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## When Traits Match States: Examining the Associations between Self-Report Trait and State Mindfulness following a State Mindfulness Induction

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### Abstract

Previous research has found inconsistent relationships between trait mindfulness and state mindfulness. To extend previous research, we sought to examine the unique associations between self-report trait mindfulness and state mindfulness by levels of meditation experience (meditation-naïve vs. meditation-experienced) and by mindfulness induction (experimentally induced mindful state vs. control group). We recruited 299 college students (93 with previous mindfulness meditation experience) to participate in an experiment that involved the assessment of five facets of trait mindfulness (among other constructs), followed by a mindfulness induction (vs. control), followed by the assessment of state mindfulness of body and mind. Correlational analyses revealed limited associations between trait mindfulness facets and facets of state mindfulness, and demonstrated that a brief mindfulness exercise focused on bodily sensations and the breath elicited higher state mindfulness of body but not state mindfulness of mind. We found significant interactions such that individuals with previous meditation experience and higher scores on the observing facet of trait mindfulness had the highest levels of state mindfulness of body and mind. Among individuals with meditation experience, the strengths of the associations between observing trait mindfulness and the state mindfulness facets increased with frequency of meditation practice. Some other interactions ran counter to expectations. Overall, the relatively

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#### Compliance with Ethical Standards

Informed Consent: Informed consent was obtained from all individual participants included in the present study.

#### Author Contributions:

AJB: designed and executed the study, conceptualized the research questions, conducted the analyses, drafted the introduction, method, statistical analyses, and results sections, and created the tables and figures. ADW: drafted part of the method and discussion sections. MRP: assisted with analysis, interpretation of the data, and drafted parts of the discussion section. KW: wrote parts of discussion sections of the first draft and edited the other sections of the first draft. All authors contributed to and approved of the final manuscript.

weak associations between trait and state mindfulness demonstrates the need to improve our operationalizations of mindfulness, advance our understanding of how to best cultivate mindfulness, and reappraise the ways in which mindfulness can manifest as a state and as a trait.

## Keywords

Trait Mindfulness; State Mindfulness; Mindfulness Induction; Mindfulness Experience; College Students

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## Introduction

Among clinical populations, mindfulness based interventions (MBIs; e.g., Mindfulness Based Stress Reduction, MBSR: Kabat-Zinn, 1990; Mindfulness Based Cognitive Therapy, MBCT: Segal, Williams, & Teasdale, 2002; Mindfulness Based Relapse Prevention, MBRP: Witkiewitz, Marlatt, & Walker, 2005) have been shown to be efficacious at reducing targeted outcomes (e.g., substance use, Chiesa & Serretti, 2013; stress, Grossman, Niemann, Schmidt, & Walach, 2004; mental health symptoms; Hofmann, Sawyer, Witt, & Oh, 2010). Most MBIs have an explicit goal of cultivating mindfulness, defined as paying attention in the present moment with awareness and nonjudgment (Bishop et al., 2004; Kabat-Zinn, 1994), through mindfulness meditation practices. Mindfulness has been described and measured within Western culture as a state of being (Brown & Ryan, 2003; Lau et al., 2006) and has also been characterized as a trait or disposition (Baer, Smith, Hopkins, Krietemeyer, & Toney 2006). Some studies have found support for increases in state mindfulness following MBIs (Bieling et al., 2012; Kiken et al., 2015; Lau et al., 2006), yet, findings have been mixed as to whether MBIs promote higher trait mindfulness (also referred to as dispositional mindfulness) after treatment (Bowen et al., 2009; Carmody & Baer, 2008; Manuel, Somohano, & Bowen, 2016). For example, Manuel et al. (2016) found no significant relationships between type (formal versus informal), frequency (days/week), and duration (minutes) of mindfulness practice on either the total or subscale scores of the Five Facet Mindfulness Questionnaire (FFMQ; Baer et al., 2006) in a clinical sample of adults following MBRP for substance use. There have also been inconsistent findings regarding the relationship between trait mindfulness and state mindfulness (Tanay & Bernstein, 2013; Thompson & Waltz, 2007).

In order to test whether trait and state mindfulness are overlapping constructs, Thompson and Waltz (2007) examined whether trait mindfulness (i.e., facets of the FFMQ) and mindfulness during meditation (i.e., state mindfulness) correlated among subsamples based on meditation experience. Overall, the researchers found little to no relationship between state mindfulness and trait mindfulness. Specifically, the only significant correlation was found between the FFMQ observing subscale and state mindfulness, and only among meditation-naïve individuals.

In a psychometric evaluation of the State Mindfulness Scale (SMS), Tanay and Bernstein (2013) also found inconsistent relationships between trait mindfulness facets (measured using the FFMQ) and state mindfulness facets (i.e., state mindfulness of mind and body) of the SMS. Specifically, the researchers found that the SMS total and subscale scores were

significantly positively related to FFMQ observing subscale scores ( $r_s = .39 - .47$ ) and FFMQ non-reactivity subscale scores ( $r_s = .18 - .20$ ), but significantly negatively related with FFMQ non-judging subscale scores ( $r_s = -.20$ ). However, they did not assess whether previous meditation experience moderated these relationships.

Empirically, differences in the factor structure and concurrent validity of the FFMQ have been found based on whether participants had meditation experience (Baer et al., 2008; Bravo, Booth, & Pearson, 2016). For example, the FFMQ observing subscale has been shown to be positively related to poor psychological symptoms among college students without prior meditation experience, whereas it has been shown to be negatively related to these outcomes among individuals with meditation experience (Baer et al., 2008). Further, observing has been found to be the mindfulness facet that is most strongly positively correlated with meditation experience (Baer et al. 2006) and the facet that reliably increases following MBIs (Carmody & Baer, 2008). Compared to meditation-naïve individuals, experienced meditators may also be interpreting the trait mindfulness items differently, which may explain inconsistent results (Grossman, 2008, 2011). Thus, examining whether previous mindfulness meditation experience moderates the relationship between trait and state mindfulness is warranted.

Beyond differences found by meditation experience, the association between state and trait mindfulness may also be impacted by type of meditation practice. For example, a meditation that ostensibly targets a specific facet of mindfulness may enhance the relationship between that facet and the most similar trait mindfulness facet. Given that experienced meditators are familiar with mindfulness meditation and their ratings of trait mindfulness skills are based on their skills of paying attention in meditation (Moore & Malinowski, 2009), the association between specific facets of trait mindfulness and state mindfulness may be further enhanced when meditators are engaging in a meditation exercise compared to their daily activities. Moreover, this experience of paying attention during meditation also suggests that meditation experienced individuals should display higher associations between trait mindfulness and state mindfulness measured during (or immediately following) meditation, compared to meditation-naïve individuals. Taken together, whether the relationships between state and trait mindfulness are different for individuals placed in a more mindful state (i.e., engaged in a mindfulness meditation exercise) versus their typical state (i.e., control condition) or individuals with and without meditation experience needs further exploration.

The purpose of the present study was to extend the findings of Thompson and Waltz (2007) and Tanay and Bernstein (2013) by examining the unique relationships between self-report trait mindfulness and state mindfulness facets by levels of meditation experience (meditation-naïve versus meditation-experienced) and by mindfulness induction. Specifically, independent moderation models were conducted predicting both state mindfulness of mind and state mindfulness of body from specific trait mindfulness facets, mindfulness experience (meditation-naïve vs. meditation-experienced), mindfulness condition (mindfulness control group vs. mindfulness induction group), and their interactions (e.g., observing X mindfulness experience X mindfulness condition). We expected the relationships between trait and state mindfulness would be stronger for meditation-experienced individuals and stronger for those in the mindfulness induction

condition. Precisely, we expected that meditation-experienced participants would have higher state mindfulness scores in the meditation condition compared to the control condition, and compared to meditation-naïve participants. In combination, we expected the strongest associations between trait and state mindfulness among individuals with previous meditation experience who were also given the brief mindfulness induction.

## Method

### Participants

The present research is a secondary analysis of data from a study examining state mindfulness as a distinct factor that may buffer the association between negative emotional states (i.e., sadness and anxiety), alcohol coping motives, subjective alcohol craving, and attentional bias toward alcohol-related cues among college student drinkers (Bravo, Pearson, & Henson, 2017). Participants for the present study were 299 undergraduate students recruited from a psychology department participant pool at a large, southeastern university in the United States. To be eligible, participants must have been currently enrolled in any psychology course and been at least 18 years old. The majority of participants identified as being either White, non-Hispanic ( $n = 115$ ; 38.5%), or African American ( $n = 132$ ; 44.1%), were female ( $n = 239$ ; 79.9%), and reported a mean age of 20.84 years ( $SD = 5.17$ ). To distinguish between meditation-naïve and individuals with any mindfulness meditation experience, students responded to a single item about previous meditation experience (i.e., “Do you have any previous or current experience with mindfulness meditation?”). Ninety-three (31.1%) students reported previous mindfulness meditation experience, with about half reporting practicing mindfulness meditation for at least a year ( $n = 45$ , 49.5%). With regards to frequency of mindfulness meditation practice, 6 (6.5%) students reported daily practice, 12 (12.9%) reported practicing 3–5 times a week, 15 (16.1%) reported weekly practice, 14 (15.1%) reported monthly practice, 19 (20.4%) reported practicing a few times a year, 6 (6.5%) reported practicing once a year, and 21 (21%) reported that it had been longer than a year since their last mindfulness meditation experience. Participants received research credit for completing the study which was applied as course credit at the participating university. The study was approved by the institutional review board at the participating institution.

### Procedure

Upon arrival to the laboratory, participants received information about the study before providing informed consent. After providing consent, all participants completed a battery of measures assessing trait mindfulness, current mood state, alcohol consumption, and drinking motives. Next, participants were randomly assigned (prior to start of the experiment) to 1 of 3 mood conditions in which they watched a 2–3 minute video clip known to elicit sadness ( $n = 100$ ), anxiety ( $n = 103$ ), or a control condition ( $n = 96$ ). Following the video clips, all participants completed measures on mood state, current alcohol craving, alcohol demand, and completed a visual dot probe task assessing attentional bias for alcohol-related cues. Next, participants in each mood induction paradigm were randomly assigned to either a mindfulness condition ( $n = 151$ ) or no-mindfulness control condition ( $n = 148$ ). Individuals in the mindfulness condition completed a mindfulness meditation exercise via an 8-minute guided mindfulness audio clip. Participants in the mindfulness control condition listened to

an 8-minute educational information audio clip. Following the audio clips, all participants completed measures of state mindfulness, current alcohol craving, current mood state, current alcohol demand and performed another visual dot probe task and completed demographic information.

## Materials and Apparatus

All measures and tasks (e.g., mood inductions) were presented in a research lab to participants on computers using *Qualtrics* and *E-prime 2.0* software. For information on alcohol measures and mood conditions, see Author, 2016).

**Trait mindfulness**—Trait mindfulness was assessed using the 39-item Five Facet Mindfulness Questionnaire (FFMQ; Baer et al., 2006) measured on a 5-point response scale (1 = *Never or very rarely true*, 5 = *Very often or always true*). The five facets (items were averaged) include acting with awareness (e.g., “It seems I am ‘running on automatic’ without much awareness of what I’m doing”; reverse-coded), non-judging of inner experience, (e.g., “I criticize myself for having irrational or inappropriate emotions”; reverse-coded), non-reactivity to inner experience (e.g., “I perceive my feeling and emotions without having to react to them”), describing (e.g., “I am good at finding the words to describe my feeling”), and observing (e.g., “When I am walking, I deliberately notice the sensations of my body moving”).

**Mindfulness of body induction**—The first session of MBSR, MBCT, MBRP and other MBIs begin with mindfulness exercises focused on bodily sensations and the second session is focused on mindfulness of breath sensations. Moreover, it is generally recommended in the mindfulness literature that it is important to focus the attention on body and breath before attempting to bring greater mindful awareness to states of mind (Lutz, Slagter, Dunne, and Davidson, 2008). Consistent with these recommendations, individuals in the mindfulness condition completed a mindfulness meditation exercise geared toward bodily sensations via an 8-minute guided mindfulness audio clip: “Mindfulness of Body and Breath” (Williams & Penman, 2011). This brief mindfulness practice included an abbreviated body scan for the first four minutes, followed by four minutes of mindful attention to the breath. Participants were instructed first to find a comfortable and supportive position, then to bring awareness to the physical sensations at the points of contact between the body and the cushion or chair supporting them. Participants were then instructed to bring a ‘spotlight of attention’ to various parts of the body, starting at the feet, and continuing up the body to the chest, back, arms, and head, until they were holding the whole body in awareness. Following this, participants were guided to focus on sensations in center of body, specifically the abdomen, and sensations related to inhaling and exhaling. Participants were guided to register when the mind wandered off into thoughts, notice where mind had been, and then gently escort their attention back to the breath. Finally, participants were advised to think of the breath as an anchor, with which they could always bring their attention back to the present moment. This task has been shown to induce a mindful state among participants in previous research (Kramer, Weger, & Sharma, 2013; Yusainy & Lawrence, 2015). Participants in the mindfulness control condition listened to an 8-minute educational excerpt from a public radio station on recent discoveries about fruit flies and their nomenclature (All

Things Considered, 2010). A similar procedure has been used as a control condition for mindfulness induction in other studies (Kramer et al., 2013; Yusainy & Lawrence, 2015).

**State mindfulness**—State mindfulness was measured using the State Mindfulness Scale (SMS; Tanay & Bernstein, 2013). The SMS is a self-report measure that consist of 21 items and uses a 5-point response scale (1 = *not at all*, 5 = *very well*). The measure assesses state mindfulness of mind (e.g., “I was aware of what was going on in my mind”; 15 items) and state mindfulness of body (e.g., “I noticed physical sensations come and go”; 6 items) immediately following a mindfulness experience (i.e., mindfulness induction). The participants were provided with instructions stating, “Please indicate the degree to which each of the 21 statements below described what you just experienced” (Tanay & Bernstein, 2013). For the present study, the SMS subscales were summed.

### Statistical Analyses

After ensuring outcomes (SMS body and mind subscales) were normally distributed and free of outliers, moderation analyses were conducted using the PROCESS macro for SPSS (Hayes, 2012). Independent models were conducted predicting both state mindfulness of mind and state mindfulness of body from specific trait mindfulness facets, mindfulness experience (coded 0 = meditation-naïve and 1 = meditation-experienced), mindfulness condition (coded 0 = mindfulness control group and 1 = mindfulness induction group), and their interactions (e.g., observing X mindfulness experience X mindfulness condition). Within all models, trait mindfulness facets and state mindfulness facets were standardized (i.e., z-scores) to provide standardized regression coefficients. Mindfulness facets were entered as covariates within each model examining unique mindfulness facets. Significant effects were determined by a 95% bias-corrected bootstrapped confidence interval (based on 10,000 bootstrapped samples) that does not contain zero. Significant interaction terms were interpreted by plotting predicted outcome values and conditional effects (provided by PROCESS) at levels of the moderator as recommended by Cohen et al. (2003). It is important to highlight that there were no significant differences between mood conditions (i.e., sadness, anxious, mood control) on both state mindfulness of mind,  $F(2, 296) = 0.11$ ,  $p = .90$ , partial  $\eta^2 = .00$ , and state mindfulness of body,  $F(2, 296) = 0.35$ ,  $p = .70$ , partial  $\eta^2 = .00$ . Further, there were no significant differences in allocation to mindfulness conditions across the three mood groups,  $\chi^2(2) = 0.15$ ,  $p = .929$ . Thus analyses were conducted without mood condition as a covariate.

## RESULTS

Bivariate correlations, descriptive statistics, and internal consistency measures across meditation experience (i.e., meditation-naïve and meditation-experienced students) are shown in Table 1. Independent  $t$ -tests found significant mean differences between meditation-experienced and meditation-naïve students, such that meditation-experienced individuals had higher scores on observing trait mindfulness, state mindfulness of body, and state mindfulness of mind, but lower scores on non-judging trait mindfulness. To compare the mindfulness induction group to the no-mindfulness control group, a series of ANOVA models were conducted on SMS mind and body subscales. At post-mindfulness induction,

there was not a significant difference between the mindfulness induction group ( $M = 47.91$ ) and the no-mindfulness induction group ( $M = 46.29$ ) on the SMS mindfulness of mind subscale,  $F(1, 297) = 1.14, p = .29$ , partial  $\eta^2 = .00$ . In contrast, the mindfulness induction group ( $M = 19.16$ ) reported significantly higher scores on the SMS mindfulness of body subscale than the no-mindfulness induction group ( $M = 16.31$ ),  $F(1, 297) = 18.39, p < .001$ , partial  $\eta^2 = .06$ . These results are not surprising, given that the mindfulness meditation exercise was geared towards focusing on body and breathing sensations.

### Moderation Models

There were no significant interactions found in models with describing trait mindfulness, acting with awareness trait mindfulness, and non-reactivity trait mindfulness as predictors of state mindfulness outcomes (see Table 2). Further, there were no significant interactions found in a model with non-judging trait mindfulness predicting state mindfulness of mind. However, describing trait mindfulness had a unique positive association (i.e., main effect) with state mindfulness of mind ( $\beta = .23$ ) and was a significant covariate (positive effect) on state mindfulness of body within all other trait mindfulness moderation models. No unique significant effects (i.e., main effects) were found for acting with awareness trait mindfulness and non-reactivity trait mindfulness (see Table 2).

**Observing trait mindfulness moderation models**—There was a significant interaction between observing trait mindfulness and previous meditation experience on state mindfulness of mind ( $\beta = .45$ , 95% CI [0.07, 0.83]) and state mindfulness of body ( $\beta = .56$ , 95% CI [0.19, 0.93]). The interaction, shown in top panel of Figure 1, was such that the direct effect of observing trait mindfulness on state mindfulness of mind was significantly stronger among meditation-experienced students (no-mindfulness control group:  $\beta = .64$ , 95% CI [0.31, 0.97]) compared to meditation-naïve students (no-mindfulness control group:  $\beta = .20$ , 95% CI [-0.01, 0.40]). Results were similar for state mindfulness of body, such that the direct effect of observing trait mindfulness on state mindfulness of body was significantly stronger among meditation-experienced students (no-mindfulness control group:  $\beta = .75$ , 95% CI [0.43, 1.07]) compared to meditation-naïve students (no-mindfulness control group:  $\beta = .19$ , 95% CI [-0.01, 0.39]) (see top panel in Figure 1).

In examining state mindfulness of body as an outcome, there was also a significant interaction between mindfulness experience and the mindfulness experimental condition,  $\beta = .49$ , 95% CI [0.03, 0.96]. Post hoc analyses using a Bonferroni correction revealed that at average levels of observing trait mindfulness (when controlling for other trait mindfulness facets), mindfulness-experienced students in the mindfulness induction condition reported a higher mean on state mindfulness of body ( $M = 20.39$ ) compared to mindfulness-experienced students in the no-mindfulness control condition ( $M = 17.85$ ,  $M$  difference = 2.54, 95% CI [0.0001, 5.07]), meditation-naïve students in the mindfulness induction condition ( $M = 17.76$ ,  $M$  difference = 2.64, 95% CI [0.49, 4.78]) and meditation-naïve students in the no-mindfulness control condition ( $M = 15.56$ ,  $M$  difference = 4.83, 95% CI [2.02, 7.65]). Further, meditation-naïve students in the mindfulness induction condition reported a higher mean on state mindfulness of body compared to meditation-naïve students in the no-mindfulness control condition ( $M$  difference = 2.20, 95% CI [0.26, 4.14]). There

were no significant differences found between individuals in the no-mindfulness control condition based on mindfulness experience ( $M$  difference = 2.30, 95% CI [-0.10, 4.70]).

**Non-judging trait mindfulness moderation models**—There was a significant interaction between non-judging trait mindfulness and previous meditation experience on state mindfulness of body ( $\beta = -.51$ , 95% CI [-0.84, -0.18]). Specifically, the direct effect of non-judging trait mindfulness on state mindfulness of body was significantly negative among meditation-experienced students (no-mindfulness control group:  $\beta = -.41$ , 95% CI [-0.70, -0.12]) but near zero among the meditation-naïve students (no-mindfulness control group:  $\beta = .10$ , 95% CI [-0.09, 0.29]).

### Exploratory Moderation Models based on Frequency of Mindfulness Meditation

Given that the frequency of mindfulness meditation is positively associated with trait mindfulness facets (exception being acting with awareness; Baer et al., 2008), we conducted exploratory moderation models examining frequency of mindfulness meditation (standardized; higher scores indicate more frequent mindfulness meditation) as a moderator among the 93 students that reported previous mindfulness meditation experience. Once again, there were no significant interactions or main effects found in models with acting with awareness or non-reactivity trait mindfulness as predictors of state mindfulness outcomes (see Table 3). However, we found interactions with observing, describing, and non-judging trait mindfulness facets.

**Observing trait mindfulness moderation models**—There was a significant interaction between observing trait mindfulness and frequency of mindfulness meditation on state mindfulness of mind ( $\beta = .35$ , 95% CI [0.03, 0.68]) and state mindfulness of body ( $\beta = .41$ , 95% CI [0.09, 0.74]). The association between observing trait mindfulness and state mindfulness of mind (see bottom panel of Figure 1) significantly strengthened with more frequent mindfulness meditation practice: low frequency (1 SD below mean),  $\beta = .17$ , 95% CI [-0.35, 0.69]); average frequency,  $\beta = .52$ , 95% CI [0.20, 0.85]); high frequency (1 SD above mean),  $\beta = .87$ , 95% CI [0.48, 1.27]). Similarly, the association between observing trait mindfulness and state mindfulness of body (see bottom panel in Figure 1) strengthened with more frequent mindfulness meditation practice: low frequency (1 SD below mean),  $\beta = .16$ , 95% CI [-0.36, 0.67]); average frequency,  $\beta = .57$ , 95% CI [0.24, 0.89]); high frequency (1 SD above mean),  $\beta = .98$ , 95% CI [0.58, 1.37]).

**Describing trait mindfulness moderation models**—There was a significant interaction between describing trait mindfulness and frequency of mindfulness meditation on state mindfulness of body ( $\beta = -.27$ , 95% CI [-0.50, -0.03]). Surprisingly, the association between describing trait mindfulness and state mindfulness of body significantly weakened with more frequent mindfulness meditation practice: low frequency (no-mindfulness control group),  $\beta = .41$ , 95% CI [0.02, 0.79]); average frequency (no-mindfulness control group),  $\beta = .14$ , 95% CI [-0.14, 0.42]); high frequency (no-mindfulness control group),  $\beta = -.13$ , 95% CI [-0.48, 0.23]).



**Non-judging trait mindfulness moderation models**—There was both a significant two-way interaction between non-judging trait mindfulness and frequency of mindfulness meditation and a significant three-way interaction between non-judging trait mindfulness, frequency of mindfulness meditation, and mindfulness induction condition on both state mindfulness outcomes (see Table 3). Given the higher order significant interaction, we probed for the effects of the three-way interaction. The interactions were similar across both state mindfulness outcomes (see Figure 2). Specifically, the association between non-judging trait mindfulness and state mindfulness of mind significantly weakened with more frequent mindfulness meditation practice, but only among individuals in the no-mindfulness induction condition: low frequency,  $\beta = .21$ , 95% CI [-0.28, 0.69]); average frequency,  $\beta = -.28$ , 95% CI [-0.60, 0.08]); high frequency,  $\beta = -.75$ , 95% CI [-1.21, -0.29]);  $\beta$ 's ranged from  $-.20$  to  $-.13$  for those in the mindfulness induction condition. Similarly, the association between non-judging trait mindfulness and state mindfulness of body significantly weakened with more frequent mindfulness meditation practice, but only among individuals in the no-mindfulness induction condition: low frequency,  $\beta = .26$ , 95% CI [-0.22, 0.73]); average frequency,  $\beta = -.31$ , 95% CI [-0.63, 0.01]); high frequency,  $\beta = -.88$ , 95% CI [-1.33, -0.44]);  $\beta$ 's ranged from  $-.11$  to  $.02$  for those in the mindfulness induction condition.

## DISCUSSION

The present study examined the association between self-reported trait mindfulness and state mindfulness among meditation naïve and meditation experienced college students who received a mindfulness induction audio clip or an educational control audio clip. Specifically, we investigated the association between various facets of trait mindfulness (observing, describing, acting with awareness, non-judging, non-reactivity) and state-level mindfulness of body and mindfulness of mind and examined whether these associations differed by meditation experience and mindfulness induction (brief guided meditation exercise). Further, we conducted exploratory moderation models among meditation-experienced individuals to investigate how frequency of meditation practice impacts these associations.

Results revealed stark differences in the link between specific trait- and state-level mindfulness facets and these associations were shown to differ by meditation experience, frequency of meditation practice, and mindfulness induction. Only one trait  $\times$  state interaction, namely that between previous meditation experience and the observing facet of trait mindfulness predicted significantly higher scores on both state-level mindfulness of body and state-level mindfulness of mind. These findings were corroborated when examining frequency of mindfulness meditation practice as a moderator such that the association between observing trait mindfulness and state mindfulness of mind and body strengthened with more frequent mindfulness meditation practice. One possible explanation for our findings is that compared to meditation-naïve individuals, experienced meditators have been shown to have higher awareness of attention (Hölzel et al., 2011) which may cause them to provide more accurate reports of their trait observing skills (Grossman, 2008, 2011) and hence may lead to higher correlations with state mindfulness subscales.

Interestingly, higher trait-level non-judging predicted lower state-level mindfulness of body among individuals with previous meditation experience. Though somewhat counterintuitive, this finding extends previous research that found a negative association between trait-level non-judging and state mindfulness of body (Tanay & Bernstein, 2013) by suggesting that this negative association may be driven by individuals with previous mindfulness meditation experience. Further, when examining frequency of meditation practice, we found that the association between non-judging trait mindfulness and both state mindfulness of mind and body went from weakly positive among individuals with the lowest frequency of meditation to strongly negative among individuals with the highest frequency of meditation experience, but only among individuals in the no-mindfulness induction condition. Further, we found that the association between describing trait mindfulness and state mindfulness of body significantly weakened with more frequent mindfulness meditation practice.

It has long been suspected that as meditators become more practiced and experienced, they become more aware of their deficiencies (i.e., are not as mindful as they previously thought), which in turn influences their understanding and interpretation of mindfulness items/scales (Grossman 2008, 2011). In support of this notion, mean levels of non-judging trait mindfulness in the present study was higher for meditation-naïve compared to meditation-experienced students. Further, increased awareness of these deficiencies may have led experienced meditators to have increased awareness of mind-wandering, especially in the mindfulness control condition when students were not instructed to focus on a particular object. Despite reporting higher levels of describing and non-judging trait mindfulness, this increased awareness of mind-wandering among experienced meditators may have led them to report lower levels state mindfulness which may explain the negative associations between non-judging/describing and state mindfulness. Overall, our counterintuitive interactions highlight the need to use more than just retrospective self-report methods in assessing mindfulness as it may mask relationships between trait mindfulness, state mindfulness, and meditation experience.

The experimental mindfulness induction condition showed a consistent significant impact on state-level mindfulness of body, and no significant impact on state-level mindfulness of mind. Given that the mindfulness exercise focused on paying attention to bodily sensations, these results are not surprising. Further, our choice of meditation practice and measure of state mindfulness may have impacted the associations between specific trait mindfulness facets and state mindfulness facets. For example, the SMS items measure observing bodily and mental experience which fails to tap into acting with awareness and non-reacting trait mindfulness facets. Moreover, our meditation induction was a focused attention exercise on body and breath and perhaps other practices that utilize open-monitoring (Lutz et al., 2011) might better facilitate increases in acting with awareness and non-reacting trait mindfulness facets. Although only found within one moderation model, we found that being induced into a mindful state elicited higher reports of state mindfulness of body for individuals with previous meditation experience compared to meditation-naïve students and individuals randomized into the educational control audio clip. Importantly, we also found that being induced into a mindful state elicited higher reports of state mindfulness of body for naïve meditators, compared to those in the control group. Taken together, the type of meditation

exercise given may impact the associations between trait mindfulness facets and state mindfulness.

### Limitations

Some key limitations of the present study must be noted. First, given the convenience sample (i.e., volunteer college students selected from one university) it is unknown whether findings generalize to other populations (e.g., non-college students and clinical populations). Second, we considered participants as meditation-experienced if they self-reported any exposure to mindfulness meditation practices; thus, there was heterogeneity within this group in terms of level of exposure/experience. Future work should purposively recruit a group of individuals with more extensive mindfulness meditation experience to observe how these processes may differ in a population of expert meditators. Third, we examined our constructs utilizing retrospective self-reports from one particular measure of trait mindfulness and another measure of state mindfulness. Reflecting a broader issue in the field (Grossman, 2008, 2011; Grossman & Van Dam, 2011), the relatively low correspondence between these two measures may partially reflect the difference between trait and state mindfulness, but also the potentially disparate conceptual underpinnings of these particular self-report measures (Witkiewitz & Black, 2014).

Further, we did not assess trait mindfulness post state mindfulness induction, thus were unable to examine whether being induced into a more mindful state leads to more or less self-report of trait mindfulness. Tanay and Bernstein (2013) found that improvement in state mindfulness (assessed with the SMS) during a mindfulness intervention predicted development of trait mindfulness (assessed with the Mindful Attention and Awareness Scale; Brown & Ryan, 2003) from baseline to 6-week post-intervention. However, the literature has been mixed with respect to the effect of MBIs on trait mindfulness facets assessed with the FFMQ (increased trait mindfulness, Bowen et al., 2009; Carmody & Baer, 2008; non-significant changes in trait mindfulness, Manuel et al., 2016). Future studies, across various populations (clinical and nonclinical), examining how specific mindfulness meditation practices impact specific trait mindfulness facets are needed to unravel the associations between increasing state mindfulness and its effects on trait-mindfulness.

We also did not assess *nonattachment* (i.e., letting go of positive states) which has recently been proposed as a sixth dimension of trait mindfulness (see Sahdra, Ciarrochi, & Parker, 2016 for an overview); and future research should examine the relationship between *nonattachment* and state mindfulness. Finally, given that the field of psychology is currently undergoing a rather strong indictment regarding effects that are not reproducible (Simmons, Nelson, & Simonsohn, 2011), future research should attempt to replicate the present study's findings utilizing a combination of both self-report and observational/biological measures of mindfulness, especially considering the statistical difficulties in detecting moderation effects (McClelland & Judd, 1993).

### Suggestions for Future Directions

Consistent with previous research, we did not find robust associations between facets of trait mindfulness and facets of state mindfulness. However, we did find specific associations that

warrant further exploration. For example, our finding that the observing facet of trait mindfulness was a relatively strong predictor of both state mindfulness of body and state mindfulness of mind, especially among mediators with frequent meditation practice, is particularly interesting. Future research is needed to determine whether the actual effects that the observing facet of mindfulness exert on particular outcomes (in this case, state mindfulness) depends on mindfulness meditation experience, or whether the validity of the assessment of trait mindfulness depends on mindfulness meditation experience.

From a precision medicine perspective, the current study may help to elucidate those individuals who will be most likely to develop greater state mindfulness during MBIs. Future research should determine whether individuals with different levels of different facets of trait mindfulness are more or less likely to respond to briefer or longer MBIs. Overall, the small effect size association between trait and state mindfulness identified in the current study is a difficult problem for MBI research. Measures that are specific to the acquisition of mindfulness skills (e.g., the Applied Mindfulness Process Scale; Li, Black, & Garland, 2016) may be more useful in evaluating the efficacy and effectiveness of MBIs than the more general measures of trait and state mindfulness used in the current study. Taken together, additional research is needed to determine how to best match MBIs to effectively cultivate mindfulness.

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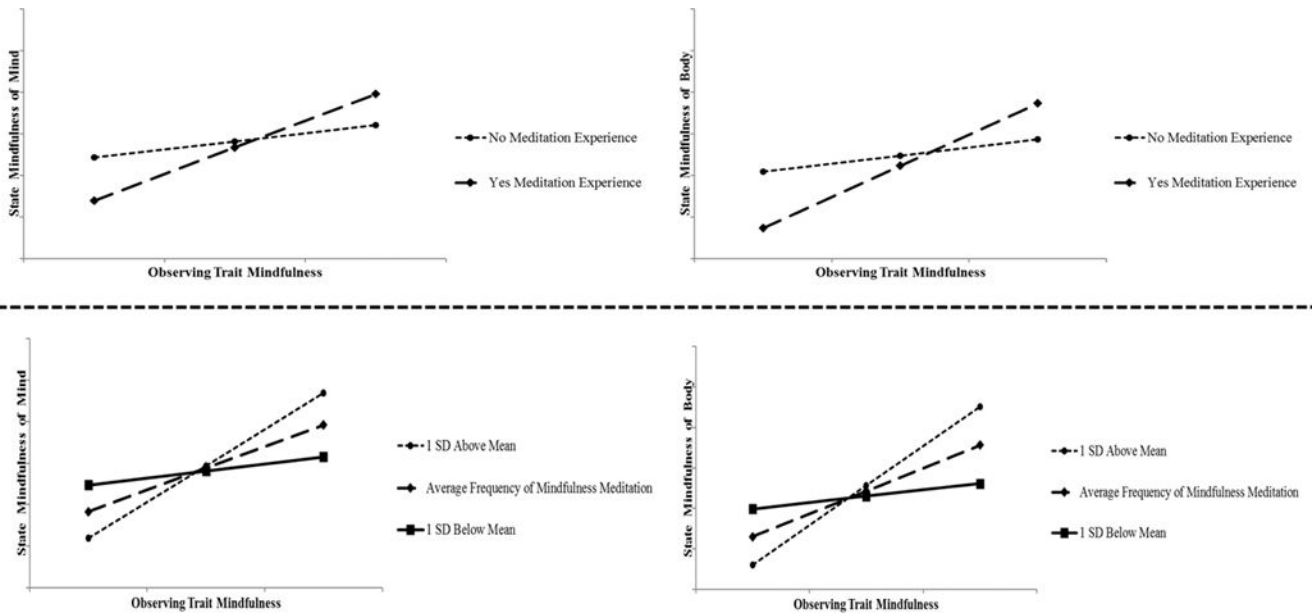
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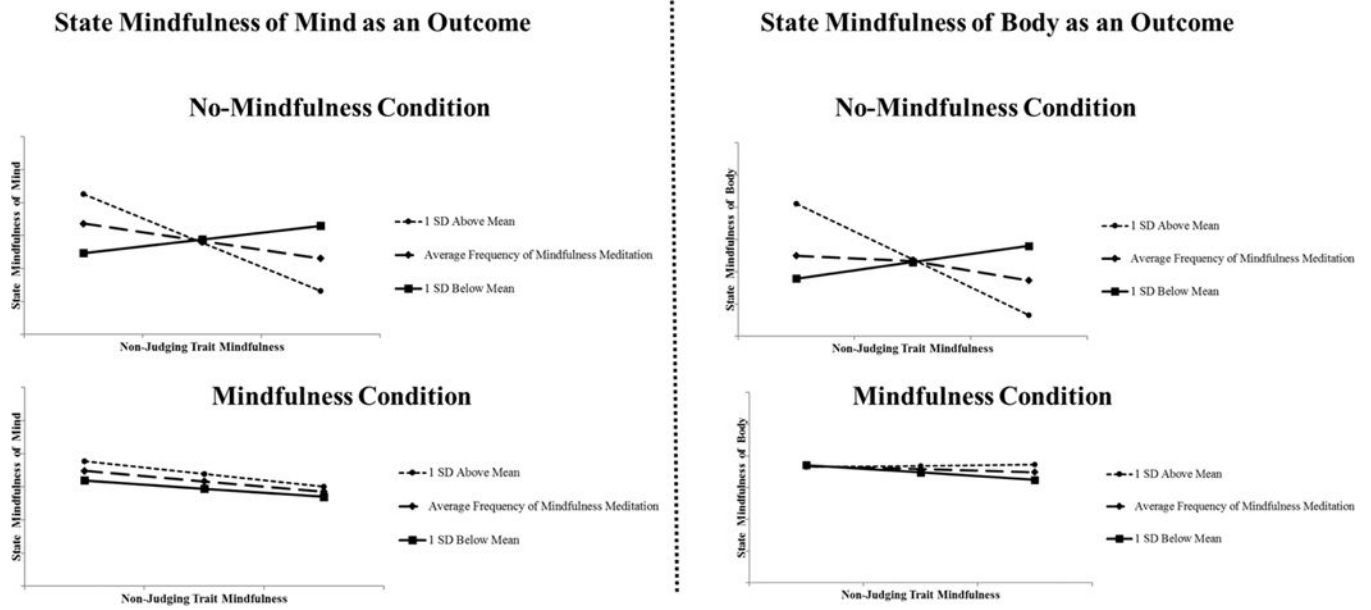
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**Figure 1.**

Top panel depicts simple slopes of observing trait mindfulness facet X mindfulness experience on state mindfulness outcomes within the no-mindfulness control condition and averaging across other trait mindfulness facets. Bottom panel (analyses conducted among 93 students reporting prior mindfulness meditation) depicts simple slopes of observing trait mindfulness facet X frequency of mindfulness meditation on state mindfulness within the no-mindfulness control condition and averaging across other trait mindfulness facets.



**Figure 2.** Depicts simple slopes of the non-judging trait mindfulness facet X frequency of mindfulness meditation X mindfulness condition interaction on state mindfulness outcomes and averaging across other trait mindfulness facets.



Correlations and descriptive statistics of all study variables among meditation experienced students (below diagonal) and meditation-naïve students

**Table 1**

|                           | <b>1</b>   | <b>2</b>    | <b>3</b>   | <b>4</b>    | <b>5</b>    | <b>6</b>   | <b>7</b>   | <b>8</b>   | <b>M</b> | <b>SD</b> |
|---------------------------|------------|-------------|------------|-------------|-------------|------------|------------|------------|----------|-----------|
| 1. Observing              | <b>.27</b> | <u>.83</u>  | .13        | <b>-.15</b> | <b>-.28</b> | <b>.35</b> | <b>.23</b> | <b>.21</b> | 3.15     | 0.80      |
| 2. Describing             | <b>.78</b> | .06         | <u>.88</u> | <b>.28</b>  | <b>.16</b>  | <b>.36</b> | <b>.27</b> | <b>.27</b> | 3.36     | 0.78      |
| 3. Acting with Awareness  | <b>.73</b> | -.17        | <b>.51</b> | <u>.88</u>  | <b>.45</b>  | .06        | .00        | .07        | 3.42     | 0.80      |
| 4. Non-judging            | <b>.53</b> | <b>-.41</b> | <b>.27</b> | <b>.56</b>  | <u>.88</u>  | .04        | -.10       | .01        | 3.40     | 0.85      |
| 5. Non-reactivity         | <b>.52</b> | <b>.41</b>  | <b>.32</b> | .07         | -.13        | <u>.78</u> | <b>.26</b> | <b>.25</b> | 2.94     | 0.72      |
| 6. State Mindfulness-Mind | <b>.29</b> | <b>.29</b>  | <b>.27</b> | .04         | <b>-.26</b> | <b>.42</b> | <u>.94</u> | <b>.72</b> | 45.77    | 12.82     |
| 7. State Mindfulness-Body | <b>.23</b> | <b>.23</b>  | <b>.21</b> | .05         | <b>-.21</b> | <b>.21</b> | <b>.77</b> | <u>.88</u> | 16.98    | 5.58      |
| <i>M</i>                  | 3.28       | 3.55        | 3.33       | 3.37        | 3.14        | 2.99       | 50.02      | 19.36      |          |           |
| <i>SD</i>                 | 0.48       | 0.80        | 0.89       | 0.83        | 0.94        | 0.74       | 13.36      | 6.32       |          |           |

Note. Significant correlations ( $p < .05$ ) are bolded for emphasis. Cronbach's alphas are underlined and shown on the diagonals. Correlations for meditation experienced students ( $n = 93$ ) are below the diagonal. Correlations for meditation-naïve students ( $n = 206$ ) are above the diagonal. Independent t-test found significant mean differences between meditation experienced and meditation-naïve students on observing (higher for meditation experienced), non-judging (higher for meditation-naïve), state mindfulness of body (higher for meditation experienced), and state mindfulness of mind (higher for meditation experienced).

Summary of Unique Effects of Trait Mindfulness Facets, Mindfulness Experience, Mindfulness Condition, and their Interactions on State Mindfulness

Table 2

|   | State Mindfulness of Mind |      |              |         | State Mindfulness of Body |              |         |    |        |
|---|---------------------------|------|--------------|---------|---------------------------|--------------|---------|----|--------|
|   | $\beta$                   | SE   | 95% CI       | $\beta$ | SE                        | 95% CI       | $\beta$ | SE | 95% CI |
| <i>Observing</i>  |                           |      |              |         |                           |              |         |    |        |
| Constant  | -.089                     | .086 | -0.26, 0.08  | -.261   | .085                      | -0.43, -0.09 |         |    |        |
| Observing   | .196                      | .102 | -0.01, 0.40  | .193    | .101                      | -0.01, 0.39  |         |    |        |
| Mindfulness Experience  | -.074                     | .180 | -0.43, 0.28  | -.122   | .178                      | -0.47, 0.23  |         |    |        |
| Mindfulness Condition   | .034                      | .127 | -0.22, 0.28  | .344    | .125                      | 0.10, 0.59   |         |    |        |
| Observing $\times$ Mindfulness Experience                                 | .445                      | .191 | 0.07, 0.83   | .556    | .189                      | 0.19, 0.93   |         |    |        |
| Observing $\times$ Mindfulness Condition                                  | -.135                     | .130 | -0.39, 0.12  | -.063   | .128                      | -0.32, 0.19  |         |    |        |
| Mindfulness Experience $\times$ Mindfulness Condition                     | .308                      | .241 | -0.16, 0.78  | .494    | .238                      | 0.03, 0.96   |         |    |        |
| Observing $\times$ Mindfulness Experience $\times$ Mindfulness Condition  | -.259                     | .060 | -0.74, 0.22  | -.354   | .240                      | -0.04, 0.20  |         |    |        |
| <i>Describing</i>   |                           |      |              |         |                           |              |         |    |        |
| Constant  | .223                      | .060 | 0.10, 0.34   | .171    | .060                      | 0.05, 0.29   |         |    |        |
| Acting with Awareness   | .015                      | .063 | -0.11, 0.14  | .192    | .062                      | -0.10, 0.14  |         |    |        |
| Non-judging   | -.123                     | .063 | -0.25, 0.001 | -.032   | .062                      | -0.15, 0.09  |         |    |        |
| Non-reactivity  | .147                      | .063 | 0.03, 0.27   | .084    | .061                      | -0.04, 0.20  |         |    |        |
| R <sup>2</sup>  | .236                      | .062 |              | .256    |                           |              |         |    |        |
| <i>Describing</i>   |                           |      |              |         |                           |              |         |    |        |
| Constant  | -.086                     | .087 | -0.26, 0.09  | -.253   | .086                      | -0.42, -0.08 |         |    |        |
| Describing  | .231                      | .092 | 0.05, 0.41   | .167    | .091                      | -0.01, 0.35  |         |    |        |
| Mindfulness Experience  | .113                      | .170 | -0.22, 0.45  | .076    | .169                      | -0.26, 0.41  |         |    |        |
| Mindfulness Condition   | .064                      | .128 | -0.19, 0.32  | .360    | .127                      | 0.11, 0.61   |         |    |        |
| Describing $\times$ Mindfulness Experience                                | -.016                     | .148 | -0.31, 0.28  | -.112   | .146                      | -0.40, 0.18  |         |    |        |
| Describing $\times$ Mindfulness Condition                                 | -.056                     | .136 | -0.32, 0.21  | .031    | .135                      | -0.23, 0.30  |         |    |        |
| Mindfulness Experience $\times$ Mindfulness Condition                     | .097                      | .231 | -0.36, 0.55  | .286    | .229                      | -0.16, 0.74  |         |    |        |
| Describing $\times$ Mindfulness Experience $\times$ Mindfulness Condition | .106                      | .231 | -0.35, 0.56  | .145    | .229                      | -0.31, 0.60  |         |    |        |
| <i>Observing</i>  |                           |      |              |         |                           |              |         |    |        |
| Constant  | .197                      | .062 | 0.07, 0.32   | .249    | .062                      | 0.13, 0.37   |         |    |        |
| Acting with Awareness   | .032                      | .064 | -0.09, 0.16  | .043    | .063                      | -0.08, 0.17  |         |    |        |
| Non-judging   | -.142                     | .064 | -0.27, -0.02 | -.055   | .064                      | -0.18, 0.07  |         |    |        |
| Non-reactivity  | .151                      | .062 | 0.03, 0.27   | .085    | .062                      | -0.04, 0.21  |         |    |        |

|  | State Mindfulness of Mind |             |                   |             | State Mindfulness of Body |                     |         |    |        |
|--|---------------------------|-------------|-------------------|-------------|---------------------------|---------------------|---------|----|--------|
|  | $\beta$                   | SE          | 95% CI            | $\beta$     | SE                        | 95% CI              | $\beta$ | SE | 95% CI |
| <i>Observing</i>   | <b>.211</b>               |             |                   |             | <b>.227</b>               |                     |         |    |        |
| <i>R</i> <sup>2</sup>  |                           |             |                   |             |                           |                     |         |    |        |
| <i>Acting with Awareness</i>   |                           |             |                   |             |                           |                     |         |    |        |
| Constant   | -.085                     | .087        | -0.26, 0.09       | -.249       | .086                      | -0.42, -0.08        |         |    |        |
| Acting with Awareness  | .008                      | .090        | -0.17, 0.19       | .076        | .089                      | -0.10, 0.25         |         |    |        |
| Mindfulness Experience   | .100                      | .170        | -0.24, 0.44       | .050        | .168                      | -0.28, 0.38         |         |    |        |
| Mindfulness Condition  | .058                      | .128        | -0.19, 0.31       | <b>.356</b> | <b>.126</b>               | <b>0.11, 0.60</b>   |         |    |        |
| Acting with Awareness $\times$ Mindfulness Experience                                | -.065                     | .173        | -0.41, 0.28       | -.321       | .171                      | -0.66, 0.02         |         |    |        |
| Acting with Awareness $\times$ Mindfulness Condition                                 | .033                      | .129        | -0.22, 0.29       | -.038       | .128                      | -0.29, 0.21         |         |    |        |
| Mindfulness Experience $\times$ Mindfulness Condition                                | .111                      | .231        | -0.34, 0.57       | .313        | .228                      | -0.14, 0.76         |         |    |        |
| Acting with Awareness $\times$ Mindfulness Experience $\times$ Mindfulness Condition | .158                      | .241        | -0.32, 0.63       | .401        | .237                      | -0.07, 0.87         |         |    |        |
| <i>Observing</i>   | <b>.197</b>               | <b>.062</b> | <b>0.08, 0.32</b> | <b>.250</b> | <b>.061</b>               | <b>0.13, 0.37</b>   |         |    |        |
| Describing   | <b>.222</b>               | <b>.062</b> | <b>0.10, 0.34</b> | <b>.182</b> | <b>.061</b>               | <b>0.06, 0.30</b>   |         |    |        |
| Non-judging  | -.148                     | .064        | -0.27, -0.02      | -.046       | .064                      | -0.17, 0.08         |         |    |        |
| Non-reactivity   | <b>.159</b>               | <b>.063</b> | <b>0.04, 0.28</b> | .102        | .062                      | -0.02, 0.22         |         |    |        |
| <i>R</i> <sup>2</sup>  | <b>.213</b>               |             |                   |             | <b>.235</b>               |                     |         |    |        |
| <i>Non-judging</i>   |                           |             |                   |             |                           |                     |         |    |        |
| Constant   | -.091                     | .087        | -0.26, 0.08       | -.264       | <b>.085</b>               | <b>-0.43, -0.10</b> |         |    |        |
| Non-judging  | -.076                     | .097        | -0.27, 0.11       | .100        | .095                      | -0.09, 0.29         |         |    |        |
| Mindfulness Experience   | .076                      | .174        | -0.27, 0.42       | .001        | .170                      | -0.33, 0.34         |         |    |        |
| Mindfulness Condition  | .063                      | .128        | -0.19, 0.32       | <b>.369</b> | <b>.125</b>               | <b>0.12, 0.62</b>   |         |    |        |
| Non-judging $\times$ Mindfulness Experience  | -.227                     | .173        | -0.57, 0.11       | -.509       | <b>.169</b>               | <b>-0.84, -0.18</b> |         |    |        |
| Non-judging $\times$ Mindfulness Condition   | -.061                     | .134        | -0.33, 0.20       | -.156       | .131                      | -0.42, 0.10         |         |    |        |
| Mindfulness Experience $\times$ Mindfulness Condition                                | .139                      | .234        | -0.32, 0.60       | .363        | .230                      | -0.09, 0.82         |         |    |        |
| Non-judging $\times$ Mindfulness Experience $\times$ Mindfulness Condition           | .174                      | .236        | -0.29, 0.64       | .443        | .231                      | -0.01, 0.90         |         |    |        |
| <i>Observing</i>   | <b>.192</b>               | <b>.062</b> | <b>0.07, 0.32</b> | <b>.239</b> | <b>.061</b>               | <b>0.12, 0.36</b>   |         |    |        |
| Describing   | <b>.226</b>               | <b>.062</b> | <b>0.11, 0.35</b> | <b>.184</b> | <b>.060</b>               | <b>0.07, 0.30</b>   |         |    |        |
| Acting with awareness  | .035                      | .064        | -0.09, 0.16       | .047        | .062                      | -0.08, 0.17         |         |    |        |
| Non-reactivity   | <b>.154</b>               | <b>.063</b> | <b>0.03, 0.28</b> | .096        | .062                      | -0.03, 0.22         |         |    |        |

|   | State Mindfulness of Mind |             |                     |             | State Mindfulness of Body |                   |         |    |        |
|---|---------------------------|-------------|---------------------|-------------|---------------------------|-------------------|---------|----|--------|
|   | $\beta$                   | SE          | 95% CI              | $\beta$     | SE                        | 95% CI            | $\beta$ | SE | 95% CI |
| <i>Observing</i>  | <b>.215</b>               |             |                     |             | <b>.249</b>               |                   |         |    |        |
| R <sup>2</sup>  |                           |             |                     |             |                           |                   |         |    |        |
| <i>Non-reactivity</i>   |                           |             |                     |             |                           |                   |         |    |        |
| Constant  | -.083                     | .087        | -0.26, 0.09         | -.253       | .087                      | -0.43, -0.08      |         |    |        |
| Non-reactivity  | .184                      | .094        | -0.002, 0.37        | .091        | .094                      | -0.09, 0.28       |         |    |        |
| Mindfulness Experience  | .107                      | .171        | -0.23, 0.44         | .098        | .170                      | -0.24, 0.43       |         |    |        |
| Mindfulness Condition   | .068                      | .128        | -0.19, 0.32         | .366        | .127                      | 0.12, 0.62        |         |    |        |
| Non-reactivity × Mindfulness Experience                         | .021                      | .173        | -0.32, 0.36         | -.081       | .172                      | -0.42, 0.26       |         |    |        |
| Non-reactivity × Mindfulness Condition                          | -.147                     | .129        | -0.40, 0.11         | -.046       | .128                      | -0.30, 0.21       |         |    |        |
| Mindfulness Experience × Mindfulness Condition                  | .108                      | .230        | -0.34, 0.56         | .271        | .228                      | -0.18, 0.72       |         |    |        |
| Non-reactivity × Mindfulness Experience × Mindfulness Condition | .214                      | .241        | -0.26, 0.69         | .240        | .240                      | -0.23, 0.71       |         |    |        |
| <i>Observing</i>  | <b>.190</b>               | <b>.062</b> | <b>0.07, 0.31</b>   | <b>.246</b> | <b>.062</b>               | <b>0.12, 0.36</b> |         |    |        |
| Describing  | <b>.215</b>               | <b>.061</b> | <b>0.10, 0.33</b>   | <b>.164</b> | <b>.061</b>               | <b>0.05, 0.28</b> |         |    |        |
| Acting with awareness   | .027                      | .064        | -0.10, 0.15         | .041        | .063                      | -0.08, 0.17       |         |    |        |
| Non-judging   | <b>-.135</b>              | <b>.064</b> | <b>-0.26, -0.01</b> | -.045       | .064                      | -0.17, 0.08       |         |    |        |
| R <sup>2</sup>  | <b>.217</b>               |             |                     |             | <b>.227</b>               |                   |         |    |        |

Note. Significant effects are in bold typeface for emphasis and were determined by a 95% bias-corrected bootstrapped confidence that does not contain zero. Mindfulness experience was coded 0 = meditation-naïve and 1 = meditation experience. Mindfulness condition was coded 0 = control condition and 1 = mindfulness condition. All other mindfulness facets were entered as covariates within each model.

Summary of Unique Effects of Trait Mindfulness Facets, Frequency of Mindfulness Meditation, Mindfulness Condition, and their Interactions on State Mindfulness

Table 3

|  | State Mindfulness of Mind |             |                   |             | State Mindfulness of Body |                   |         |    |        |
|--|---------------------------|-------------|-------------------|-------------|---------------------------|-------------------|---------|----|--------|
|  | $\beta$                   | SE          | 95% CI            | $\beta$     | SE                        | 95% CI            | $\beta$ | SE | 95% CI |
| <i>Observing</i>   |                           |             |                   |             |                           |                   |         |    |        |
| Constant   | -.062                     | .136        | -0.33, 0.21       | -.287       | .136                      | -0.56, -0.02      |         |    |        |
| Observing  | <b>.527</b>               | <b>.164</b> | <b>0.21, 0.85</b> | <b>.573</b> | <b>.164</b>               | <b>0.25, 0.90</b> |         |    |        |
| Frequency of Mindfulness Meditation  | .032                      | .144        | -0.25, 0.32       | .065        | .144                      | -0.22, 0.35       |         |    |        |
| Mindfulness Condition  | .130                      | .178        | -0.22, 0.48       | <b>.567</b> | <b>.178</b>               | <b>0.21, 0.92</b> |         |    |        |
| Observing $\times$ Frequency of Mindfulness Meditation                                 | <b>.352</b>               | <b>.163</b> | <b>0.03, 0.68</b> | <b>.413</b> | <b>.163</b>               | <b>0.09, 0.74</b> |         |    |        |
| Observing $\times$ Mindfulness Condition   | -.316                     | .193        | -0.70, 0.07       | -.296       | .193                      | -0.68, 0.09       |         |    |        |
| Frequency of Mindfulness Meditation $\times$ Mindfulness Condition                     | .087                      | .181        | -0.28, 0.45       | .018        | .181                      | -0.34, 0.37       |         |    |        |
| Observing $\times$ Frequency of Mindfulness Meditation $\times$ Mindfulness Condition  | -.197                     | .201        | -0.60, 0.20       | -.285       | .201                      | -0.69, 0.11       |         |    |        |
| <i>Describing</i>  | <b>.298</b>               | <b>.110</b> | <b>0.08, 0.52</b> | <b>.239</b> | <b>.110</b>               | <b>0.02, 0.45</b> |         |    |        |
| Acting with Awareness  | .064                      | .118        | -0.17, 0.30       | .035        | .118                      | -0.20, 0.27       |         |    |        |
| Non-judging  | -.201                     | .111        | -0.42, 0.02       | -.166       | .111                      | -0.39, 0.05       |         |    |        |
| Non-reactivity   | .158                      | .112        | -0.07, 0.38       | .032        | .112                      | -0.19, 0.26       |         |    |        |
| R <sup>2</sup>   | <b>.443</b>               |             |                   | <b>.442</b> |                           |                   |         |    |        |
| <i>Describing</i>  |                           |             |                   |             |                           |                   |         |    |        |
| Constant   | -.128                     | .135        | -0.40, 0.14       | -.376       | .133                      | -0.64, -0.12      |         |    |        |
| Describing   | .232                      | .145        | -0.06, 0.52       | .137        | .143                      | -0.15, 0.42       |         |    |        |
| Frequency of Mindfulness Meditation  | -.028                     | .148        | -0.33, 0.27       | -.006       | .145                      | -0.30, 0.28       |         |    |        |
| Mindfulness Condition  | .211                      | .182        | -0.15, 0.58       | <b>.665</b> | <b>.179</b>               | <b>0.31, 1.03</b> |         |    |        |
| Describing $\times$ Frequency of Mindfulness Meditation                                | -.169                     | .121        | -0.41, 0.07       | -.267       | .119                      | -0.50, -0.03      |         |    |        |
| Describing $\times$ Mindfulness Condition  | -.010                     | .194        | -0.40, 0.38       | .078        | .191                      | -0.30, 0.46       |         |    |        |
| Frequency of Mindfulness Meditation $\times$ Mindfulness Condition                     | .143                      | .188        | -0.23, 0.52       | .079        | .185                      | -0.29, 0.45       |         |    |        |
| Describing $\times$ Frequency of Mindfulness Meditation $\times$ Mindfulness Condition | .186                      | .204        | -0.22, 0.59       | .251        | .201                      | -0.15, 0.65       |         |    |        |
| Observing  | <b>.317</b>               | <b>.112</b> | <b>0.10, 0.54</b> | <b>.364</b> | <b>.110</b>               | <b>0.15, 0.65</b> |         |    |        |
| Acting with Awareness  | .118                      | .121        | -0.12, 0.36       | .089        | .119                      | -0.15, 0.33       |         |    |        |
| Non-judging  | -.235                     | .116        | -0.47, -0.01      | -.200       | .114                      | -0.43, 0.03       |         |    |        |

|   | State Mindfulness of Mind |             |                    |             | State Mindfulness of Body |                   |         |    |        |  |
|---|---------------------------|-------------|--------------------|-------------|---------------------------|-------------------|---------|----|--------|--|
|   | $\beta$                   | SE          | 95% CI             | $\beta$     | SE                        | 95% CI            | $\beta$ | SE | 95% CI |  |
| <b>Observing</b>  |                           |             |                    |             |                           |                   |         |    |        |  |
| Non-reactivity  | .143                      | .116        | -0.09, 0.38        | .012        | .114                      | -0.22, 0.24       |         |    |        |  |
| R <sup>2</sup>  | <b>.381</b>               |             |                    | <b>.397</b> |                           |                   |         |    |        |  |
| <b>Acting with Awareness</b>  |                           |             |                    |             |                           |                   |         |    |        |  |
| Constant  | -.113                     | .134        | -0.38, 0.15        | -.358       | .132                      | -0.62, -0.01      |         |    |        |  |
| Acting with Awareness   | -.065                     | .178        | -0.42, 0.29        | -.190       | .175                      | -0.54, 0.16       |         |    |        |  |
| Frequency of Mindfulness Meditation                                       | .001                      | .145        | -0.29, 0.29        | .049        | .142                      | -0.23, 0.33       |         |    |        |  |
| Mindfulness Condition   | .185                      | .179        | -0.17, 0.54        | <b>.634</b> | <b>.176</b>               | <b>0.28, 0.98</b> |         |    |        |  |
| Acting with Awareness × Frequency of Mindfulness Meditation               | -.220                     | .137        | -0.49, 0.05        | -.263       | .135                      | -0.53, 0.01       |         |    |        |  |
| Acting with Awareness × Mindfulness Condition                             | .269                      | .206        | -0.17, 0.54        | .402        | .203                      | -0.001, 0.81      |         |    |        |  |
| Frequency of Mindfulness Meditation × Mindfulness Condition               | .093                      | .185        | -0.14, 0.68        | .004        | .182                      | -0.36, 0.37       |         |    |        |  |
| Awareness × Frequency of Mindfulness Meditation × Mindfulness Condition   | .286                      | .189        | -0.09, 0.66        | .346        | .186                      | -0.02, 0.72       |         |    |        |  |
| Observing   | <b>.309</b>               | <b>.110</b> | <b>0.09, 0.53</b>  | <b>.368</b> | <b>.108</b>               | <b>0.15, 0.58</b> |         |    |        |  |
| Describing  | <b>.260</b>               | <b>.115</b> | <b>0.03, 0.49</b>  | .213        | .113                      | -0.02, 0.44       |         |    |        |  |
| Non-judging   | -.219                     | .115        | -0.45, 0.01        | -.173       | .113                      | -0.40, 0.05       |         |    |        |  |
| Non-reactivity  | .197                      | .119        | -0.04, 0.43        | .090        | .117                      | -0.14, 0.33       |         |    |        |  |
| R <sup>2</sup>  | <b>.397</b>               |             |                    | <b>.413</b> |                           |                   |         |    |        |  |
| <b>Non-judging</b>  |                           |             |                    |             |                           |                   |         |    |        |  |
| Constant  | -.081                     | .131        | -0.34, 0.18        | -.325       | .127                      | -0.58, -0.07      |         |    |        |  |
| Non-judging   | -.277                     | .165        | -0.61, 0.05        | -.321       | .161                      | -0.64, -0.001     |         |    |        |  |
| Frequency of Mindfulness Meditation                                       | -.012                     | .141        | -0.29, 0.27        | .035        | .137                      | -0.24, 0.31       |         |    |        |  |
| Mindfulness Condition   | .165                      | .175        | -0.18, 0.51        | <b>.615</b> | <b>.170</b>               | <b>0.28, 0.95</b> |         |    |        |  |
| Non-judging × Frequency of Mindfulness Meditation                         | -.484                     | .172        | -0.83, -0.14       | -.573       | .168                      | -0.91, -0.24      |         |    |        |  |
| Non-judging × Mindfulness Condition                                       | .165                      | .201        | -0.28, 0.51        | .273        | .196                      | -0.12, 0.66       |         |    |        |  |
| Frequency of Mindfulness Meditation × Mindfulness Condition               | .125                      | .183        | -0.24, 0.49        | .016        | .178                      | -0.34, 0.37       |         |    |        |  |
| Non-judging × Frequency of Mindfulness Meditation × Mindfulness Condition | <b>.449</b>               | <b>.224</b> | <b>0.002, 0.90</b> | <b>.643</b> | <b>.219</b>               | <b>0.21, 1.08</b> |         |    |        |  |
| Observing   | <b>.319</b>               | <b>.107</b> | <b>0.11, 0.53</b>  | <b>.360</b> | <b>.104</b>               | <b>0.15, 0.57</b> |         |    |        |  |
| Describing  | .218                      | .110        | -0.000, 0.44       | .153        | .107                      | -0.06, 0.37       |         |    |        |  |
| Acting with awareness   | .096                      | .116        | -0.14, 0.33        | .045        | .113                      | -0.19, 0.27       |         |    |        |  |

|  | State Mindfulness of Mind |             |                   |             | State Mindfulness of Body |                   |         |    |        |
|--|---------------------------|-------------|-------------------|-------------|---------------------------|-------------------|---------|----|--------|
|  | $\beta$                   | SE          | 95% CI            | $\beta$     | SE                        | 95% CI            | $\beta$ | SE | 95% CI |
| <i>Observing</i>   |                           |             |                   |             |                           |                   |         |    |        |
| Non-reactivity   | .187                      | .124        | -0.06, 0.43       | .118        | .121                      | -0.12, 0.36       |         |    |        |
| R <sup>2</sup>   | <b>.426</b>               |             |                   |             |                           |                   |         |    |        |
| <i>Non-reactivity</i>  |                           |             |                   |             |                           |                   |         |    |        |
| Constant   | -.118                     | .138        | -0.39, 0.16       | -.359       | .138                      | -0.63, -0.83      |         |    |        |
| Non-reactivity   | .171                      | .168        | -0.17, 0.51       | .024        | .168                      | -0.31, 0.36       |         |    |        |
| Frequency of Mindfulness Meditation  | .001                      | .157        | -0.31, 0.31       | .048        | .157                      | -0.27, 0.36       |         |    |        |
| Mindfulness Condition  | .187                      | .187        | -0.19, 0.56       | <b>.621</b> | <b>.187</b>               | <b>0.25, 0.99</b> |         |    |        |
| Non-reactivity × Frequency of Mindfulness Meditation                         | .001                      | .144        | -0.29, 0.29       | -.020       | .144                      | -0.31, 0.27       |         |    |        |
| Non-reactivity × Mindfulness Condition                                       | -.064                     | .219        | -0.50, 0.37       | -.048       | .219                      | -0.49, 0.39       |         |    |        |
| Frequency of Mindfulness Meditation × Mindfulness Condition                  | .130                      | .196        | -0.26, 0.52       | .063        | .196                      | -0.33, 0.45       |         |    |        |
| Non-reactivity × Frequency of Mindfulness Meditation × Mindfulness Condition | .079                      | .207        | -0.33, 0.49       | .187        | .207                      | -0.23, 0.60       |         |    |        |
| <i>Observing</i>   |                           |             |                   |             |                           |                   |         |    |        |
| Observing  | <b>.349</b>               | <b>.111</b> | <b>0.13, 0.57</b> | <b>.408</b> | <b>.110</b>               | <b>0.19, 0.63</b> |         |    |        |
| Describing   | .227                      | .118        | -0.01, 0.46       | .175        | .118                      | -0.06, 0.41       |         |    |        |
| Acting with awareness  | .098                      | .127        | -0.15, 0.35       | .052        | .126                      | -0.20, 0.30       |         |    |        |
| Non-judging  | -.214                     | .118        | -0.45, 0.02       | -.161       | .118                      | -0.40, 0.08       |         |    |        |
| R <sup>2</sup>   | <b>.368</b>               |             |                   |             | <b>.367</b>               |                   |         |    |        |

Note. Significant effects are in bold typeface for emphasis and were determined by a 95% bias-corrected bootstrapped confidence interval that does not contain zero. Mindfulness condition was coded 0 = control condition and 1 = mindfulness condition. All other mindfulness facets were entered as covariates within each model examining unique mindfulness facets.