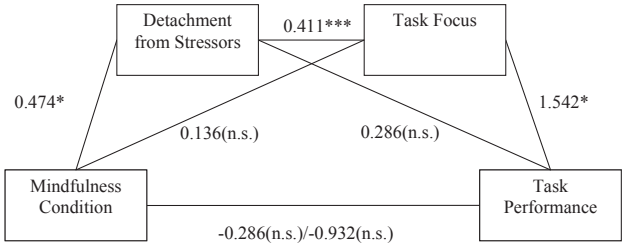

Fig. 9. Detachment from stressors and subsequent task focus sequentially mediate the null effect of mindfulness meditation on task performance (defined as overall creativity) in Experiment 5. The values are based on unstandardized regression coefficients. $^{\dagger}p < .10$, $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$.

sequential model (point estimate = .045, bias-corrected 95% confidence interval = [−0.098, 0.248]). Our hypothesized sequential model therefore was a better fit to the data than the alternative models.

According to statistical experts, when the absolute value of the c path (the effect of the independent variable on the dependent variable without accounting for the mediators) is smaller than the absolute value of the c' path (the residual effect of the independent variable on the dependent variable when accounting for the mediators), the mediators are likely to be suppressing the relationship between the independent and dependent variables (MacKinnon et al., 2000, p. 177). That was the case in this experiment for both task performance dependent variables. For the number of uses generated, the absolute value of the c′ path effect (point estimate = −.915, $p = .088$), was larger than that of the c path effect (point estimate = −.390, $p = .485$). For the overall creativity measure, the absolute value of the c' path effect (point estimate = −.932, $p = .233$) was also larger than that of the c path effect (point estimate = −.286, $p = .722$). That the effect of mindfulness on number of uses generated is negative and becomes marginally significant only when the mediators are accounted for (i.e., the c′ path) suggests that mindfulness might somewhat impair task performance if not for the competing influences of detachment from stressors and increased task focus.

7.3. Discussion

Experiment 5 tested why state mindfulness did not reduce task performance (documented again in this study), despite reducing motivation. Experiment 5 found evidence of two mediators of that (null) effect. In support of H4, state mindfulness allowed people to mentally disengage from their current stressors, which improved task focus. The mediators are conceptually and empirically related to improved task performance. It seems that several of state mindfulness's effects cancel each other out in the aggregate.

8. General discussion

Five experiments and two meta-analyses tested whether state mindfulness would influence task motivation and task performance. The results converged to indicate that state mindfulness impaired motivation to engage in prospective tasks (supporting H1), which was mediated sequentially by reductions in future focus and state arousal (supporting H2). State mindfulness did not impair behavioral performance on the same tasks to a similar degree (supporting H3b but not H3a). In fact, there was no significant negative effect of the mindfulness condition on task performance in any of the 14 experiments we conducted. One reason why mindfulness does not impair performance despite reducing motivation is that mindfulness also decreases concerns about stressors, which then increases task focus, which bolsters performance (H4).

Multiple types of meditation inductions (focused breathing and body scan), comparison conditions (mind-wandering, writing, and reading), tasks (anagrams, cover letter editing, text copying, and brainstorming), and participant samples (U.S. general population and French working young adults) were used to empirically examine these relationships. These changes in design features, participant samples, and tasks add to our confidence in the results. As task performance dependent measures, we studied actual behaviors and not just self-reported behavioral intentions. If we had designed our studies solely with self-reported behavioral intentions, we likely would have come to different conclusions about the role of mindfulness and performance. Thus, our findings demonstrate the importance of measuring actual behavioral dependent variables in the behavioral sciences (Baumeister, Vohs, & Funder, 2007).

8.1. Theoretical contributions

The present research contributes to the literature in several ways. First, it extends the nascent management literature on mindfulness by providing the first empirical demonstration that state mindfulness reduces motivation. Good et al. (2016) noted that the relationship between mindfulness and motivation is an important open question and that a state of mindfulness could be at odds with feeling motivated to achieve a goal. This work is an answer to that call.

Our findings may suggest that mindfulness can have negative consequences for a major organizationally-valued construct, motivation. Under that interpretation, the present findings are a rarity, as there are scant few investigations showing that mindfulness has negative consequences of any kind (Grapendorf et al., 2017; Stanley et al., 2006; Wilson et al., 2015). In that way, we contribute to a broader theme on how constructs widely thought to bring about desirable effects, such as self affirmation and multi-cultural experiences, nevertheless also can exert undesirable consequences (Lu, Quoidbach, et al., 2017; Vohs, Park, & Schmeichel, 2013).

Yet another interpretation of reduced motivation after mindfulness centers on the tasks used in the current studies. The current experiments presented people with somewhat tedious tasks (although not necessarily unpleasant; see Experiment 2), ones that lack substantial meaning for our participants. While many workplace tasks are indeed tedious, even the most monotonous tasks in the workplace can often occur in the context of some larger purpose, such as contributing to the organization's goals or being a source of income (and hence resources and stability) for oneself or one's family. While not tested here, it is possible that being in a mindful state made people realize how unimportant the experimental tasks were to them. That notion suggests that in other circumstances, mindfulness may increase motivation towards tasks that align with employees' personal values or about which employees are passionate. Research testing whether mindfulness enhances motivation on tasks with inherent interest or which people are encouraged to see as meaningful would be welcome.

Second, our results advance current understandings in the emotion literature regarding subjective arousal. The present findings show that even a single session of mindfulness meditation can reduce subjective state arousal. This pattern may seem to contrast with findings on trait mindfulness. Three studies showed that trait mindfulness was positively associated with scores on the Subjective Vitality Scale (Ryan & Frederick, 1997), which measures how much people felt energized and vital over the past week or month (Brown & Ryan, 2003). Yet another study found a positive correlation between the frequency with which employees reported taking work breaks to meditate and subjective vitality scores (Fritz, Lam, & Spreitzer, 2011).

Research on the effects and correlates of meditation (for a review, see Hölzel et al., 2011) support a link between mindfulness and low levels of physiological activation. An eight-week mindfulness training program can reduce self-reported pre-sleep cognitive arousal (Cincotta, Gehrman, Gooneratne, & Baime, 2011). An eight-week mindfulness training program reduced heart rate variability (Wolever et al., 2012) and four sessions of mindfulness meditation can reduce heart rate

(Zeidan, Johnson, Gordon, & Goolkasian, 2010). An eight-week mindfulness training program among cancer patients reduced diastolic blood pressure and cortisol levels (Carlson, Speca, Faris, & Patel, 2007). Experienced meditators have a lower breathing rate than meditation novices (Lazar et al., 2005) and lowered oxygen and carbon dioxide consumption was found after an eight-day stay of meditation (Young & Taylor, 1998). If such physiological activation cues occur after a single induction and influence how motivated people feel, these findings provide another explanation for why mindfulness impaired motivation but not performance in the present research. Mindfulness meditation may reduce arousal (subjective and physiological) during and immediately after the meditation, and in doing so conserves energy to be expended later, contributing to task performance, as well as feelings of renewal and vitality.

8.2. Extensions, implications, and applications

To what extent is it a problem for organizations that mindfulness reduces motivation if it does not impair performance? Although participants in our experiments were directed to perform their tasks, employees in the workplace often do have a choice of what to work on (Gardner, Dunham, Cummings, & Pierce, 1987, 1989). If employees are unmotivated to attempt certain tasks, they may procrastinate on or avoid them.

Motivation helps determine how people choose to spend their time. While we situated the findings in the context of workplace tasks, we see them as being meaningful for a host of contexts, and outside the workplace people have much more freedom to choose how to spend their time. Even within the workplace, choice of how much time to devote to projects, whether to elevate projects in priority or procrastinate until the last minute to complete them, are ways that motivation determines outcomes. On what people choose to spend their time determines, in part, their performance and expertise in an area. For instance, women can perform as well as men on many, if not most, STEM-related skills. Their paucity in STEM fields is now understood to be much more of a function of their interest and motivation to engage in them, not their abilities (Ceci, Williams, & Barnett, 2009). The burgeoning area of research on interests (Rounds & Su, 2014; Su, Rounds, & Armstrong, 2009) and on deliberate practice (Ericsson, Krampe, & Tesch-Römer, 1993) attests to the value and power of motivation for long-term outcomes.

Whether mindfulness exercises by people who have been practicing mindfulness consistently for a while would reduce motivation remains an open question. On the one hand, people with extended experience with mindfulness might not show the decrement in motivation that we observed. That could be because the kind of people who stick with long-term mental control exercises may be different kinds of people than those who do not, thereby amounting to a self-selection or third-variable effect. That could also be because those who undergo meditation training might become more motivated to perform their work, owing to the increases in physical and mental well-being associated with such programs (Brown, Ryan, & Creswell, 2007; Keng, Smoski, & Robins, 2011).

On the other hand, people with extended mindfulness practice may well show a demotivating effect, as what we observed in the current studies on state mindfulness. People who have engaged in some form of mindfulness training probably self-induce state mindfulness when facing stress, arguably more so than people without mindfulness training. In those cases, our findings suggest their task motivation immediately thereafter may be impaired. Research testing motivation among people with extensive mindfulness experience just after engaging in a session of mindfulness would richly inform ours.

Our findings could have several pragmatic contributions. If employees practice mindfulness before or during work, they may become demotivated to attempt subsequent work tasks, so employees may want to consider the timing of their meditation efforts in order to reap the benefits of mindfulness without paying a motivational price. It may also behoove organizers of mindfulness programs to consider the time of day at which meditations take place, keeping in mind how the psychological state induced by meditation may impact motivation towards subsequent work demands and other valued outcomes.

9. Conclusion

In contrast to the promise that “mindfulness…is now suggested as a cure for essentially every ailment” (North, 2014, p. 1; see also Grant, 2015; Joiner, 2017), the present research reveals a nuanced picture. Mindfulness may well provide mental health benefits, such as by enabling people to detach from the stress of everyday concerns (as seen here). In doing so, though, mindfulness may hamper the desire to tackle everyday concerns, despite leaving eventual performance intact. In short, mindfulness seems to exert disparate and sometimes conflicting effects on what people want to do versus how well they can perform.

10. Author note

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Appendix A

Anagram Word Puzzles Used in Experiment 3

Cafe book → facebook
Teaching → cheating
Crouton → contour
Percussion → supersonic
Stationed → antidotes
Continued → unnoticed
Circle → cleric
Impressive → permissive
Monday → dynamo OR daymon OR nomady
San diego → diagnose OR agonized

Note: Each anagram word puzzle was accompanied by the instruction “(please find a one-word anagram)”.

Appendix B

Detachment from Stressors Scale Items Used in Experiment 5

During the recording, I distanced myself from work.
During the recording, I forgot about work.
The recording was a break from the demands of work.
During the recording, I didn't think about work at all.
During the recording, I kicked back and relaxed.
The recording was a relaxing thing.
During the recording, I used the time to relax.
The recording was a leisure time.
During the recording, I distanced myself from obligations.
During the recording, I forgot about my obligations.
During the recording, I distanced myself from my worries and concerns.
During the recording, I didn't think about things I need to do.
The recording was a break from the demands of my daily life.
During the recording, I distanced myself from my problems.
The recording was a break from the concerns of my daily life.
The recording was a break from the problems in my life.

Note: Each statement was preceded by the prompt "How much do you agree with the following statement?"

Appendix C. Supplementary material

Supplementary data associated with this article can be found, in the online version, at https://doi.org/10.1016/j.obhdp.2018.05.001.

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