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## Mindfulness Changes Construal Level: An Experimental Investigation

Eugene Y. Chan and Yitong Wang

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## BRIEF REPORT

## Mindfulness Changes Construal Level: An Experimental Investigation

Eugene Y. Chan  
Monash UniversityYitong Wang  
University of Technology Sydney

Mindfulness involves paying attention to the present moment and accepting any thoughts or feelings that might arise without judgment. Mindfulness can influence a number of outcomes. Currently, we are interested if it influences people's level of mental construal. Two central dimensions of mindfulness (focusing on the present, and Openness to Experience) can lead to diverging predictions. While focusing on the present may produce a concrete construal level, openness to experience may facilitate an abstract construal level instead. We conducted 2 experiments to test the effect of a brief mindfulness induction on construal level. Mindfulness prompted participants to think more abstractly (Experiment 1), which was mediated by Openness to Experience (Experiment 2). Thus, mindfulness may prompt how people process information more broadly. We situate our research in the broader literature on mindfulness and reconcile our findings with previous work.

*Keywords:* mindfulness, construal level theory, abstraction, Openness to Experience

*Supplemental materials:* <http://dx.doi.org/10.1037/xge0000654.supp>

In the past decade or so, there has been an increasing body of work examining the consequences of mindfulness on attention (Chiesa, Calati, & Serretti, 2011), memory (Jha, Stanley, Kiyonaga, Wong, & Gelfand, 2010; Mrazek, Franklin, Phillips, Baird, & Schooler, 2013), stress (Brown & Ryan, 2003; Kiken & Shook, 2011), and self-awareness (Vago & Silbersweig, 2012), among others. However, these outcomes are relatively specific effects on behavior or cognition. It is not known if mindfulness affects broader cognitive processes that can encompass multiple outcomes.

We examine if mindfulness affects people's construal levels. Construal level theory (CLT; Trope & Liberman, 2000, 2010) states that people can mentally represent or "construe" stimuli at either a concrete or an abstract level. At a concrete level, people focus on the narrow details, but on the big picture at an abstract level. For example, people can construe "reading" concretely as following lines of print or abstractly as gaining knowledge (Vallacher & Wegner, 1987). CLT can predict myriad outcomes such as categorization (Lieberman, Sagristano, & Trope, 2002), empathy (Wolfin, Corneille, Yzerbyt, & Förster, 2011), and social perception (Nussbaum, Trope, & Liberman, 2003). Therefore, if mind-

fulness can affect construals, then it may offer a holistic explanation for at least some effects of mindfulness, such as why mindfulness might enhance morality (Ruedy & Schweitzer, 2010) and counteract self-control depletion (Friese, Messner, & Schaffner, 2012), given that CLT can predict morality (Eyal, Liberman, & Trope, 2008) and affect self-control (Schmeichel, Vohs, & Duke, 2011). It may predict others effects as well, given that CLT shapes other outcomes including risk attitudes (Sagristano, Trope, & Liberman, 2002) and consumption choices (Fiedler, 2007).

Mindfulness involves "paying attention in a particular way: on purpose, in the present moment, nonjudgmentally" (Kabat-Zinn, 1994, p. 4). Mindfulness consists of two aspects that are conceptualized as (a) attention to the present moment, and (b) an openness to and acceptance of thoughts and feelings in a nonjudgmental way (Bishop et al., 2004; Kabat-Zinn, 1990, 1994). Being mindful usually involves focusing on one's internal or bodily sensations to facilitate the openness and acceptance of thoughts or feelings. Interestingly, these two dimensions can lead to opposing predictions on construal level.

The first dimension has been described as "watchfulness, the lucid awareness of each event that presents itself on the successive occasions of experience" (Bodhi, 2011, p. 21). Thus, mindfulness may facilitate concrete construals as the "present moment" is low psychological distance, which is one of the antecedents to thinking concretely (Brown & Ryan, 2003; Trope & Liberman, 2000; Watkins, 2015b). Several mindfulness outcomes are consistent with concrete construals. For example, mindfulness can increase the ability to recall emotional events (Heeren, Van Broeck, & Philippot, 2009; Williams, Teasdale, Segal, & Soulsby, 2000) and

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 Eugene Y. Chan, Monash Business School, Monash University; Yitong Wang, UTS Business School, University of Technology Sydney.

Correspondence concerning this article should be addressed to Eugene Y. Chan, Monash Business School, Monash University, 26 Sir John Monash Drive, Caulfield East, VIC 3145, Australia. E-mail: [eugene.chan@monash.edu](mailto:eugene.chan@monash.edu)

facilitate attention (Chiesa et al., 2011). In a similar vein, concrete construal levels reduce recall of overgeneral memories and increase autobiographical memory specificity (Watkins & Teasdale, 2001, 2004), while attention involves a concrete level of thinking (Chan & Maglio, 2019).

However, being mindful also involves being open to experiences (Bishop et al., 2004). Although being open to novel experiences has not been linked to construal levels directly, it requires people to process unfamiliar information, which is linked to abstraction since greater abstract thinking facilitates the understanding of novel stimuli (Mrkva, Travers, & Van Boven, 2018). Thus, mindfulness may lead to abstraction. Several mindfulness outcomes are consistent with abstract construals: less reactivity to emotional stimuli (Britton, Shahar, Szepsenwol, & Jacobs, 2012; Williams, Stein, & Galguera, 2014), greater self-regulation ability (Bowlin & Baer, 2012; Fujita, Trope, Liberman, & Levin-Sagi, 2006), positive affect (Brown & Ryan, 2003; Labroo & Patrick, 2009), and greater creativity (Lebuda, Zabelina, & Karwowski, 2016).

Table 1 presents a brief review of the mindfulness literature showing inconsistent findings regarding the possible link between mindfulness and construals. Thus, we remain agnostic as to how mindfulness can influence construals. The problem is exacerbated by how many studies have measured trait mindfulness, making causation difficult to ascertain. This motivated us to manipulate a brief mindfulness state to directly test the impact of mindfulness on people's construals and the likely mechanism.

## Experiment 1

We manipulated a brief mindfulness state with a 15-min audio track (Hafenbrack, Kinias, & Barsade, 2014) and measured construals using the Behavioral Identification Form (BIF; Vallacher & Wegner, 1987) to determine if mindfulness affects construals.

## Method

**Procedure.** We recruited 154 students ( $M_{\text{age}} = 19.98$  years old,  $SD = 2.21$ ; 84 men, 68 women, 2 undisclosed); they received course credit. We calculated our sample size with G\*Power (Version 3.1.9.23.1.9.2) with an estimated effect size of .50, alpha of .05, and power of .90.<sup>1</sup> The sample size needed was 140. We recruited 10% more in case we needed to exclude participants with incomplete responses. However, generalized linear model assumptions were met with no data missingness. We received ethics approvals from Monash University and University of Technology Sydney. There were 77 students in the mindfulness and 77 in the mind-wandering condition. We considered the latter as an active control as mind-wandering represents a baseline mental state (Winning & Boag, 2015).

Seated in cubicles, students were randomly assigned to listen to an audio track using headphones. In the mindfulness condition, participants listened to a 15-min audio recording (Hafenbrack et al., 2014) featuring a guided meditation exercise suitable for people with no mindfulness experience, instructing them through a breathing exercise. In the control condition, students listened to a 15-min audio track that induced mind wandering (Hafenbrack et al., 2014), instructing them to follow their thoughts, replicating a waking baseline mental state (Mason et al., 2007). A timer pre-

vented students from proceeding onto the next task (Hafenbrack et al., 2014).

All participants then completed the BIF. On this task, students were presented with 25 target behaviors that they could redescribe in either the narrow, discrete terms or the global, superordinate terms. For example, "painting a room" could be redescribed concretely in terms of "applying brush strokes" or abstractly as "making the room look fresh." The BIF is a widely adopted measure of construal level (Hansen & Trope, 2013; Shaeffer, Libby, & Eibach, 2015).

As a manipulation check, students indicated the extent that, while they were answering the questions, they (a) focused on their breathing, (b) focused on the physical sensations of breathing, and were (c) in touch with their body, each on 9-point scales (1 = *Not at All* to 9 = *Very Much*; Hafenbrack et al., 2014). Students were fully debriefed, then dismissed. None of them indicated any suspicion about the study.

## Results

We averaged the manipulation check statements ( $\alpha = .84$ ). Mindful trainees scored higher ( $M = 6.58$ ,  $SD = 1.29$ ) than mind-wandering ones ( $M = 5.39$ ,  $SD = 1.65$ ),  $t(152) = 5.02$ ,  $p < .001$ ,  $d = .80$ . This result indicated that the manipulation was successful.

On the BIF,<sup>2</sup> we summed up the number of abstract choices that students chose to redefine each of the 25 target activities. A higher score (out of 25) indicated a more abstract construal. Mindful trainees scored higher ( $M = 18.55$ ,  $SD = 3.09$ ) than mind-wandering participants ( $M = 17.39$ ,  $SD = 2.68$ ),  $t(152) = 2.48$ ,  $p = .01$ ,  $d = .40$ . Thus, mindful trainees showed more abstract construal compared with mind-wandering participants.

## Discussion

Mindfulness may lead to an abstract level of construal, compared to mind wandering. However, might mind wandering exert the opposite effect? Thus, we next included an inert control condition. Further, we examine if Openness To Experience can mediate the effect, per our reasoning.

## Experiment 2

In Experiment 2, in addition to adding an inert control condition and testing the likely mechanism, we used written instructions to induce mindfulness to generalize the effect beyond audio clips. We also measured construal in terms of whether participants were processing visual shapes globally or locally (Gasper & Clore, 2002) to generalize the effect beyond scores on the BIF. Lastly, since mindfulness leads to relaxation (Amutio, Martínez-Taboada, Hermosilla, & Delgado, 2015), which produces abstract construals (Pham, Hung, & Gorn, 2011), we measured relaxation as well.

<sup>1</sup> Hafenbrack et al. (2014) and Hafenbrack and Vohs (2018) also used audio manipulations, reporting effect sizes of around  $d = .50$  for various outcomes (e.g., sunk cost, task motivation), thus we reasoned similar effect sizes for our focal outcome of interest, BIF scores.

<sup>2</sup> Our Levene's test shows  $L = .100$ ,  $p = .75$  on the BIF mean between the two groups (mindfulness and mind-wandering), thus indicating homogeneity of variance.

Table 1  
*Brief Review of the Mindfulness Literature Indicating Possible Relation to Construal Level*

Article	Participants	Random assignment?	Measured/manipulated mindfulness	Main findings	Possible relation to construal level
Current research	Healthy students	Yes	Audio induction (Study 1); text induction (Study 2)	Greater BIF (Study 1), KPT scores (Study 2)	Abstract
Crane, Winder, Hargus, Amarasinghe, and Barnhofer (2012)	Depressed patients	Yes	Mindfulness-based CBT	Enhanced life-goal specificity	Concrete (Ülkümen & Cheema, 2011)
Hargus, Crane, Barnhofer, and Williams (2010)	Depressed patients	Yes	Mindfulness-based CBT	Greater meta-awareness and memory specificity	Concrete (Watkins & Teasdale, 2001, 2004)
Heeren et al. (2009)	Healthy adults, but interested in mindfulness	Matched sample	Mindfulness training	Reduces overgeneral memories, increases autobiographic memories	Concrete (Watkins & Teasdale, 2001, 2004)
Williams et al. (2000)	Depressed patients	Yes	Mindfulness-based CBT	Reduces overgeneral memories	Concrete (Watkins & Teasdale, 2001, 2004)
Berry et al. (2018)	Healthy Students	N/A (Study 1); Yes (Studies 2–4)	MAAS scale (Study 1); Audio induction (Studies 2–4)	Fostered prosociality toward ostracized strangers	Abstract (Agerström & Björklund, 2009)
Brewer et al. (2011)	Smokers interested in quitting	Yes	Mindfulness training	Reduced smoking frequency	Abstract (Chiou, Wu, & Chang, 2013)
Chambers, Lo, and Allen (2008)	Healthy adults, interested in mindfulness	Matched sample	Mindfulness training	Greater sustained attention; greater working memory capacity	Sustained attention: concrete (Chan & Maglio, 2019; Schmeichel et al., 2011); working memory capacity: abstract (Kane & Engle, 2003; Schmeichel et al., 2011)
Chan (2019)	Healthy students	Yes	Audio induction	Greater sustainability	Abstract (Reczek, Trudel, & White, 2018)
	Healthy adults (Study 1); healthy students (Study 2, 3)	N/A (longitudinal; Study 1); yes (Study 2)	MAAS scale (Study 1); audio induction (Study 2); text induction (Study 3)	Reduced insect-eating attitudes via greater disgust	Abstract (van Dijke, van Houwelingen, De Cremer, & De Schutter, 2018)
Feldman, Greeson, and Senville (2010)	Healthy students	Yes	Audio induction	Reduced reactivity to repetitive thoughts	Abstract (Schwartz, Eyal, & Tamir, 2018)
Friese et al. (2012)	Healthy adults	Yes	Guided meditation	Counteracted self-control depletion	Abstract (Fujita & Carnevale, 2012)
Geschwind, Peeters, Drukker, van Os, and Wichers (2011)	Depressed patients	No	Mindfulness-based CBT	Greater positivity	Abstract (Labroo & Patrick, 2009)
Hafenbrack and Vohs (2018)	Healthy adults	Yes	Audio induction (Study 1, 2, 4); body scan meditation (Study 3)	Reduced motivation, no impact on performance	Abstract (Bohm-Bawerk, 1889; Ekman & Lundberg, 1971)
Hafenbrack et al. (2014)	Healthy adults	N/A (Study 1); Yes (Studies 2a, 2b, and 3)	MAAS scale (Study 1); audio induction (Studies 2a, 2b, 3)	Reduced sunk cost	Abstract (Wakslak, Liberman, & Trope, 2006)
Kiken and Shook (2011)	Healthy students	N/A (Study 1); yes (Study 2)	FFMQ scale (Study 1); audio induction (Study 2)	Greater positivity, reduced negativity	Abstract (Labroo & Patrick, 2009)
Kiken and Shook (2014)	Healthy students	N/A (Study 1); yes (Study 2)	FFMQ scale (Study 1); audio induction (Study 2)	Reduced negativity	Abstract (Labroo & Patrick, 2009)
Ruedy and Schweitzer (2010)	Healthy students	N/A	MAAS scale	Greater morality	Abstract (Eyal et al., 2008)
Shapiro, Jazaieri, and Goldin (2012)	Healthy students	N/A (longitudinal)	Mindfulness training	Greater morality	Abstract (Eyal et al., 2008)
Singh et al. (2011)	Smoker with mild intellectual disabilities interested in quitting	N/A (longitudinal)	Mindfulness training	Reduced smoking frequency	Abstract (Chiou et al., 2013)

*Note.* CBT = cognitive behavioral therapy; BIF = Behavioral Identification Form; KPT = Kimchi-Palmer Task; MAAS = Mindful Attention Awareness Scale; FFMQ = Five Facet Mindfulness Questionnaire.

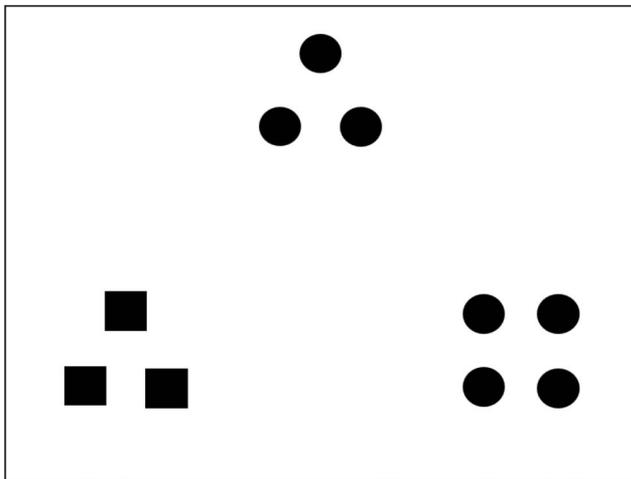
## Method

**Procedure.** We recruited 171 undergraduates ( $M_{\text{age}} = 20.26$  years old,  $SD = 1.52$ ; 77 men, 94 women). We determined our sample size using G\*Power, an estimated effect size of  $f = .30$ , probability of .05, power of .90, with  $df = 2$ , and three groups. The sample size required was 144. Because we sought to maximize power, we recruited 200 students, but only 171 showed up. Four students did not answer questions in full, and thus their data were excluded. We received ethics approvals from Monash University and University of Technology Sydney. There were 56 students in the mindfulness group, 55 in the mind-wandering one, and 56 in the control; the manipulations were assigned randomly.

Text instructions designed to induce a mindful or mind-wandering state were shown on computer screens; the instructions, based on the audio tracks from Hafenbrack et al. (2014), were from Chan (2019). In both groups, enforced by a timer, students spent 10 min following the instructions. In the control condition, students did not read any instructions but simply proceeded to the dependent measures.

Then, to measure construal levels, we used the Kimchi-Palmer Task (KPT; Kimchi & Palmer, 1982). Abstract construals are closely connected to global processing, while concrete construals correspond to local processing (Hansen & Melzner, 2014; Rim et al., 2015). On the KPT, there is a target image shown. Participants indicated which of two other images was most similar to the target image. The two figures matched the focal one at the feature (local, concrete match) or configural level (global, abstract match). Choosing the global figure indicated a more abstract construal. We presented 10 such images. The figures and the left-right placement of the figures were randomized across participants (Figure 1).

Then, we measured Openness to Experience using the 10-item version of the Big Five Inventory (BFI; John & Srivastava, 1999).



**Figure 1.** Experiment 2: Kimchi-Palmer Task (KPT) example. On the KPT (Kimchi & Palmer, 1982), participants indicate which of the two shapes along the bottom is most similar to the one at the top. In this case, if participants choose the former (three square arranged in a triangle), because the overall shape (triangle) is similar, they are said to be processing the images globally. If they choose the latter, because the individual shape (circle) is similar, they are said to be processing the images locally.

Personality traits are usually stable, but situational contexts can influence them, including openness, at least temporarily (Sparkman, Eidelman, & Blanchar, 2016; van Tilburg, Sedikides, & Wildschut, 2015). Thus, a brief mindfulness induction might temporarily change students' openness levels. To measure relaxation, we asked students how relaxed they felt (1 = *Not at All*, 9 = *Very Much*). Openness was measured first, then relaxation. Students were debriefed and then dismissed. None indicated any suspicion about the study.

## Results

Table 2 presents the correlations of all measured dependent variables.

We totaled the number of global figures chosen on the KPT.<sup>3</sup> The difference across the three groups was significant,  $F(1, 164) = 3.23, p = .04, d = .28$ . Mindful trainees scored higher ( $M = 3.86, SD = 2.18$ ) than mind-wandering students ( $M = 3.02, SD = 1.99$ ),  $t(109) = 2.11, p = .03, d = .40$ , as well as those in the control condition ( $M = 2.95, SD = 2.21$ ),  $t(110) = 2.23, p = .03, d = .42$ . Mindful trainees also scored higher than the average of the mind-wandering and control groups ( $M = 2.95, SD = 2.05$ ),  $t(165) = 2.54, p = .01, d = .39$ . There was no difference between the mind-wandering and the control group ( $p = .85$ ). Please see the online supplemental materials for further analyses. In summary, mindful trainees scored higher on abstraction than both mind-wandering participants and those in the control.

We then formed subscales for Openness to Experience ( $r = .86$ ), Conscientiousness ( $r = .92$ ), Extraversion ( $r = .89$ ), Agreeableness ( $r = .91$ ), and Neuroticism ( $r = .88$ ) from the BFI (Table 3). Mindfulness increased scores on Openness compared to mind-wandering and control. Mindful trainees scored higher on Openness ( $M = 4.43, SD = 2.13$ ) than those in the mind-wandering ( $M = 3.36, SD = 2.14$ ),  $t(109) = 2.62, p = .01, d = .50$ , and those in the control groups ( $M = 3.20, SD = 1.87$ ),  $t(110) = 3.24, p < .01, d = .61$ ,  $F(1, 164) = 5.90, p < .01, d = .38$ . There was no difference between the mind-wandering and control groups ( $p = .66$ ). Thus, mindful trainees scored higher on our presumed mediating variable than mind-wandering participants and those in the control.

We then averaged the responses to our measures of relaxation. There was a marginally significant difference across the three conditions,  $F(1, 164) = 2.78, p = .07, d = .26$ . Mindful trainees scored higher ( $M = 4.45, SD = 1.79$ ) than those in the mind-wandering ( $M = 3.65, SD = 2.05$ ),  $t(109) = 2.16, p = .03, d = .41$ , and those in the control groups ( $M = 3.71, SD = 2.00$ ),  $t(110) = 2.23, p = .05, d = .38$ . There was no difference between those in the mind-wandering and control groups ( $p = .88$ ).

Furthermore, the correlations between Openness to Experience and KPT scores were significant but only moderately high,  $r = .43, p < .001$ , fulfilling the criteria for meaningful mediation (Pieters, 2017). Therefore, we tested the possible mediating effects of both Openness to Experience and relaxation in explaining why

<sup>3</sup> Our Levene's test shows  $L = .25, p = .77$  on the KPT means between the three groups (mindfulness, mind-wandering, control), thus indicating homogeneity of variance.

Table 2  
Experiment 2: Correlations Between Measured Variables

Construct	KPT	Relaxation	Openness	Conscientiousness	Extraversion	Agreeableness	Neuroticism
KPT		-.01	.43*	.12	.41*	.41*	.26*
Relaxation			.01	.14	-.02	.10	.003
Openness				.26*	.37*	.32*	.29*
Conscientiousness					.06	.19*	.18*
Extraversion						.32*	.29*
Agreeableness							.11
Neuroticism							

Note. KPT = Kimchi-Palmer Task.

\*  $p < .05$ .

mindfulness, compared to mind-wandering and control groups, increases abstraction. Given no differences between mind-wandering and the control group on our dependent variables, we collapsed them into a single baseline group. We included all five Big Five personalities as well as relaxation in a parallel mediation analysis, utilizing Model 4 of Hayes' (2013) bootstrapping protocols. At the 99% confidence interval (CI) and with 10,000 bootstrapped samples, the results are presented in Table 4. Only the indirect effect of Openness mediated the effect of mindfulness on abstraction as it was estimated between .03 and .52. Thus, mindfulness increased global processing via Openness to Experience rather than other personality traits or relaxation. Please refer to the online supplemental materials for further analyses.

## Discussion

We again find that mindfulness facilitates an abstract construal. It likely does so by facilitating Openness to Experience. Relaxation and other personality traits do not explain the effect.

### General Discussion

This research presents evidence that mindfulness can shape construal level, specifically by inducing abstraction (Experiment 1). The effect likely arises because mindfulness enhances openness to experience (Experiment 2). Two further experiments (see the online supplemental materials) provide more evidence of mindfulness inducing abstraction, while also ruling out self-awareness (Vago & Silbersweig, 2012) and style of processing (Bishop et al., 2004; Hölzel et al., 2011) as alternative mechanisms.

Why might mindfulness not induce concrete construals, in line with a greater focus on the present moment? Dreyfus (2011) argued that the terms "present" and "present moment" do not mean orienting to the temporal or psychological present; rather, it is a term to capture the experience of considering all matters, thoughts, and emotions so long as they are relevant to the object. Matters, thoughts, or emotions can be in the past or future, not just the present. To Dreyfus (2011), mindfulness is the ability of the mind to "retain its object and not float away from it" (p. 51). Thus, the term present is a misnomer as it may not represent low psychological distance in CLT terms.

How can we reconcile our results with others suggesting that mindfulness might lead to concrete construals? First, much of extant work measures mindfulness as a trait, which makes it difficult to determine causal effects. Thompson and Waltz (2007) reported that, in line with our findings, mindfulness meditation increases Openness to Experience, measured using the Revised NEO Personality Inventory (NEO-PI; Costa & McCrae, 1995), but trait mindfulness did not correlate with Openness. Second, many existing studies on mindfulness has typically recruited psychiatric populations (Watkins, 2015a); less is known about how it affects healthy adults. Revisiting Table 1, we interpret our review of the literature, though brief, as offering support for abstraction from mindfulness with healthy adults recruited for a randomized experimental mindfulness induction. But, there still are many inconsistent findings, providing a rich ground for future research. For example, if the greater attention to the present moment is somehow stronger than the openness to experiences, then mindfulness can conceivably produce greater concrete construals.

Table 3  
Experiment 2: Big Five Personality Results

Construct	Openness	Conscientiousness	Extraversion	Agreeableness	Neuroticism
Mindfulness	4.43 (2.13)	4.02 (2.07)	4.70 (2.33)	4.27 (2.39)	3.48 (1.84)
Mind wandering	3.36 (2.14)	3.58 (2.00)	4.47 (2.38)	4.75 (2.34)	3.62 (2.06)
Control	3.20 (1.87)	3.66 (2.01)	3.93 (2.15)	4.29 (2.34)	3.00 (1.75)
$F(1, 164)$	5.90	.72	1.65	.72	1.63
$p$ value	<.01	.48	.19	.48	.20
Cohen's $d$	.53	.19	.28	.19	.28

Note. Results comparing mindfulness, mind-wandering, and the control on each of the Big Five personality dimensions: Openness to Experience, Conscientiousness, Extraversion, Agreeableness, and Neuroticism. Standard deviations are presented in the parentheses. The  $p$  values and Cohen's  $d$  are across all three conditions.

Table 4  
*Experiment 2: Indirect Effects in Mediation Analysis*

Construct	Effect	SE	99% CI	
			LL	UL
Openness to Experience	.23	.12	.03	.52
Conscientiousness	-.01	.03	-.09	.06
Extraversion	.08	.08	-.04	.27
Agreeableness	-.06	.10	-.29	.14
Neuroticism	.02	.05	-.05	.15
Relaxation	-.04	.06	-.18	.07

*Note.* The mediation analysis was conducted at the 99% confidence interval (CI) with 10,000 bootstrapped samples using Model 4 of Hayes (2013) to test for possible parallel mediating effects of all five dimensions on the Big Five Inventory and relaxation. LL = lower limit; UL = upper limit.

The difficulty in assessing the likely effects of mindfulness on construal is exacerbated by how mindfulness has multiple dimensions, though most conceptualizations (Baer et al., 2008) include “the present moment” and “openness to experiences.” Thus, echoing Thompson and Waltz (2007), mindfulness might not be a “singular” term; different dimensions might lead to different construals. Further, Grossman and Van Dam (2011) argued that scientific studies of mindfulness, based in Western psychology, may not appropriately capture its original term that is based in Buddhist psychology (cf., Gethin, 2011; Mick, 2017). Our manipulations thus may not capture the construct appropriately either. Moreover, there is a distinction between mindfulness and meditation (Thompson & Waltz, 2007); we have not ruled out the possible role of meditation in our studies.

There are several directions that need future exploration. Although prior work has used personality traits as mediators in explaining psychological mechanism (Sparkman et al., 2016; van Tilburg et al., 2015), we acknowledge the limitation of the current design, since we used correlational analyses. Manipulating Openness to Experience using experimental methods (Spencer, Zanna, & Fong, 2005) would better future researchers to test for causation. Further, we used a two-item measure of Openness, which does not capture various types of Openness such as liberalism, creativity, and Extraversion. Thus, our work replicates Thompson and Waltz (2007), who used the NEO-PI and showed similar effects on Openness, but more is needed to assess the specific types of Openness that (state) mindfulness might influence. Indeed, there are other measures of Openness. Openness can involve thinking in a complex or deep manner (John & Srivastava, 1999), which relates to thinking in a narrow, discrete manner, suggesting concrete construals; we are unable to determine this with a two-item measure of Openness. Finally, we acknowledge that the current studies are not able to explain all the results in Table 1. We encourage more experimental work on mindfulness to further examine these effects and explore newer ones.

### Context of This Research

EYC has conducted other research on the impact of mindfulness on other choices and decisions, but in specific outcomes, motivating him to inquire the impact of mindfulness on choices and decisions broadly. YW conducts research in decision making and

is interested in how a variety of factors change how people make choices. Together, EYC and YW have researched other topics in decision making. They plan on further research on other outcomes of mindfulness and to establish its potential moderators and boundaries as it is such a broad construct with more empirical work needed. A question of interest is the definition of mindfulness. The current work suggests two possible effects depending on how mindfulness is manipulated. Thus, it may be that mindfulness is not a singular concept but encompasses two distinct aspects that should be treated separately.

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