



# Facets of Mindfulness Predict Depressive and Anxiety Symptom Improvement Above CBT Skills

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## Abstract

Mindfulness training is increasingly being incorporated into traditional cognitive behavioral therapy (CBT) approaches. Although the acquisition and use of both CBT and mindfulness skills have been independently linked with positive therapeutic outcomes, the additional therapeutic benefit provided by mindfulness skills above and beyond traditional CBT skills (e.g., behavioral activation, cognitive reappraisal) is unclear. The present study tested the incremental predictive validity of mindfulness skills above CBT skills in predicting depressive and anxiety symptom improvement within a psychiatric hospital unit incorporating training in both CBT and mindfulness skills. Adult patients ( $N = 134$ , mean age = 34.0, 47.8% females, 90.3% White) with depression and anxiety receiving combined psychotherapeutic and pharmacological treatment at a psychiatric hospital completed repeated assessments of CBT skills (Cognitive Behavioral Therapy-Skills Checklist), mindfulness skills (Five Facet Mindfulness Questionnaire), and both depressive (Patient Health Questionnaire-9) and anxiety (Generalized Anxiety Disorder Scale-7) symptoms. We tested whether mindfulness skills and/or CBT skills predicted depressive and anxiety symptom improvement. Higher levels of both mindfulness skills ( $r_s = -.15$  to  $-.51$ ) and CBT skills ( $r_s = -.12$  to  $-.21$ ) were cross-sectionally associated with lower depressive and anxiety symptoms. However, while controlling for CBT skills, two mindfulness facets (nonreactivity to inner experience and acting with awareness) predicted subsequent depressive ( $t_s < -2.49$ ,  $p_s < .014$ ) and anxiety ( $t_s < -2.31$ ,  $p_s < .022$ ) symptom improvement, thus demonstrating incremental predictive validity. Findings suggest the potential therapeutic benefits of mindfulness skills training for depressed and anxious patients within the context of short-term, intensive psychiatric treatment.

**Keywords** Mindfulness · Nonreactivity · Cognitive behavioral therapy · Skills · Depression · Anxiety

Mindfulness is commonly conceptualized as a multifaceted construct consisting of several related abilities or skills. Although definitions differ, they typically highlight attentional control elements (i.e., the ability to focus attention towards present moment experience) coupled with a curious, accepting, and nonjudgmental attitude towards experience (Bishop et al. 2004). For example, Segal et al. (2002) state that during periods of mindfulness, “the focus of a person’s

attention is opened to admit whatever enters experience, while at the same time, a stance of kindly curiosity allows the person to investigate whatever appears, without falling prey to automatic judgments or reactivity” (pp. 322–323). Accordingly, measures assessing mindfulness are commonly comprised of several subscales, or empirically derived factors, purportedly assessing different facets of mindfulness (e.g., Five Facet Mindfulness Questionnaire (FFMQ; Baer et al. 2006), Philadelphia Mindfulness Scale (PHLMS; Cardaciotto et al. 2008), The Kentucky Inventory of Mindfulness Skills (KIMS; Baer et al. 2004), Toronto Mindfulness Scale (TMS; Lau et al. 2006)). The commonly used FFMQ, for example, consists of five factor analytically derived subscales or “facets” (Observing, Describing, Nonjudging, Nonreactivity, and Acting with Awareness) assessing the ability to (1) observe moment-to-moment internal (e.g., thoughts, feelings, and sensations) and external (e.g., sights, sounds, smells) experiences; (2) describe or label these experiences with words; (3)

**Electronic supplementary material** The online version of this article (<https://doi.org/10.1007/s12671-018-1005-1>) contains supplementary material, which is available to authorized users.

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approach internal experiences with a nonjudgmental attitude; (4) be nonreactive towards unpleasant thoughts, feelings, and sensations; and (5) bring undivided attention and full awareness to present moment activities and experiences (as opposed to “running on autopilot” with no or limited conscious awareness). It is worth noting the varied use of the term “mindfulness” in the literature, including referring to (1) the state-like quality or attentional mode of mindful awareness towards present experience (i.e., consistent with the Segal et al. (2002) definition above), (2) the trait-like aspects of mindfulness, reflecting the more stable disposition or “general tendency to be mindful in daily life” (Lau et al. 2006, p. 1447) and, as exemplified below, (3) mindfulness as an intervention (Davidson 2010).

Beginning in the 1990s, and in part inspired by promising findings emerging from studies of mindfulness-based stress reduction (MBSR; Kabat-Zinn 1990), a growing number of psychotherapies began integrating training in mindfulness skills with traditional cognitive behavioral therapy (CBT) interventions. These include Mindfulness-Based Cognitive Therapy (MBCT; Segal et al. 2002), Acceptance and Commitment Therapy (ACT; Hayes et al. 1999), Dialectical Behavior Therapy (DBT; Linehan 1993), and Emotion Regulation Therapy (ERT; Renna et al. 2017), among others. Despite such integration, it is still unclear whether the acquisition and use of different mindfulness skills predict improvement in depressive and/or anxiety symptoms above and beyond the contribution of traditional CBT skills (e.g., cognitive reappraisal, behavioral activation), thus demonstrating *incremental predictive validity* (Davidson 2016).

Although focused on depression relapse prevention rather than symptom improvement, there are a few relevant studies that have compared MBCT vs. an active control condition in an effort to isolate the active ingredients contributing to a lowered relapse risk (Meadows et al. 2014; Shallcross et al. 2015; Williams et al. 2014). In a three-arm dismantling trial, Williams et al. (2014) compared depression relapse rates following MBCT, cognitive psychoeducation, and treatment as usual (TAU). As summarized by the authors, the cognitive psychoeducation condition “comprised all elements of the MBCT program *except* the experiential cultivation of mindfulness through meditation practice and followed the same format of eight weekly 2-h classes (i.e., matched for time with MBCT), with follow-up classes at 6 weeks and 6 months.” (p. 278). Results revealed no between-group differences in the relapse rate over a 12-month follow-up for the full sample. However, for those who experienced greater childhood trauma, MBCT was associated with a lower relapse rate (41%) than cognitive psychoeducation (54%) or TAU (65%), suggesting that mindfulness training may be beneficial for this subgroup. However, the cognitive psychoeducation condition did not require the same amount of homework outside of classes as the MBCT group. Thus, it is unclear whether the

relatively greater benefits of MBCT for the childhood trauma subgroup are attributable to the mindfulness training per se, or perhaps due to the higher volume of homework. Shallcross et al. (2015) compared MBCT versus a structurally equivalent Health Enhancement Program (HEP). The HEP condition matched MBCT on in-class time, group size and, importantly, assigned homework completed outside of class. Results indicated no between-group differences in relapse rates over a 60-week follow-up. In sum, these studies differ significantly in the content and structure of the control groups employed, as well as in results (also see Chiesa et al. 2015; Eisendrath et al. 2016; Manicavasgar et al. 2011; Meadows et al. 2014).

In their systematic review, Gu et al. (2015) aggregated studies that tested mediators of MBCT and MBSR in an effort to elucidate the mechanisms that account for the efficacy of these interventions. They identified 16 studies (12 randomized clinical trials and 4 quasi-experimental studies) testing mindfulness as a mediator. Fourteen of these studies found evidence supporting mindfulness as a mediator of treatment outcome; however, only one was deemed “high-quality” according to a 16-point checklist assessing methodological rigor. Moreover, no study tested whether mindfulness significantly mediates treatment outcome while controlling for the cognitive and behavioral elements shared with traditional CBT (e.g., psychoeducation about depression, behavioral activation to increase pleasure and mastery, identifying negative thoughts). In addition, the bulk of these studies relied on assessments of mindfulness at only pre-treatment and post-treatment, and failed to establish the critical causal criteria of temporal precedence (i.e., change in the mediator must precede and predict subsequent changes in symptoms). Repeated assessments of both mindfulness and symptoms during treatment would allow for a more fine-grained assessment of the temporal relation between mindfulness skills and symptom change.

The goal of the present study is to test the incremental predictive validity of several mindfulness skills, assessed with the FFMQ, above and beyond cognitive behavioral skills within the context of a naturalistic psychiatric hospital setting incorporating training in both traditional CBT and mindfulness skills. Specifically, we test whether patient-reported use of mindfulness skills, assessed repeatedly throughout the course of therapy, predicts subsequent depressive and/or anxiety symptom improvement, while controlling for patient use of CBT skills. We hypothesized that higher levels of each mindfulness facet would predict greater depressive and anxiety symptom improvement while including CBT skill use as a covariate in our models. In addition, we also control for two plausible symptom-related third variable confounds: concurrent symptoms (i.e., symptom severity at the point at which mindfulness skills are assessed) and *prior* symptom improvement (i.e., symptom change leading up to the session at which mindfulness skills are assessed). Concurrent symptom

severity and prior symptom improvement represent important third variable confounds insofar as they predict *both* patient-reported use of skills and subsequent symptom improvement (Strunk et al. 2012; Webb et al. 2016).

## Method

### Participants

Participants were patients receiving treatment within the Behavioral Health Partial Hospital Program (BHP) at McLean Hospital. Eligibility criteria for the current study included: current BHP patient, able to complete the BHP assessment battery (described below) and provide consent for clinical data to be used for research. Patients with current or past psychotic disorder or bipolar disorder were excluded. A total of 134 patients (ages 18–72 years,  $M = 34.04$ ,  $SD = 15.04$ ; 47.8% females, 50.7% males, 1.5% non-binary) met these criteria during the study period (November 2016 to March 2017).

We assessed diagnoses using a structured clinical interview (see below). The most common diagnosis in this sample was a major depressive episode in the context of major depressive disorder (MDD), current or in partial remission (78.4%). In this sample, 94.8% of participants had a lifetime history of MDD, and 76.1% reported a recurrent course. The mean number of previous reported episodes was 4.90 ( $SD = 3.90$ ). The mean age of onset for participants' first major depressive episode was 18 years old (median = 15.5 years; range 5–60 years). At pre-treatment, the mean Patient Health Questionnaire – 9 Items (PHQ-9) depression score was in the moderately severe range ( $M = 15.20$ ,  $SD = 5.14$ ) (see Table 1 for detailed sample characteristics).

In addition to a diagnosis of MDD, diagnostic comorbidity with one or more anxiety disorder was common in this sample (76% of participants) as typically seen in real-world psychiatric settings (Table 1). Twenty-seven percent of the sample scored above the cut-off (total score  $\geq 7$ ) suggesting a BPD diagnosis on the McLean Screening Instrument for Borderline Personality Disorder (MSI-BPD; Zanarini et al. 2003). Over half (51.8%) of the sample had previously been hospitalized (inpatient) at least once for their psychiatric problems (31% received inpatient psychiatric treatment in the week prior to admission to the BHP).

### Procedure

**Treatment** The BHP delivers CBT and related behavioral approaches (both in group and individual formats) and pharmacological treatment to patients suffering from a wide range of psychiatric disorders (principally mood and anxiety disorders). Individual treatment plans were constructed for each

**Table 1** Detailed sample characteristics (demographics, diagnoses, medications, and treatment information)

Sample characteristics	<i>N</i>	%
Gender		
Female	64	47.8
Male	68	50.7
Non-binary	2	1.5
Race		
Native American or Alaskan Native	2	1.5
Asian	13	9.7
Black	2	1.5
Native Hawaiian or Pacific Islander	2	1.5
White	121	90.3
Other	3	2.2
Do not know	1	0.7
Ethnicity		
Non-Latin	127	94.8
Latin	7	5.2
Education		
8th grade or less	1	0.7
Some high school	0	0.0
High school/GED	10	7.5
Some college/Associate's degree	58	43.3
4-year college graduate	33	24.6
Post-college education	32	23.9
Employment		
Current student	47	35.1
Unemployed (if not a current student)	34	25.4
Employed part-time (if not a current student)	11	8.2
Employed full-time (if not a current student)	42	31.3
Marital status		
Never married	84	62.7
Separated, divorced, or widowed	10	7.5
Married or living with partner	40	29.9
Past history of psychiatric hospitalization		
Yes	67	50.1
No	65	49.2
Missing	2	0.7
Current diagnoses (DSM-IV-TR)		
MDE within MDD (current or in partial remission)	105	78.4
Generalized anxiety disorder	68	50.7
Social anxiety disorder	42	31.3
Post-traumatic stress disorder	16	11.9
Panic disorder	22	16.4
Obsessive-compulsive disorder	29	21.6
Alcohol abuse or dependence	28	20.9
Medication		
Any antidepressant medication	101	75.4
Primary antidepressant type: SSRI/SNRI	74	55.2

**Table 1** (continued)

Sample characteristics	<i>N</i>	%
Primary antidepressant type: tricyclic	3	2.2
Primary antidepressant type: tetracyclic	8	6.0
Primary antidepressant type: other	16	11.9
Other medication		
Antianxiety medication: benzodiazepine	34	25.4
Antianxiety medication: other	11	8.2
Atypical antipsychotic medication	32	23.9
Mood stabilizer: anti-epileptic	26	19.4
Mood stabilizer: other	10	7.5
Stimulant/ADHD medication	27	20.1
Sleep medication	4	3.0
	<i>M</i>	<i>SD</i>
Age (in years)	34.0	15.0
Number of treatment days in partial hospital program	13.3	4.2
Number of groups attended	35.1	10.9
Behavioral activation	3.9	1.8
Cognitive restructuring	2.7	1.4
Distress tolerance	1.6	1.1
Emotion regulation	1.4	1.0
Interpersonal effectiveness	1.5	1.0
Mindfulness	1.5	1.0
Acceptance and values	1.5	0.9

patient by clinical team managers who conducted intake assessments, developed an initial conceptualization, and oversaw all aspects of treatment, along with a psychiatrist. Treatment consisted primarily of CBT-based groups provided by psychologists, social workers, occupational therapists, postdoctoral- and graduate-level psychology trainees, and mental health counselors. Patients attended up to five 50-min groups each day, 5 days per week (Monday-Friday). Patients were assigned to groups by their case managers based on presenting symptoms. Similarly, individual therapists (in consultation with the rest of the treatment team) customized the content of therapy sessions to each patient. Although each patient received an individualized course of treatment, the content of interventions drew on a specific set of evidence-based treatments. Specifically, most of the groups in this program introduce and provide opportunities for patients to practice specific skills drawn from CBT (Beck et al. 1979), Dialectical Behavior Therapy (DBT; Linehan 1993), and Acceptance and Commitment Therapy (ACT; Hayes and Smith 2005). For example, one CBT group offered daily focused on behavioral activation (BA) strategies to address depressive symptoms, based on a protocol adapted from Martell et al. (2010). Another CBT group offered daily focused on identifying and challenging negative automatic thoughts

related to depression and was guided by a protocol adapted from Beck et al. (1979). One CBT group offered weekly focused on worry and stress management to address anxiety symptoms (adapted from Craske and Barlow 2006). Four DBT groups, each offered twice weekly, focused on learning mindfulness, distress tolerance, interpersonal effectiveness, and emotion regulation skills (adapted from Linehan 1993). Two ACT groups each offered once weekly focused on practicing mindfulness/acceptance as well as values-oriented skills (adapted from Hayes and Smith 2005). All group protocols followed by group leaders were developed by staff psychologists with specific expertise in the intervention modules delivered.

The remaining group content not described above consisted of psychoeducation (providing information about specific diagnoses), self-monitoring (providing tools for self-assessment), wellness (reviewing self-care strategies), and process (providing and receiving support from other participants) groups. The average number of groups attended over the course of participants' stay at the BHP was 35 ( $SD = 11$ ; see Table 1). Approximately 94% of patients attended a CBT-, DBT-, and ACT-based groups.

To ensure consistency in the delivery of evidence-based treatment interventions, group leaders were rated for adherence to the group protocols twice per year by trained research assistants. Fidelity raters calculated the number of components covered (yes/no) using a checklist developed for each group protocol outlining the expected content of the session. The inter-rater reliability for all groups is excellent ( $r = .99$ ). In addition, for the time period in which data were obtained in the current study, seven groups and group leaders were rated (one session rated for each of these seven groups). For each group, we calculated the percentage of components addressed (i.e., number of components addressed/total number of components in protocol), which ranged from 89 to 100% ( $M = 95%$ ).

Due to the short-term nature of partial hospitalization (i.e., average length of stay = 13.28 days in the present sample including weekend days and holidays), treatment comprised short-term skills-based groups, not the "full-package" or comprehensive treatment in each of the above psychotherapy modalities (e.g., DBT typically requires both a skills group and a DBT-specific individual therapy). All patients also received two to three individual therapy sessions per week from graduate-level psychologists to practice the skills learned in groups (for additional details on this treatment program, see Beard and Björngvinsson (2013)). Upon admission, 75.4% (101/134) of the sample was prescribed at least one antidepressant (see Table 1 for details).

**General Procedures and Assessment** Patients attending the partial hospital program completed daily self-report questionnaires on a computer as part of standard care. Data obtained

was originally used for treatment planning and progress monitoring. Patients were provided the opportunity to consent for their clinical data to be used for research. Only patients who provided informed written consent are included in the current report. The local Institutional Review Board approved all study procedures. Study data were collected and managed using the REDCap (Research Electronic Data Capture) application hosted at McLean Hospital. REDCap is a web-based application designed to facilitate and securely streamline data capture for research studies (Harris et al. 2009).

The duration of treatment (i.e., number of days from partial hospital admission to discharge) did not moderate the associations tested below between skill use and symptom change, and findings also remained the same when excluding dropouts (see [Supplemental Results](#)). The PHQ-9 and Generalized Anxiety Disorder Scale – 7 Items (GAD-7) measures were administered every day of treatment, including admission and discharge. The Five Facet Mindfulness Questionnaire – Short Form (FFMQ-SF) and Cognitive Behavioral Therapy-Skills Checklist (CBT-SC) were administered at admission, day 3 of treatment, day 6 of treatment, and discharge. Given the naturalistic clinical setting, some patients did not complete all the self-report and diagnostic measures at one or more of the assessment points for a variety of reasons (e.g., clinical acuity resulting in admission to inpatient unit, unexpected discharge). Overall, 90.3% (121/134) of the sample had at least three data points for CBT skills ( $M = 3.6$ ;  $SD = .76$ ). For mindfulness skills, 85.1% (114/134) of our sample had at least three data points ( $M = 3.4$ ;  $SD = .98$ ), and 100% of the sample had at least three waves of data for both the PHQ-9 ( $M = 6.9$ ;  $SD = 1.26$ ) and the GAD-7 ( $M = 6.8$ ;  $SD = 1.36$ ). Measures are rotated out of the BHP assessment program every 4–6 months to reduce patient burden and allow other measures from other researchers to be included. We were granted access to collect patient data using our skills (FFMQ and CBT-SC) and outcome (PHQ-9 and GAD-7) measures from November 2016 to March 2017, for a total of 5 months of data collection, yielding a sample size of 134 for depressed patients meeting our inclusion and exclusion criteria (see also Kertz et al. 2015; Webb et al. 2014, 2016).

## Measures

**Five Facet Mindfulness Questionnaire – Short Form (Bohlmeijer et al. 2011)** The FFMQ is a commonly used 24-item measure assessing mindfulness skills on a 5-point Likert scale ranging from 1 (*never or very rarely true*) to 5 (*very often or always true*). The reliability and validity of the FFMQ-SF have previously been established in a sample of adults with depressive and anxiety symptoms (Bohlmeijer et al. 2011). The measure consists of five subscales: Observing (e.g., “Generally, I pay attention to sounds, such as clocks ticking, birds chirping, or cars passing”), Describing (e.g., “I’m good

at finding the words to describe my feelings”), Nonjudging of inner experience (e.g., “I tell myself that I shouldn’t be feeling the way I’m feeling”; Item reverse scored), Nonreactivity to inner experience (e.g., “When I have distressing thoughts or images, I just notice them and let them go”), and Acting with awareness (e.g., “I do jobs or tasks automatically without being aware of what I’m doing”; Item reverse scored) (Baer et al. 2006; Bohlmeijer et al. 2011). Patients were asked to consider the last 24 h when rating each item. In addition, to reduce patient burden, and given the naturalistic psychiatric setting, assessments had to be brief. We thus eliminated the Observing subscale (4 items), which has yielded the least consistent association with depressive and anxiety outcomes in cross-sectional and longitudinal studies (Baer et al. 2006, 2008; Bohlmeijer et al. 2011; Christopher et al. 2012; Royuela-Colomer and Calvete 2016). Internal consistencies at each assessment timepoint had the following ranges: For Describing ( $\alpha = .84-.90$ ), Nonjudging of inner experience ( $\alpha = .78-.89$ ), Nonreactivity to inner experience ( $\alpha = .81-.89$ ), and Acting with awareness ( $\alpha = .80-.89$ ).

**Cognitive Behavioral Therapy-Skills Checklist** We developed the CBT-SC as a 10-item patient-rated assessment of frequency of CBT skill use relevant to the BHP. We designed this very brief face valid scale for two reasons: (a) because we needed a short measure to minimize patient burden and provide an opportunity for self-monitoring of skills use, and (b) because existing measures typically only focus on a specific subset of skills (Jarrett et al. 2011), and we wanted to assess self-reported use of a broad range of skills taught in this program. In line with the other skill and symptom measures in this study, patients considered their use of skills in the past 24 h. Items were scored a 1 if used and 0 if not used. Item content covered the core CBT skills taught at the BHP and included the name of the skill and an explanation. An exploratory factor analysis (EFA; see [Supplemental Results](#)) indicated that a 1-factor structure provided the best fit to CBT-SC data. Accordingly, the 10-item total score was used (Kuder-Richardson 20 (KR-20) internal consistency = .67–.78 across assessment timepoints). Items assessed psychoeducation and self-assessment (PE/SA; 2 items; e.g., “Self-assessment: I kept track of what I was thinking, feeling, or doing (using a diary card, a schedule, a journal, etc.)”), behavioral skills (3 items assessing behavioral scheduling, behavioral activation, and exposure; e.g., “Behavioral scheduling: I spent time intentionally planning/scheduling activities”), cognitive skills (1 item assessing identifying and modifying negative automatic thoughts; “Identifying or Challenging Negative Automatic Thoughts: I intentionally examined my thinking (in my head, or using a thought record or another tool)”), and other skills (4 items assessing distress tolerance, coping strategies, valued living, interpersonal effectiveness; e.g., “Interpersonal effectiveness: I intentionally thought about how to communicate

with others in an effective way; I communicated with others in a way that was helpful to me and/or them”) (see [Supplemental Results](#) for analyses focused on CBT-SC domains, as well as analyses focused on helpfulness ratings (on 5-point Likert scale)).

**Patient Health Questionnaire – 9 Items (Kroenke and Spitzer 2002)** The PHQ-9 is a brief self-report measure assessing the frequency of depressive symptoms over the past 2 weeks. The PHQ-9 has been validated as a severity measure in psychiatric hospital settings (Beard et al. 2016). The instructions for the repeated daily assessments asked about symptoms in the past 24 h (rather than 2 weeks). This modification to the time frame assessed has demonstrated comparable psychometric properties in the GAD-7, a companion measure to the PHQ-9, possessing identical format and response options (Beard and Björgvinsson 2014). Internal consistency for the current sample was good ( $\alpha = .82-.84$ ) across assessment timepoints.

**Generalized Anxiety Disorder Scale – 7 Items (Spitzer et al. 2006)** The GAD-7 is a brief self-report measure assessing anxiety symptoms over the past 2 weeks. The GAD-7 has shown excellent reliability and validity and has been validated in psychiatric hospital settings (Beard and Björgvinsson 2014). Similar to the PHQ-9, the instructions for the daily assessment asked patients to rate their symptoms for the past 24 h (Beard and Björgvinsson 2014). Internal consistency for the current sample was good ( $\alpha = .87-.89$ ) across assessment timepoints.

**Miniature International Neuropsychiatric Interview (Sheehan et al. 1998)** The Miniature International Neuropsychiatric Interview (MINI) is a structured interview assessing Axis I symptoms (e.g., mood, anxiety, substance abuse, psychosis) according to the Diagnostic and Statistical Manual of Mental Disorders - Fourth Edition (DSM-IV-TR). Each MINI diagnostic module consists of a series of screening items followed by questions about specific symptomatology. The MINI was administered by doctoral practicum students and interns in clinical psychology who received weekly supervision by a postdoctoral psychology fellow. Training included reviewing administration manuals, rating practice tapes for diagnoses, and completing mock interviews. All clinicians were required to pass a final training interview with their supervisor before administering MINIs for the program. MINI raters also meet bi-annually to rate an audio recording of a MINI interview. Reliability ratings yielded near perfect agreement (Cohen’s  $Kappa = .91$ ) on diagnoses.

The MINI typically lasts between 20 and 60 min, and was used in this naturalistic setting to minimize burden on participants. The MINI nonetheless has strong reliability and validity in relation to a longer structured interview, the

Structured Clinical Interview for DSM-IV (SCID-IV), with inter-rater reliabilities ranging from kappas of .89 to 1.0 (Sheehan et al. 1998). In addition, for patients in this partial hospital program, inter-rater reliability between mood diagnoses made using the MINI and those made independently by psychiatrists has previously been demonstrated to be adequate, ranging from .69 to .75 (Kertz et al. 2012).

## Data Analyses

To model the association between skill use (i.e., FFMQ – Describe, Nonjudgment, Nonreactivity, Acting with Awareness scores, and CBT-SC total score) and symptom change over time, two sets of models were tested predicting subsequent change in depressive symptoms (PHQ-9) and separately, subsequent change in anxiety symptoms (GAD-7). Due to the hierarchical (nested) structure of the data (i.e., treatment days nested within patients), and similar to prior studies (Sasso et al. 2016; Strunk et al. 2012; Webb et al. 2014, 2016; Zilcha-Mano et al. 2016), we utilized SAS (9.2) mixed procedure with maximum likelihood estimation, specifying treatment day using the repeated function and a heterogeneous autoregressive covariance structure. First, to test the association between skill use and *subsequent* depressive symptom improvement, a vector of lagged PHQ-9 scores for each patient served as the dependent variable (i.e., PHQ-9 at Time T+1), with PHQ-9 scores at the previous timepoint (Time T) entered as a covariate. With regard to appropriately modeling predictor-outcome associations, it is important that the predictor variable terms entered be assessed at the same timepoint (i.e., the same treatment day). Accordingly, a vector of mindfulness (Describe, Nonjudgment, Nonreactivity, Acting with Awareness) and CBT skill scores were entered (simultaneously in the same model) as our predictor variables (i.e., Time T = Intake, day 3, day 6, or discharge). In other words, the model uses repeated assessments to statistically estimate the relation between skill measures (Time T) and PHQ-9 scores the next treatment day (Time T+1), adjusting for PHQ-9 scores at the same assessment timepoint as the skill measures (Time T). For the analysis predicting depressive symptoms change, a total of 301 lagged scores were used. This value was 318 for the analysis predicting anxiety symptom change. To control for the influence of *prior* depressive symptom change, a residualized prior change score was included as a covariate (i.e., PHQ-9 at Time T, adjusting for PHQ-9 at Intake). Models predicting subsequent anxiety symptom improvement were identical as above, but used a vector of lagged GAD-7 scores as the dependent variable. For all models, a negative *b* value indicates that higher scores on the given skills measure predicted relatively lower subsequent symptoms (see [Supplemental Results](#) for details of screening for potential violations of distributional assumptions and outliers).

## Results

Means, standard deviations, and inter-correlations for skill and symptom variables are presented in Table 2. Higher CBT skill scores were associated with lower depression and anxiety scores at the same timepoint. With regard to mindfulness skills, each of the four subscales was significantly inversely associated with depressive and anxiety symptoms.

**Prediction of Subsequent Depressive Symptom Change** As shown in Table 3 (top panel), and while controlling for the other skill domains, higher levels of two mindfulness facets (Nonreactivity and Acting with Awareness) significantly predicted subsequent improvement in depressive symptoms. Specifically, for every 1-point increase in Nonreactivity scores, there is a corresponding 1.4-point decrease in depressive symptoms from the current treatment day to the next; and for every 1-point increase in Acting with Awareness scores, there is a .9-point decrease in depressive symptoms (adjusting for covariates). There were no significant associations between depressive symptom improvement and the other skill domains. It is important to note that both Nonreactivity ( $b = -1.70$ ,  $t = -4.36$ ,  $p < .001$ ) and Acting with Awareness ( $b = -1.32$ ,  $t = -3.89$ ,  $p < .001$ ) remained significantly associated with depressive symptom change when included in a model alone, with all other skill terms removed (i.e., removing CBT skills and the three other FFMQ facets). Both mindfulness facets also remained significantly associated with depressive symptom change when controlling for concurrent anxiety symptom severity ( $ts < -2.50$ ; all  $ps < .013$ ).

**Prediction of Subsequent Anxiety Symptom Change** As shown in Table 3 (bottom panel), both the FFMQ Nonreactivity and Acting with Awareness facets significantly predicted subsequent anxiety symptom change. For every 1-point increase in Nonreactivity scores, there is a

corresponding 1.1-point decrease in anxiety symptoms from the current treatment day to the next; and for every 1-point increase in Acting with Awareness scores, there is a .6-point decrease in anxiety symptoms (adjusting for covariates). Both Nonreactivity ( $b = -1.28$ ,  $t = -3.87$ ,  $p < .001$ ) and Acting with Awareness ( $b = -.90$ ,  $t = -3.49$ ,  $p < .001$ ) remained significantly associated with anxiety symptom change when included in a model alone, with all other skill terms removed. In addition, both facets remained significantly associated with anxiety symptom change when controlling for concurrent depressive symptom severity (all  $ts < -2.58$ ; all  $ps < .011$ ).

**Controlling for Medication Status** Given the naturalistic psychiatric hospital setting, many patients were prescribed a psychiatric medication, most commonly an antidepressant (Table 1). The above two primary models were re-run controlling for whether or not patients were prescribed an antidepressant, antianxiety, antipsychotic, mood stabilizer, or stimulant/ADHD medication. Within these control analyses, both the FFMQ Nonreactivity and Acting with Awareness subscales remained significantly associated with subsequent depressive ( $ts < -2.43$ ;  $ps < .016$ ) and anxiety ( $ts < -2.19$ ;  $ps < .03$ ) symptom change (see [Supplemental Results](#) for additional secondary analyses).

## Discussion

The present study tested the association between mindfulness skills (i.e., Nonreactivity, Nonjudgment, Describing, and Acting with Awareness), CBT skills, and both depressive and anxiety symptom improvement. We tested the incremental predictive validity of mindfulness skills above traditional CBT skills (e.g., behavioral activation, cognitive restructuring) in predicting depressive and anxiety symptom change. Importantly, these skills—as well as both depressive

**Table 2** Means, standard deviations, and correlations for all variables

Variable	Intake <i>M (SD)</i>	Discharge <i>M (SD)</i>	Effect size ( <i>d</i> )	2	3	4	5	6	7
1. PHQ – 9	15.20 (5.1)	10.25 (4.7)	– 1.17	.73**	– .21**	– .18**	– .28**	– .39**	– .51**
2. GAD – 7	10.89 (5.2)	7.34 (4.5)	– 0.80	–	– .12*	– .15**	– .31**	– .48**	– .41**
3. CBTSC	0.39 (0.3)	0.54 (0.2)	0.51	–	–	.16**	– .03	.15**	.14**
4. FFMQ – Describe	15.69 (4.3)	17.24 (4.2)	0.52	–	–	–	.22**	.31**	.31**
5. FFMQ – Nonjudgment	13.97 (4.2)	16.21 (4.8)	0.46	–	–	–	–	.31**	.30*
6. FFMQ – Nonreactivity	11.73 (3.5)	13.93 (4.1)	0.57	–	–	–	–	–	.44*
7. FFMQ – Acting with Awareness	15.14 (3.9)	17.50 (4.5)	0.61	–	–	–	–	–	–

PHQ – 9, Patient Health Questionnaire – 9-item scale; GAD-7, Generalized Anxiety Disorder 7-item scale; CBTSC, Cognitive Behavior Therapy Skills Checklist; FFMQ Five Facet Mindfulness Questionnaire – Short Form: Describing, Nonjudgment, Nonreactivity, and Acting with Awareness subscales; correlations are averaged across assessment timepoints

\* $p < .05$ ; \*\* $p < .01$

**Table 3** Repeated measures analyses of the relation between skill domain and subsequent symptom change

Predictor	Dependent variable	Parameter estimate ( <i>b</i> )	Standard error ( <i>SE</i> )	<i>t</i> value	<i>p</i> value
CBTSC	Subsequent	0.39	1.00	0.39	0.700
FFMQ – Describe	depressive symptom	0.07	0.32	0.22	0.827
FFMQ – Nonjudgment	improvement	–0.20	0.30	–0.69	0.493
FFMQ – Nonreactivity		–1.42	0.42	–3.41	< <b>0.001</b>
FFMQ – Acting with Awareness		–0.90	0.36	–2.50	<b>0.013</b>
CBTSC	Subsequent	1.47	0.79	1.86	0.065
FFMQ – Describe	anxiety symptom	–0.12	0.26	–0.46	0.647
FFMQ – Nonjudgment	improvement	–0.04	0.24	–0.18	0.854
FFMQ – Nonreactivity		–1.12	0.34	–3.27	<b>0.001</b>
FFMQ – Acting with Awareness		–0.64	0.28	–2.32	<b>0.021</b>

CBTSC, Cognitive Behavior Therapy Skills; FFMQ, Five Facet Mindfulness Questionnaire – Short Form: Describing, Nonjudgment, Nonreactivity, and Acting with Awareness subscales. All models control for symptoms at the time at which the predictor was assessed and prior symptom change. In the above table, negative *b* values indicate that higher scores on the predictor variable are related to relatively larger improvements in symptom scores

Bold values signify  $p < .05$

and anxiety symptoms—were assessed repeatedly throughout treatment, allowing us to test the association between the acquisition/use of skills and subsequent symptom change over time. Although there were significant cross-sectional associations between higher scores on each mindfulness facet and lower concurrent depressive and anxiety symptoms (Table 2), only the FFMQ Nonreactivity and Acting with Awareness subscales predicted *subsequent* improvement in depressive and anxiety symptoms (Table 3). Critically, both of these mindfulness facets predicted depressive and anxiety symptom change above and beyond the contribution of CBT skills, demonstrating incremental predictive validity.

Interventions incorporating mindfulness training highlight the importance of cultivating an accepting, *nonreactive* stance towards unpleasant internal experiences, which may serve to interrupt counterproductive second-order reactions (e.g., rumination, worry) that only prolong and exacerbate negative emotional states (Segal et al. 2012; Baer et al. 2006; Curtiss and Klemanski 2014). The ability to observe and label thoughts and feelings as they arise is a core feature of mindfulness (i.e., the so-called “what” skills; Linehan 2014). However, definitions of mindfulness highlight the nonreactive and nonjudgmental attitude or stance towards those internal experiences (i.e., the “how” skills). In other words, simply observing or describing thoughts and feelings—in the absence of an open and accepting stance towards internal experiences—may be quite aversive to those with heightened depressive and anxiety symptomatology. Indeed, greater ability to observe thoughts and feelings has been associated with higher levels of anxiety symptoms and general psychological distress (Baer et al. 2006, 2008; Desrosiers et al. 2013), as well as been positively correlated (Christopher et al. 2012;

Royuela-Colomer and Calvete 2016) or uncorrelated (Barnhofer et al. 2011; Cash and Whittingham 2010) with depressive symptoms. Observing aversive internal feelings and thoughts may be counterproductive insofar as individuals are reactive to what arises. For example, a depressed individual observing their sad mood or blunted affect may engage in depressogenic rumination about the meaning and implications of these symptoms. Similarly, a patient with panic disorder observing benign—but unpleasant—internal sensations (e.g., lightheadedness, heart palpitations) may begin catastrophizing (“I’m having a heart attack!”), which in turn triggers a surge in anxiety and worsening of symptoms. The fact that nonreactivity predicted symptom change above the contribution of CBT skills (e.g., learning to identify and modify negative cognitions and behavioral activation) suggests that individuals with elevated levels of depression and anxiety—at least within the context of a short-term psychiatric hospital treatment setting—may benefit from training in this core facet of mindfulness.

Studies have also reported significant associations between greater acting with awareness and lower depressive and anxiety symptoms (Bränström et al. 2011; Curtiss and Klemanski 2014; de Bruin et al. 2012; Royuela-Colomer and Calvete 2016). Although the bulk of these studies relied on cross-sectional designs, Royuela-Colomer and Calvete (2016) tested longitudinal associations between mindfulness facets and depressive symptoms in a sample of unselected adolescents. They found that higher scores on the FFMQ Acting with Awareness and Nonreactivity subscales predicted lower depression scores 4 months later (controlling for baseline depressive symptom severity and the other FFMQ subscales). Notably, the other FFMQ subscales did not emerge as



significant predictors of future depression. Heightened conscious awareness of present experience may facilitate one's ability to respond flexibly to negative thoughts and feelings as they arise, as well as may increase positive affect via enhancing one's ability to attend to pleasant experiences and activities in the present moment. The fact that the two other subscales of the FFMQ, Describing (i.e., being able to put one's experience into words) and Nonjudging (i.e., being able to refrain from engaging with evaluative and potentially self-critical thoughts), did not predict symptom improvement was somewhat surprising given the potential usefulness of both skills. It is possible that both skills are therapeutically beneficial insofar as they help individuals cultivate other core mindfulness skills (in particular, nonreactivity towards unpleasant internal experiences), which may be more proximally helpful to alleviate symptoms of depression and anxiety.

The analyses presented in this study could be considered relatively conservative tests of mindfulness skills-outcome associations, given that in addition to including CBT skills as a covariate, we also controlled for both concurrent levels of symptoms and prior symptom improvement, each of which may represent plausible third variable confounds (Strunk et al. 2012; Webb et al. 2016). Despite the inclusion of these covariates, clinical trials in which patients are randomly assigned to a mindfulness intervention incorporating CBT vs. a CBT-only group are needed to evaluate the added therapeutic value of mindfulness skills training over and above traditional cognitive behavioral approaches. In addition, and consistent with the goals of personalized treatment (DeRubeis et al. 2014; Simon and Perlis 2010), it will be important to evaluate whether certain patient characteristics moderate the efficacy of mindfulness interventions. It is likely that certain individuals are better-suited and receptive to mindfulness interventions and more likely to benefit from their incorporation into CBT; whereas, others may derive little therapeutic benefit.

It is important to highlight the context within which these findings emerged, namely, a short-term (average length of treatment = 13.3 days) behavioral health partial hospital program. Given the briefer treatment duration in this unit relative to other mindfulness-based interventions (MBIs) (e.g., MBCT and MBSR are both 8-week programs), it is unclear to what extent patients acquired and internalized different facets of mindfulness. As succinctly summarized by the founder of MBSR (Kabat-Zinn 1994, p. 8), mindfulness is "simple but not easy." Our findings do suggest a meaningful increase in mindfulness skills from intake to discharge ( $d_s = .46\text{--}61$ ; see Table 2), albeit based on patient self-reports of their mindfulness abilities. Thus, it is unclear whether the pattern of findings observed in the present study (e.g., FFMQ Describe and Nonjudgment facets did not significantly predict symptom change) is in part due to the relatively short-term exposure to these mindfulness skills. Relatedly, skills were not re-assessed following

discharge. Thus, the extent to which the observed increases in these skills were sustained over time is unknown.

Finally, we did not observe a significant association between CBT skills and subsequent symptom improvement, whereas others have (Jarrett et al. 2013; Webb et al. 2016). It is important to note, however, that greater self-reported use of CBT skills was associated with lower levels of concurrent depressive and anxiety symptoms. Given the mixed findings regarding concurrent vs. lagged CBT skill—outcome associations in the current study, it will be important for future studies to test these relationships in other settings. In addition, the CBT skills measure used in this study was developed to cover the specific cognitive behavioral content of this short-term, naturalistic behavioral health partial hospital program. Thus, it may be that alternative CBT skills measures would have yielded a different set of findings.

### Limitations and Future Research

While the current findings are expected to generalize to other similar short-term psychiatric settings, the extent to which findings from this sample and treatment setting generalize to other contexts (e.g., weekly outpatient therapy) is unclear. Given the naturalistic setting in which this study was conducted, the length and content of treatment varied across participants. Though treatment content was based on a defined set of evidence-based modalities and skills, the specific course of treatment each participant received was individualized by their treatment team, and findings from this study may therefore only apply to settings offering similar care. Second, additional studies are also needed to determine whether similar relationships exist in more ethno-racially diverse samples. Third, we relied on patient-report measures of both CBT and mindfulness skills. Our choice of a brief face valid measure of CBT skills was motivated by the need to minimize burden on participants and to simultaneously assess usage of a broad range of skills taught in this program. However, the fact that the measure was never used or previously validated in prior publications raises the question of whether our findings would generalize to other CBT skills measures. Alternative approaches could have included the use of therapist-report measures of patient competence in different skill domains, as well as more objective, performance-based measures. More recently, several behavioral and performance-based measures have been developed assessing mindfulness-related abilities, including focused attention (Frewen et al. 2014; Levinson et al. 2014), self-distancing (Shepherd et al. 2016), and decreased "experiential self-referential processing" (Hadash et al. 2016). This research in developing behavioral- and performance-based measures is in its infancy, and it is not yet clear to what extent the latter constructs relate to different facets of mindfulness. Fourth, in order to model the short-term effects of mindfulness and CBT skills on symptom change in

this intensive and brief partial hospital treatment context, we focused on skill use in the past 24 h in predicting symptom change over the next 24 h (see also Webb et al. 2016). The fact that the assessment time frame of the FFMQ was modified may have also influenced our pattern of findings. In addition, the present study is observational in nature; experimental designs in which patients are randomly assigned to treatment conditions (e.g., a CBT treatment vs. CBT + mindfulness training) are needed to strengthen causal inferences about the incremental benefits of mindfulness skills above traditional CBT skills. Finally, the current study examined short-term outcomes, and future studies should examine these prospective associations over a follow-up period and with regard to relapse.

The present study highlights the potential therapeutic benefits of incorporating training in two specific facets of mindfulness into CBT for depression and anxiety in acute psychiatric care. These preliminary findings warrant subsequent randomized controlled augmentation trials to more precisely quantify the additional benefit of mindfulness skills, as well as to determine who is most likely to benefit from these skills.

**Acknowledgments** The authors of this manuscript wish to thank the numerous staff and patients of the Behavioral Health Partial Program at McLean Hospital for their support of this project.

**Author Contributions** CAW: designed and executed the study, conducted the data analyses, and wrote the paper. CB: collaborated with the design of the study and writing of the paper. MF: contributed to data analyses and wrote part of the procedures and results. TB: collaborated in the design of the study, and writing and editing of the final manuscript.

**Funding** Funding for the study was provided by the Behavioral Health Partial Program and McLean Hospital. The first author (Webb) was funded by a NIMH National Research Service Award (NRSA; 1F32MH099810-01) and a Career Development Award (K23; K23MH108752-01).

## Compliance with Ethical Standards

This study was approved by the McLean Hospital IRB and was therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendments.

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

**Conflict of Interest** The authors declare that they have no conflict of interest.

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