

Mindfulness practice moderates the relationship between craving and substance use in a clinical  
sample

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**Abstract**

Mindfulness practice moderates the relationship between craving and substance use in a clinical sample

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**Objective:** Relapse following treatment for substance use disorders is highly prevalent, and craving has been shown to be a primary predictor of relapse. Mindfulness-based relapse prevention (MBRP) is a psychosocial aftercare program integrating mindfulness and cognitive-behavioral approaches, aimed at reducing the risk and severity of relapse. Results from a recent randomized clinical trial demonstrate enhanced remission resilience for MBRP participants versus both cognitive-behavioral and treatment-as-usual controls. The current study investigated between-session formal and informal mindfulness practice, a hypothesized primary mechanism of action in this treatment, as an attenuating factor in the relationship between craving and substance use. **Method:** Participants in this secondary analysis were 57 eligible adults who completed either inpatient treatment or intensive outpatient treatment for substance use disorders, were randomized in the parent study to receive MBRP, and completed relevant follow-up assessments. **Results:** For formal mindfulness practice at post-course, both number of days per week ( $p=.006$ ) and number of minutes per day ( $p=.010$ ) significantly moderated the relationship between craving at post-course and number of substance use days at 6-month follow up. Informal practice did not significantly influence the craving-use relationship in this analysis. **Conclusions:** These results indicate that increasing formal mindfulness practice may reduce the link between craving and substance use for MBRP participants and enhance remission resiliency. **Keywords:** addiction, mindfulness, craving, treatment, mechanism, MBRP

In 2013, an estimated 22.7 million Americans (8.6%) needed treatment for a problem related to alcohol or other drugs (National Institute on Drug Abuse, 2015). Treatment outcomes, however, are not particularly encouraging. Roughly 50% of those participating in treatment relapse to problematic substance use within 6 months of completing treatment (McKay & Weiss, 2001), and up to 80% of those who relapse experience an ongoing cycle of treatment, relapse, and problematic use (Scott, Foss, & Dennis, 2005).

Over the past several decades, treatment providers and researchers have begun to shift from a focus on abstinence only to decreasing the frequency and severity of relapse (Hendershot, Witkiewitz, George, & Marlatt, 2011; Larimer et al., 1998; Collins, Parks, & Marlatt, 1985).

Relapse Prevention (RP) is an example of this shift, from a traditional view of any substance use following treatment as a failure, to acknowledging and planning for the possibility of a lapse, and learning skills to reduce severity if a lapse does occur (Hendershot et al., 2011; Marlatt & Witkiewitz, 2005). The RP treatment protocol is based on biopsychosocial theory, the dynamic model of addictive relapse, and the incorporation of a harm reduction approach to treatment, designed to improve treatment outcomes by increasing the likelihood of remission maintenance and reducing negative consequences when relapse occurs (Larimer, Palmer, & Marlatt, 1999). The dynamic model consists of an interconnected system of specific traits (such as family history and cue-reactivity) and states (such as craving and negative affect) that influence the risk of relapse (Witkiewitz & Marlatt, 2007). Although the dynamic model is in many ways still young (Witkiewitz, 2011), the specific relationship between craving and subsequent substance use behavior has been identified across multiple levels of analysis, ranging from neuroscientific to psychosocial (Moore et al., 2014; Witkiewitz, Lustyk, & Bowen, 2013; Donovan & Witkiewitz, 2012). The relationship between craving and substance use has been identified as a particularly useful target for interventions that aim to reduce the likelihood and severity of relapse (Moore et al., 2014; Marhe, Waters, van de Wetering, & Franken, 2013; Witkiewitz & Bowen, 2010).

This article will briefly review literature on craving as a predictor of treatment outcome and mindfulness as an intervention for substance use disorders, and will report new evidence

supporting mindfulness practice as an active ingredient in mindfulness-based relapse prevention, moderating the relationship between craving and substance-related treatment outcomes.

### **Craving and Substance Use**

Several factors predict substance use following treatment; however, craving has been hypothesized to be one of the strongest and most consistent across diverse contexts and substances (Kavanagh & Connor, 2013). Craving can be defined as, "a cognitive event in which an object or activity that is associated with pleasure or relief of discomfort is in focal attention" (Kavanagh et al., 2013, p. 447). Craving as a cognitive construct has consistently predicted substance use outcomes following treatment, with a positive relationship between craving and the likelihood of substance use over the subsequent period (Kavanagh et al., 2013). For example, self-reported craving following treatment for alcohol use disorder was predictive of alcohol use during the subsequent week (Flannery, Poole, Gallop, & Volpicelli, 2003). In another trial, post-treatment craving for opioid dependence was predictive of opioid relapse (Tsui, Anderson, Strong, & Stein, 2014). Across substances of addiction, craving assessed by self-report questionnaire is a strong predictor of substance use following treatment.

Further studies have assessed both craving and use in real-time using ecological momentary assessment (EMA), enabling investigators to examine the link between craving and substance use with substantial ecological validity. A strong predictive relationship between craving and substance use has been established in a multitude of trials and settings with this method of assessment (Serre, Fatseas, Swendsen, & Auriacombe, 2015). For example, people reported craving and substance use following inpatient treatment for substance use disorders in a study based on the dynamic model of addiction relapse (Moore et al., 2014). Findings indicated that a period of high craving increased the likelihood of subsequent use 14 fold (Moore et al., 2014). Although different assessment methods may measure different facets of craving, and momentary craving may be a stronger predictor of use, the relationship between craving and use has been demonstrated across methods (Serre et al., 2015; Kavanagh et al., 2013).

For people in remission from a substance use disorder, craving may be the most difficult challenge to successful remission maintenance (Brewer, Elwafi, & Davis, 2014). Many treatments

for substance use disorder focus on identifying and avoiding high-risk situations that may trigger relapse (Larimer et al., 1999). While this strategy has been successful, avoidance of craving cues may not always be feasible (Moore et al., 2014). Thus, enhancing skillfulness in coping with craving through mindfulness practice may further improve long-term outcomes (Witkiewitz, Bowen, et al., 2014; Brewer et al., 2014).

### **Mindfulness-based Treatment for Substance Use Disorders**

Mindfulness practices have been incorporated into treatment for substance use disorder to improve remission maintenance (Bowen et al., 2014; Brewer et al., 2014; Garland et al., 2014; Witkiewitz, Bowen, Douglas, & Hsu, 2013; Zgierska et al., 2009). As a psychological construct, mindfulness can be described as a gentle, kind, and curious awareness of experience (Grossman, 2010). Mindfulness practices have played a central role in religious and spiritual traditions for at least several millennia (Hanh, 1998; Hart, 1987). In the Buddhist tradition, practice is intended to increase access to mindfulness, and help people experience freedom from craving and develop insight into the relationship between thoughts, emotions, and behaviors (Brewer, Davis, & Goldstein, 2012; Brewer et al., 2014; Hanh, 1998; Hart, 1987). Although attempts to operationalize mindfulness as a construct within modern Western psychology are ongoing (Kirk Warren Brown, Ryan, Loverich, Biegel, & West, 2011; Grossman & Van Dam, 2011; Grossman, 2010; Bishop et al., 2006; K. W. Brown, 2004; Baer, 2003), mindfulness practices have been effectively incorporated into various forms of mental health treatment with notable success (S. C. Hayes, 2003; Kabat-Zinn, 2003; Linehan et al., 1999; Teasdale et al., 2000), including treatment for substance use disorders (Bowen et al., 2014; Elwafi, Witkiewitz, Mallik, Iv, & Brewer, 2013; Garland et al., 2014).

For example, in one study with poly-substance users, participants who received mindfulness training were less likely to relapse one year after the intervention (Bowen et al., 2014). Further, those who had relapsed reported significantly fewer days of substance use or heavy drinking. In another study with tobacco smokers, people who received mindfulness training were more likely to maintain abstinence during the four-month follow-up (36% compared to 15%), and maintained a greater reduction in use over all compared to treatment as usual (Brewer et al.,

2011). In a subsequent randomized trial (Witkiewitz, Warner, et al., 2014) in a women's residential criminal justice addictions treatment program, participants in MBRP reported significantly fewer drug use days and fewer legal and medical problems compared to participants in RP.

Current theory suggests that including mindfulness practice in treatment may improve outcomes by altering the craving-use relationship (Brewer et al., 2014; Elwafi et al., 2013; Witkiewitz, Bowen, et al., 2013). Mindfulness Based Relapse Prevention (MBRP) is a treatment based on RP, and includes mindfulness practices focused on developing more skillful responses to craving (Bowen, Chawla, & Marlatt, 2011; Witkiewitz, Bowen, et al., 2013; Witkiewitz, Marlatt, & Walker, 2005). Mindfulness practices may increase the ability of individuals with substance use disorders to accept the unpleasant physical, affective and cognitive experiences of craving, and resist engaging in substance-seeking behavior to alleviate the discomfort (Witkiewitz et al., 2005). Indeed, recent behavioral and neurobiological models of addiction identify an associative learning loop reinforced by the relieving and enhancing effects of substance use to be at the core of the chronicity of relapse (Brewer et al., 2014; Field, Munafò, & Franken, 2009; Robinson & Berridge, 2008; Franken, 2003). Mindfulness practice may disrupt the relapse cycle by weakening the associative link between craving and use (Bowen et al., 2014; Elwafi et al., 2013; Ostafin, Bauer, & Myxter, 2012; Rogojanski, Vettese, & Antony, 2011).

The reduction of use observed in trials of mindfulness-based interventions might be partially achieved by an alteration in the relationship between craving and substance use behavior, whereby mindfulness training and ongoing mindfulness practice enables participants to experience in vivo exposure and response prevention (Bowen et al., 2014; Brewer et al., 2014; Garland, Gaylord, Boettiger, & Howard, 2010; Witkiewitz, Bowen, et al., 2014, 2013). Although treatment for substance use disorders frequently identify craving as dangerous and to be avoided or reduced, in mindfulness-based interventions the experience of craving is investigated through experiential practices. People are encouraged to observe their experience within sessions as an introduction to the practice of formal and informal skills and behavioral repertoires that increase mindfulness and acceptance outside of group meetings (Bowen et al., 2011). Mindfulness

practice may develop skillful coping via the awareness and acceptance of craving without self-distraction or behavioral disengagement, as hypothesized by behavioral and neurobiological models (Brewer et al., 2014; Witkiewitz, Lustyk, et al., 2013), and demonstrated in recent experimental findings (Grow, Collins, Harrop, & Marlatt, 2015; Moore et al., 2014; Elwafi et al., 2013; Ostafin et al., 2012),

### **Current Study**

The current study was designed to test mechanisms of action underlying mindfulness-based approaches to treatment for substance use disorders, using data from a randomized controlled trial (Bowen et al., 2014). While there has been a widespread incorporation of mindfulness into treatment for substance use disorders, and growing evidence to indicate that mindfulness-based interventions may provide additional protection from relapse, there still remains a dearth of evaluations of hypothesized mechanisms of action. This study will test a simple moderation hypothesis based on Buddhist philosophy (Hanh, 1998; Hart, 1987) and recent research (Grow et al., 2015; Garland et al., 2014; Moore et al., 2014; Elwafi et al., 2013; Witkiewitz & Bowen, 2010), whereby mindfulness practice moderates the relationship between craving and substance use following mindfulness training. We predict that the association between craving and use will be weakest for people who report higher levels of mindfulness practice.

## **Method**

### **Participants**

Participants in this secondary analysis were between the ages of 21 and 60, and had been recruited to participate in the larger parent MBRP efficacy trial (Bowen et al., 2014). All participants had previously completed either inpatient or intensive outpatient treatment, and were expected to attend aftercare. In order to be eligible for the study, participants had to have completed treatment during the previous two weeks, been fluent English speakers, and been medically cleared for participation. People were excluded from participation if they presented with psychosis or dementia, imminent danger to self or others, or had previously participated in MBRP trials.

**Recruitment and Screening**

People from the parent study who were randomized to the MBRP condition and participated in the 6-month follow-up (N=85) were included in the current study (See (Bowen et al., 2014)) for further detail). Given our hypotheses, only individuals with complete data for primary variables (N=57) were included in the current analysis; data from participants who reported impossible values on the practice questionnaire were excluded from the current analysis.

**MBRP Treatment**

In the parent study, MBRP was delivered as a weekly, eight-session group-based aftercare intervention to enhance remission maintenance following completion of either inpatient or intensive outpatient treatment. MBRP is a weekly, eight-session group-based treatment (See (Bowen et al., 2014)) for further detail).

**Measures****Demographic questionnaire.**

Demographics, such as age, gender, race, and ethnic background were used to describe the baseline samples.

**Substance use.**

The Timeline Followback (TLFB; (Sobell, Brown, Leo, & Sobell, 1996)) assessed substance use. The TLFB is a calendar-based form, where participants are asked to report on the quantity of their substance use during each of the 60 days prior to assessment. The TLFB has demonstrated reliability and validity both in-person and online administration (Roy et al., 2008). Because quantity of use is not equivalent between participants or substances, days of any substance use was summed and used as the primary outcome variable in the current analysis.

**Craving.**

The Penn Alcohol Craving Scale (PACS; (Flannery, Volpicelli, & Pettinati, 1999)) was adapted to include both alcohol and drug cravings. The PACS was used to assess frequency, intensity, and duration of cravings for any substances during the previous week. The PACS is a 5-item self-report questionnaire that has demonstrated reliability and validity as a unidimensional

measure. Internal consistency in the current sample was .91. The mean PACS score was used as a predictor variable in the current study.

### **Mindfulness practice.**

The MBRP Follow-up Practice Questionnaire (Bowen, unpublished) was used to evaluate how often and for how long people used different types of practice. For formal practices (sitting meditation, in a quiet place: body scan, awareness of breath/thoughts/sensations, mountain meditation), participants indicated number of days per week and total minutes per week. For informal practices (intentional mindfulness practice in the context of daily life or challenging situations: mindfulness of daily activity, urge surfing, "SOBER" breathing space), participants indicated number of days per week and total instances of practice per day. This measure provides a list of all mindfulness practices introduced in MBRP, and asks participants to indicate how many days during the past week they practiced each one. Participants also indicate how many times per day they engaged in informal practices, and how many minutes they engaged in formal practices on average per day. Four dimensions of mindfulness practice were predictor variables in the current study: (1) days per week of formal practice, (2) minutes per week of formal practice, (3) days per week of informal practice, (4) and times per day of informal practice.

### **Data Analysis Plan**

We used post-course data on mindfulness practice as predictors. Due to attrition at the 12-month follow-up, we used days of any substance use over the subsequent six-month period, for which we had more complete data, as the outcome. Linear multiple regression was used to test the hypothesized moderating effect of mindfulness practice on days of any substance use. Typical with substance use data following treatment, a significant proportion of the sample reported no substance use, resulting in a zero-inflated and positively skewed outcome variable. Zero-altered models were used to account for this distribution, and further test the reliability of our results (Atkins, Baldwin, Zheng, Gallop, & Neighbors, 2013). Specifically, the negative binomial hurdle regression model (HUNB) and zero-inflated negative binomial regression model (ZINB) were both used. Model fit was assessed using the Vuong test, a log-likelihood based model selection method for comparing model fit (Atkins et al., 2013).

## Results

### Baseline Demographics and Clinical Characteristics

Of 57 total participants in the current study, the majority was male (77.2%) with a mean age of 38 ( $SD = 11.1$ ). Over half of participants identified as white (63.16%), with more than one drug of choice (77.19%). Participants attended a mean of 4.95 ( $SD: 2.66$ ) out of 8 sessions. See Table 1 for model descriptive statistics.

### Associations Between Craving and Substance Use

The relationship between craving at post-intervention and substance use over the subsequent six-month period was examined using a multiple linear regression. Craving at post-intervention predicted subsequent days of use ( $p < .001$ ). For these individuals, higher craving at post-intervention was associated with increased substance use, such that a 1-point increase in craving predicted an increase of 13.08 days of substance use during the 180 days following treatment (Table 2).

### Mindfulness Practice as a Moderator of the Craving-use Relationship

To test whether mindfulness practice affected the relationship between craving and use, we used ordinary least squares (OLS) regression analyses with four separate moderation models for each unique dimension of practice: (1) formal days of practice per week, (2) formal minutes of practice per week, (3) informal days of practice per week, (4) informal times per day of practice. For all models, the outcome variable was days of any substance use during the six months following intervention.

The interaction between mindfulness practice and craving was significant for both formal mindfulness practice models. Days per week ( $p = .006$ ) and minutes per week ( $p = .010$ ) of formal practice moderated the relationship between craving and use: craving was less predictive of use for people who spent more time engaging in formal mindfulness practice, or did some formal practice on more days per week (Table 2). However, the interaction was not significant in the two informal mindfulness practice models (i.e., days and times of informal practice;  $p > .10$ ).

To account for the abundance of zeroes in the distribution, and test the stability of our results, we re-ran all models using ZINB and HUNB methods. Results were nearly identical

between ZINB and HUNB, and the Vuong test indicated that for all four models the HUNB method provided a better fit to the data (See Table 3). Results from the original OLS regression were comparable to the HUNB results. However, the influence of formal days of practice was the only moderation effect that remained statistically significant among the zero-altered models ( $p = .017$ ).

To better understand which of the three formal practices were affecting the relationship between craving and use, we completed three models with days of each formal practice type as the moderator: (1) body scan, (2) mountain meditation, (3) awareness of breath/thoughts/sensations. The interaction of craving with days of body scan practice ( $p = .043$ ) and days of awareness practice ( $p = .019$ ) were both significant. That is, as days of engagement in the body scan and awareness practices increased, the relationship between craving and days of use weakened.

## Discussion

### Summary of Current Findings

The goal of this study was to investigate whether or not mindfulness practice moderated the relationship between craving and use following a course of MBRP. Results indicated that both days of formal practice per week and minutes of formal practice per week reduced the strength of the relationship between craving and use. Although many investigators have hypothesized that mindfulness practice may decouple craving and subsequent use (Grow et al., 2015; Brewer et al., 2014; Garland et al., 2014; Witkiewitz, Bowen, et al., 2013; Ostafin et al., 2012), only one locatable study to date has examined mindfulness practice as a moderator of the relationship between craving and use (Elwafi et al., 2013). In a sample of tobacco smokers, results indicated days of informal practice was the only dimension of mindfulness practice that moderated the craving-use relationship (Elwafi et al., 2013). Thus, the current study is among the first to test the moderating effect of mindfulness practice for people recovering from substance use disorders, and the first to examine the effects of specific practices (i.e., body scan, awareness of breath/thoughts/sensations, mountain meditation).

In considering between-session practice, findings from this study suggest the importance of formal practice. Our results indicate that people who engage in formal practice more frequently

and for longer periods may reduce the strength of the relationship between craving and use. Additionally, among formal practices, awareness of breath/thoughts/sensations, and the body scan may be particularly beneficial. Although any participation in an MBRP group may reduce the likelihood and severity of relapse (Bowen et al., 2014), craving continues to be a strong predictor of use following the intervention for those who engage in formal practice less frequently and for less time per week. Thus, frequency and duration of formal mindfulness practice outside of sessions may be a crucial factor in improving long-term outcomes following treatment.

The apparent automaticity of the connection between craving and use is an important treatment target for people recovering from substance use disorders (Brewer et al., 2014; Witkiewitz, Bowen, et al., 2013; Garland et al., 2010), and mindfulness practice has demonstrated effectiveness in reducing otherwise automatic, reactive behaviors (Steven C. Hayes, Wilson, Gifford, Follette, & Strosahl, 1996; Kabat-Zinn, 2003; Teasdale et al., 2000). Results from this study substantiate fundamental theories about addiction and mindfulness: that mindfulness practice may reduce the strength of the relationship between impulsive mental phenomena, such as craving, and compulsive behavior (Brewer et al., 2014; Witkiewitz, Bowen, et al., 2014; Elwafi et al., 2013; Ostafin, Kassman, & Wessel, 2013; Witkiewitz, Bowen, et al., 2013; Witkiewitz, Lustyk, et al., 2013). Mindfulness practice may enhance people's ability to disentangle cognitive, affective and/or physical experiences from behavior, thus altering the response to craving.

### **Study Limitations**

Several limitations of the current study deserve mention. First, because many participants remained in various forms of aftercare throughout the follow-up period, as well as being subject to urinalysis, fewer participants reported relapsing during the six months following treatment than may be typical (Bowen et al., 2014). Future studies would benefit from recruiting samples with more variability in the outcome variable (days of substance use), as effects may differ for those at greater risk of relapse. Second, although the moderating influence of formal mindfulness practice was detected in this sample, a larger sample size may have the ability to detect the influence of informal practice in this population. Finally, craving was assessed retrospectively over a week-long period. Because an important dimension of craving is its fluctuation over time, as

demonstrated by the strong predictive relationship between momentary craving and subsequent use (Serre et al., 2015), future studies may benefit from designs which use intensive momentary assessment of craving and substance use. These data may be more ecologically valid, and thus more instructive for people interested in reducing the likelihood and severity of relapse.

### **Conclusions**

The current study found that formal mindfulness practice reduced the strength of the relationship between craving reported after intervention completion and frequency of substance use during the subsequent six months. This effect is directly relevant to treatment delivery and recovery recommendations provided to participants in MBRP groups. Based on findings from this study, group facilitators might inform people that formal mindfulness practice reduces the strength of the effect of craving on use. For example, people looking to enhance the benefits of MBRP might be encouraged to incorporate formal practices into their day on more days per week. Results may help to specify thresholds (e.g., at least 20 minutes per week) and degree of effect for different practices (e.g., body scan, mindfulness of thoughts, mountain meditation), as well as any particular conditions that may enhance or diminish the beneficial effects of mindfulness practice (e.g., gender, substance of choice, severity of dependence). Such research will help to improve the efficacy of mindfulness-based treatments for substance use disorders, and thus better help those struggling to prevent relapse.

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Table 1. Descriptive statistics for primary measures.

Variable		Mean	SD
Alcohol or drug use days	Six months following treatment	8.123	27.632
Craving (PACS)	Baseline	1.147	0.918
	Post-course	1.221	1.155
Formal practice	Minutes per week	14.912	14.805
	Days per week	6.035	4.785
Informal practice	Times per week	24.860	36.716
	Days per week	8.895	7.326

Note. Both days per week variables are a sum score of the number of days per week each type of formal and informal practice was used. Formal practice days per week is a sum of three discrete variables ranging from 0-7, for a total possible range of 0-21. Informal practice days per week is a sum of four discrete variables ranging from 0-7, for a total possible range of 0-28.

Table 2. Model estimates for hypothesized linear models.

Linear model	Predictor variable	<i>r</i>	<i>R</i> <sup>2</sup>	<i>B</i>	<i>SE</i>	<i>p</i>	df	<i>f</i> <sup>2</sup>
Craving		0.535	0.286			<0.001	1,55	0.41
	Craving (Post-course)			13.078	2.702	<0.001		
Minutes of formal	Overall model	0.603	0.364			<0.001	4,52	0.56
	Craving (Baseline)			-4.263	3.872	0.276		
	Craving (Post-course)			19.936	3.687	<0.001		
	Formal practice (mins/week)			0.471	0.334	0.164		
	Craving x Formal practice			-0.456	0.171	0.010		
Days of formal	Overall model	0.601	0.361			<0.001	4,52	0.57
	Craving (Baseline)			-3.951	3.947	0.321		
	Craving (Post-course)			20.636	3.807	<0.001		
	Formal practice (days/week)			1.489	0.856	0.088		
	Craving x Formal practice			-1.313	0.458	0.006		
Times of informal	Overall model	0.562	0.316			<0.001	4,52	0.46
	Craving (Baseline)			-4.988	4.195	0.239		
	Craving (Post-course)			14.350	3.793	<0.001		
	Informal practice (times/week)			0.014	0.138	0.919		
	Craving x Informal practice			0.050	0.103	0.634		
Days of informal	Overall model	0.521	0.271			<0.001	4,52	0.37
	Craving (Baseline)			-5.019	4.078	0.224		
	Craving (Post-course)			20.859	4.494	<0.001		
	Informal practice (days/week)			1.219	0.595	0.046		
	Craving x Informal practice			-0.719	0.454	0.119		

Note. The interaction of craving and mindfulness practice was tested using measurements from post-course for both variables.

Table 3. Model estimates for hypothesized hurdle models.

HUNB model (Count portion)	Predictor variable	<i>B</i>	<i>SE</i>	<i>p</i>
Minutes of formal practice	Craving (Baseline)	-2.233	1.683	0.185
	Craving (Post-course)	5.265	2.793	0.059
	Formal practice (mins/week)	0.083	0.087	0.338
	Craving x Formal practice	-0.143	0.075	0.058
Days of formal practice	Craving (Baseline)	-1.576	1.536	0.305
	Craving (Post-course)	8.461	3.906	0.030
	Formal practice (days/week)	0.840	0.349	0.016
	Craving x Formal practice	-0.733	0.308	0.017
Times of informal practice	Craving (Baseline)	-0.021	1.081	0.984
	Craving (Post-course)	1.153	0.775	0.137
	Informal practice (times/week)	0.059	0.057	0.294
	Craving x Informal practice	-0.019	1.923	0.479
Days of informal practice	Craving (Baseline)	0.318	1.048	0.761
	Craving (Post-course)	1.230	0.653	0.047
	Informal practice (days/week)	0.261	0.210	0.215
	Craving x Informal practice	-0.119	0.152	0.435

Note. The interaction of craving and mindfulness practice was tested using measurements from post-course for both variables.