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ORIGINAL PAPER

Changes in Dispositional Mindfulness Predict Veterans' Symptom Severity After an Intensive Cognitive Processing Therapy Program with Mindfulness Components

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Abstract

Objectives This study assessed the long-term association between cultivated mindfulness and post-traumatic stress disorder (PTSD) symptom improvement following a 3-week intensive treatment program (ITP) for veterans. The aim was to determine whether changes in self-reported dispositional mindfulness were related to reduced self-reported PTSD and depression symptom severity, 6 months after participating in the ITP.

Method The sample comprised 288 veterans, 144 of whom completed follow-up surveys. The ITP integrated Cognitive Processing Therapy with mindfulness and yoga practices modeled off Mindfulness-Based Stress Reduction, delivered daily over the course of 3 weeks. Participants completed self-report measures at baseline, post-treatment, and 6-month follow-up. Linear mixed-effects regression models were employed to analyze the link between dispositional mindfulness changes and symptom severity.

Results Significant reductions in PTSD and depression symptoms occurred from baseline to the 6-month follow-up (effect sizes Cohen's $d = 1.02$ and 0.70, respectively). Dispositional mindfulness scores increased during treatment and were maintained at the at 6-month follow-up (effect size $d = 0.36$). Increased dispositional mindfulness was significantly related to lower PTSD and depression symptom severity. Changes in all four facets of dispositional mindfulness examined, especially Acting with Awareness and Non-judgement, were associated with 6-month follow-up PTSD severity, and all but Describe were associated with 6-month follow-up depression severity.

Conclusions This study provided evidence of the long-term association between self-reported mindfulness, cultivated in an ITP, and reduced PTSD and depression symptoms. Dispositional mindfulness was associated with enduring relief from trauma-related symptoms, emphasizing its potential role in sustaining treatment outcomes. This study highlights the potential of mindfulness practices in ITPs for veterans diagnosed with PTSD.

Preregistration This study is not preregistered.

Keywords PTSD · Depression · Mindfulness · Intensive treatment · Veterans

Approximately 70% of individuals across the world report exposure to a traumatic event in their lifetime (Benjet et al., 2016; Kessler et al., 2017). Approximately 6% of individuals who experience a traumatic event will develop post-traumatic stress disorder (PTSD) at some point during their lives (Kilpatrick et al., 2013). Combat veterans are at increased risk, with PTSD prevalence estimate to be around 23% (Fulton et al., 2015). PTSD symptoms can be grouped into four symptom categories, which include intrusion symptoms, avoidance, negative alterations in mood and cognition, and alterations in arousal and reactivity (DSM-5; American Psychiatric Association, 2013).

Approximately 60% of individuals with PTSD seek treatment related to the condition (Goldstein et al., 2016). Several evidence-based practices (EBPs) have emerged for the treatment of PTSD. First-line psychotherapies for PTSD include Cognitive Processing Therapy (CPT) and

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Prolonged Exposure Therapy (PE) and Eye Movement Desensitization and Reprocessing (EMDR) (Foa et al., 2007; Resick et al., 2017; Shapiro, 2001). These treatments have been shown to reduce PTSD symptoms in a variety of populations in both the short and long terms (American Psychological Association, 2017; VA/DoD Clinical Practice Guideline, 2023).

Although these first-line treatments for PTSD have resulted in clinically significant reductions in symptoms, many are left experiencing residual symptoms following treatment including sleep difficulties, fatigue, and guilt (Kovacevic et al., 2023; Larsen et al., 2019) and dropout rates are high (Edwards-Stewart et al., 2021; Lewis et al., 2020). Intensive treatment programs (ITP) for PTSD offer full courses of first-line treatments in short periods of time, often 2–3 weeks, and have resulted in lower dropout and clinically significant PTSD and depression symptom improvement (Rauch et al., 2021; Wright et al., 2023). ITPs frequently offer more comprehensive approaches to PTSD treatment compared to standalone EBPs, often including group mindfulness interventions as an adjunctive treatment to EBPs (Bryan et al., 2022; Held et al., 2019).

In addition to the use of mindfulness-based interventions within ITPs, support for the utility of mindfulness-based interventions for survivors of trauma experiencing PTSD has grown (VA/DoD Clinical Practice Guideline, 2023; Williston et al., 2021). Recent findings suggest that mindfulness-based interventions may result in similar outcomes as EBPs for PTSD, while also resulting in lower dropout (Khatib et al., 2022; Zaccari et al., 2023). Boyd et al. (2018) summarized the current state of the literature concerning mechanisms by which mindfulness-based interventions may ameliorate symptoms of PTSD. Regarding avoidance symptoms, mindfulness may increase natural exposure to trauma reminders as survivors who engage in mindfulness practices may increase willingness to approach feared stimuli, which in turn reduces symptoms (Follette et al., 2006). Despite theoretical support, findings are currently mixed on the relationship between PTSD avoidance symptoms and self-reported mindfulness (Sylvia et al., 2024).

Negative beliefs about the self, others, and the word that arise after trauma may also benefit from mindfulness-based interventions. Garland et al. (2015) suggest in their Mindfulness-to-Meaning Theory that mindfulness practice may allow survivors to disengage from negative thoughts, offering an opportunity to reappraise based on attention to broader evidence that disproves automatic negative appraisals. By disproving automatic negative appraisals, survivors can see symptom relief in the form of both reduced negative thoughts and negative emotions. Symptoms of negative cognitions have also been shown to improve following participation in mindfulness-based interventions (Kearney et al., 2021).

Symptoms related to dysregulated arousal may also improve following participation in mindfulness-based interventions as individuals increase their ability to attend to the present moment without over-attending to trauma reminders, reducing symptoms like hypervigilance and difficulty concentrating. Kelly and Garland (2016) also suggest that mindfulness meditation and mindful yoga may help survivors of trauma by reducing sympathetic nervous system arousal. In support of these theories that suggested a negative association between mindfulness and PTSD arousal symptoms, facets of mindfulness including Non-reactivity and Acting with awareness have been found to be negatively related to PTSD arousal symptoms (Stephenson et al., 2017; Sylvia et al., 2024). Intervention studies have also shown that mindfulness-based interventions for PTSD resulted in specific improvement in sleep quality, further supporting their use as adjunctive treatments for PTSD to address PTSD arousal symptoms (Shapira et al., 2022).

As described above, individuals who participate in ITPs which combine first-line EBPs with mindfulness groups and other adjunctive services report large and lasting PTSD and depression symptom improvement (e.g., Held et al., 2020), yet questions remain about the driver of symptom change in these treatments. Specifically, the extent to which changes in dispositional mindfulness are related to PTSD and depression symptom change, especially at follow-up time points, has yet to be determined, but could provide important information about the role mindfulness skills may play in these programs. For example, greater awareness and non-judgement of thoughts may enhance delivery of cognitive EBPs through faster identification of negative thoughts, and/or act on their own to benefit survivors of trauma. Until these components are more fully explored, it is unclear whether changes in dispositional mindfulness represent a meaningful treatment target in treatment programs for PTSD.

Miller et al. (2020) reported on a veteran sample participating in a 3-week ITP that included daily mindfulness meditation and yoga practices in addition to CPT. Their study established that veterans participating in the treatment reported significant increases in all facets of mindfulness that were measured (Describing, Acting with Awareness, Non-judgement of inner experience, and Non-reactivity to inner experience). Additionally, over 70% of veterans reported that daily mindfulness training was "moderately" to "very" helpful on anonymous posttreatment surveys. The current study extended Miller et al.'s (2020) work by examining whether changes in cultivated mindfulness during a 3-week ITP that integrated mindfulness were related to PTSD and depression symptoms at 6-month follow-up. We hypothesized that overall changes in dispositional mindfulness would be significantly related to PTSD and depression symptoms at 6-month follow-up. Additionally, we examined whether sub-facets of cultivated mindfulness

would be related to symptoms of PTSD and depression. We hypothesized that each facet would explain unique variance in symptoms at 6-month follow-up.

Method

Participants

The full sample was comprised of 307 military service members or veterans (referred to as veterans henceforth), 286 of whom completed a 3-week intensive treatment program (ITP) for PTSD between August 2017 and September 2019. This sample contains data from the 170 veterans in the Miller et al. (2020) and an additional 137 veterans who have participated in the ITP since that analysis. Demographically, most participants identified as heterosexual, White, and male, and were on average 41 years old (Table 1). Regarding service histories, the majority of veterans served after the September 11, 2001, terrorist attacks and experienced combat (Table 1).

For the main analyses in the current study concerning follow-up timepoints (i.e., 6-month follow up), the sample size decreased to 144 participants due to lower completion rates of follow-up questionnaires. Follow-up surveys were an optional, unpaid opportunity for veterans who participated in the IOP; this was not a clinical trial and therefore follow-up assessment dropout was expected.

Table 1 Demographics of full sample

	Total sample ($n = 307$)	
	n	%
Sex		
Male	206	67.70
Female	101	32.90
Ethnicity		
Non-Hispanic	244	79.48
Hispanic	63	20.52
Race		
White	208	67.75
Non-White	99	32.25
Service era		
After 9/11/2001	275	89.58
Before 9/11/2001	30	9.77
Cohort		
Combat	201	65.47
MST	106	34.53
Sexual orientation		
Heterosexual	289	94.14
Lesbian	7	2.28
Gay	4	1.30
Bisexual	3	0.98
Other	3	0.99
	M	*SD*
Age	41.20	9.26

Missing values can be attributed to participants choosing not to respond to demographic questions, and/or other reasons that may have prevented them from completing the surveys

Procedure

Inclusion and Exclusion Criteria As previously reported by Miller et al. (2020), participation in the ITP required a diagnosis of PTSD characterized by exposure to combat or military sexual trauma. Assessment included two 60- to 90-min interviews consisting of a semi-structured psychosocial interview and a separate interview complete a structured PTSD interview, the Clinician Administered PTSD Scale for DSM-5 (CAPS-5; Weathers et al., 2018). These assessments were conducted by a licensed psychologist, postdoctoral psychology fellow, social worker, or licensed professional counselor. Participants also completed self-report assessments as part of the intake.

Exclusion from the ITP was considered for veterans who endorsed any of the following: active suicidal or homicidal ideation; a suicide attempt within the past 3 months; recent non-suicidal self-injury; acute substance withdrawal; current mania or eating disorders; history of psychosis, and/or any treatment-interfering medical, legal, or interpersonal issues.

Intensive Treatment Program The 3-week ITP was hosted at a large Midwestern academic medical center. The co-ed program contained cohorts ranging in size from 8 to 12 participants. Participants were assigned either a combat trauma or military sexual trauma cohort (hereafter referred to as cohort type) based on the nature of the index trauma they decided to focus on primarily during treatment. The sample includes 24 cohorts from August 2017 to September 2019. Veterans were provided with off-site lodging for the duration of the program; however, this was not a residential program as no staff were present outside of the scheduled program days and times. Philanthropic funds covered the cost of travel, lodging, and meals for all veteran participants. The primary clinical intervention of the program was individual and group CPT. CPT is a first-line treatment for PTSD that utilizes a cognitive approach to uncover and challenge negative cognitions that follow traumatic events, such as beliefs concerning self-blame or negative self-judgements (Resick et al., 2017). In addition to CPT, adjunctive components including mindfulness training, among others, were offered daily (for details about the program, see Zalta et al., 2018).

Mindfulness training was adapted from a traditional Mindfulness-Based Stress Reduction (MBSR; Kabat-Zinn, 2013) curriculum to fit the 3-week schedule of the ITP. Mindfulness sessions were taught by five qualified MBSR teachers or teachers in training. During the ITP, participants completed 13 daily sessions (about 80 min each), which included a combination of didactic, inquiry, and practice. Separate yoga practice sessions were held by the same qualified MBSR instructors and led based on the principles of mindful movement from the MBSR curriculum. For more details about the adapted mindfulness curriculum, see Miller et al. (2020).

Measures

Participants completed all surveys electronically. All measures were completed at baseline (i.e., before attending the ITP), post-treatment (i.e., the final day of CPT sessions), and 6-month follow-up.

Five Facet Mindfulness Questionnaire The Five Facet Mindfulness Questionnaire (FFMQ) is a 39-item self-report questionnaire that assesses trait mindfulness. It is comprised of five subscales: Observing, Describing, Acting with Awareness, Non-judging, and Non-reactivity (Baer et al., 2006). However, due to mounting findings concerning the limited predictive validity of the observing subscale on PTSD symptoms, we excluded it in the present examination (Carpenter et al., 2019; Harper et al., 2022). Participants use a 5-point Likert scale to endorse agreement with each item. High scores on each subscale represent higher self-reported mindfulness. The FFMQ has been validated in veteran populations (Duffy, et al., 2022). In this study, the FFMQ had good internal reliability at baseline ($\omega = 0.90$), post-treatment ($\omega = 0.94$), and 6-month follow-up ($\omega = 0.94$).

Post-traumatic Stress Disorder Check List–5 The Post-traumatic Stress Disorder Check List–5 (PCL-5) is a 20-item self-report inventory that assesses the severity of PTSD symptom, per the DSM-5 criteria. It has four subscales that correspond each of the symptom clusters of PTSD: intrusion symptoms, avoidance symptoms, negative alterations in mood and cognition, and arousal symptoms. Participants rate how much each symptom bothers them using a 5-point Likert scale with high scores indicating higher severity of PTSD symptomatology (Weathers et al., 2013). At baseline and 6-month follow-up, veterans were asked about how much their symptoms bothered them in the past month; at post, veterans were asked about how much their symptoms bothered them in the past week. The PCL-5 has been shown to have good psychometric properties in veteran populations (Bovin et al., 2016). The internal reliability in this study was excellent at baseline ($\omega = 0.90$), post-treatment ($\omega = 0.96$), and 6-month follow-up ($\omega = 0.95$).

Patient Health Questionnaire–9 The Patient Health Questionnaire–9 (PHQ-9) is a 9-item self-report questionnaire that assesses severity of depressive symptomatology using a 4-point Likert scale. Respondents rate frequency of symptoms with higher total scores indicating higher frequency of depressive symptoms within a 2-week period (Kroenke & Spitzer, 2002). The PHQ-9 has been shown to have excellent internal reliability (Kroenke et al., 2001), and was good in this study at baseline ($\omega = 0.82$), post-treatment ($\omega = 0.89$), and 6-month follow-up ($\omega = 0.89$).

Data Analyses

Linear mixed effects regression models (LMMs) were used to examine whether baseline, post, and 6-month follow-up FFMQ scores predicted changes in PCL-5 over time. Linear mixed effects models are considered a first-line approach to modeling longitudinal data due to flexibility in accommodating varying measurement timepoints and missing data, as well as variance and covariance structure over time (Gibbons et al., 1993b). We first examined whether baseline FFMQ score predicted overall PTSD severity. Using FFMQ full-scale scores as a time-varying predictor of PCL-5, we further explored whether between- and within-subjects changes in FFMQ predicted PCL-5 over time. We then examined all FFMQ subscales, excluding the Observe scale, as time-varying predictors of PCL-5 in the same LMM to examine the ability of each FFMQ subscale to predict PTSD severity over time beyond the variance in severity that the other FFMQ subscale account for. All models controlled for age, sex, cohort type, race, and ethnicity. Unstructured covariance matrices and random slopes and intercepts were utilized in all models due to information criteria and likelihood ratio tests.

Results

Sample means, standard deviations, and effect sizes related to the changes from baseline to 6-month follow-up can be found in Table 2. Linear mixed effect regression models indicated the presence of quadratic time trends for both PCL-5 and PHQ-9 ($p < 0.001$), with an initial decrease in severity decelerating following treatment, so quadratic time was included in all presented models (Table 3). Baseline demographic variables sex, cohort type, age, race, and ethnicity were not significant predictors of PCL-5 or PHQ-9 (Table 3). Higher baseline FFMQ scores predicted lower overall PTSD and depression severity across timepoints ($p < 0.001$). When exploring FFMQ as a time-varying predictor of PCL-5 and

Table 2 Means, standard deviations, and effect sizes

	Baseline ($n=307$)	Post-intervention ($n=286$)	6-month follow-up ($n=144$)[2,3]	Effect size from baseline to post-intervention	Effect size from baseline to 6-month follow-up
	M (*SD*)	*M* (*SD*)	*M* (*SD*)	*d* (95% CI)[4]	*d* (95% CI)
PCL-5	55.72 (11.97)	34.13 (19.66)	40.07 (17.64)	1.27 (1.10, 1.45)	1.02 (0.79, 1.24)
PHQ-9	17.49 (5.04)	11.80 (6.26)	13.22 (6.59)	0.99 (0.83, 1.15))	0.70 (0.52, 0.89)
FFMQ Describe	20.92 (6.26)	23.04 (6.59)	23.16 (17.25)	0.34 (0.24, 0.45)	0.36 (0.22, 0.50)
FFMQ AWA	20.25 (5.12)	21.33 (5.99)	21.91 (5.80)	0.21 (0.09, 0.32)	0.32 (0.15, 0.28)
FFMQ Non-judge	20.79 (5.86)	23.63 (6.72)	23.64 (6.40)	0.44 (0.31, 0.56)	0.44 (0.27, 0.61)
FFMQ Non-react	17.30 (4.43)	18.85 (5.04)	19.33 (4.77)	0.29 (0.16, 0.42)	0.41 (0.23, 0.59)
FFMQ Overall[1]	102.90 (17.94)	111.41 (21.09)	112.14 (22.23)	0.40 (0.27, 0.52)	0.37 (0.21, 0.53)

[1]FFMQ Overall consists of the four subscales used in the current study, which excludes the Observing subscale

[2]No difference in PHQ at baseline ($p=0.985$) or PCL-5 at baseline ($p=0.980$) existed between those who did or did not have 6-month follow-up data

[3]Only increased age was significantly associated with missingness at 6-month follow-up, with increased age being associated with lower odds of missingness

[4]Effect sizes represent Gibbons et al.'s (1993a) variant of Cohen's *d* for repeated measures

Table 3 Results from linear mixed effects models

	PCL-5		PHQ-9	
	b (95% CI)	*p*	*b* (95% CI)	*p*
Time[1]	−25.21 (−27.60, −22.83)	<0.001	−6.67 (−7.52, −5.83)	<0.001
Quadratic time	3.78 (3.40, 4.16)	<0.001	1.00 (0.86, 1.13)	<0.001
Age	0.04 (−0.11, 0.20	0.569	−0.02 (−0.07, 0.03)	0.435
Sex	−1.84 (−7.36, 3.69)	0.515	−0.24 (−2.17, 1.69)	0.806
Cohort Type	−3.00 (−8.48, 2.48)	0.283	0.16 (−1.76, 2.08)	0.869
Race	−0.41 (−3.53, 2.71)	0.797	0.24 (−0.84, 1.33)	0.659
Ethnicity	−1.13 (−4.61, 2.36)	0.526	0.28 (−0.93, 1.49)	0.649
Baseline FFMQ	−0.28 (−0.36, −0.20)	<0.001	−0.11 (−0.14, −0.08)	<0.001
FFMQ Between	−0.42 (−0.49, −0.35)	<0.001	−0.16 (−0.18, −0.13)	<0.001
FFMQ Within	−0.40 (−0.48, −0.32)	<0.001	−0.13 (−0.16, −0.11)	<0.001
FFMQ Describe	−0.38 (−0.58, −0.18)	<0.001	−0.08 (−0.15, −0.01)	0.024
FFMQ AWA	−0.59 (−0.82, −0.35)	<0.001	−0.30 (−0.39, −0.22)	<0.001
FFMQ Non-Judge	−0.59 (−0.79, −0.39)	<0.001	−0.20 (−0.27, −0.13)	<0.001
FFMQ Non-React	−0.48 (−0.73, −0.24)	<0.001	−0.15 (−0.23, −0.06)	0.001

[1]Time slope represents predicted change in outcome per month

[2]Reference categories were male, MST cohort, White, and non-Hispanic. FFMQ subscores were examined in separately models separate from overall FFMQ due to collinearity, though these models also adjusted for the same demographic covariates outlined in the table

PHQ-9, both within and between-subjects components of FFMQ scores were significant predictors of both outcomes, indicating that greater increases in FFMQ scores between-subjects and within-subjects were associated with lower PCL-5 and PHQ-9 scores over time ($p<0.001$). Additionally, improvement in all FFMQ examined subscores was significantly associated with reduction in PTSD symptoms, and three of the four subscores were significantly associated with depression severity (Acting with Awareness, Non-judgement, and Non-reactivity; see Table 3).

Discussion

Despite strong evidence demonstrating the effectiveness of EBPs for PTSD (e.g., CPT and PE), many patients continue to struggle with trauma-related symptoms after treatment (Kovacevic et al., 2023; Larsen et al., 2019). Mindfulness-based interventions have emerged as a viable adjunctive treatment for PTSD (Boyd et al., 2018; Hopwood & Schutte, 2017; Polusny et al., 2015; Williston et al., 2021). Over the

last 10 years, intensive treatment programs (ITPs) for PTSD have resulted in strong reductions in PTSD and depression symptoms, some of which included group mindfulness programming as an adjunctive treatment to individual and group psychotherapy (Held et al., 2019; Rauch et al., 2021; Sciarrino et al., 2020; Wright et al., 2023). Veterans who participated in a CPT-based ITP for PTSD that included daily mindfulness and yoga practices found the practices acceptable and reported increases across several facets of mindfulness immediately after treatment (Miller et al., 2020). Building upon these findings, the current study explored follow-up data from the same ITP to test whether cultivated mindfulness was associated with trauma-related symptoms 6 months following the completion of the ITP.

As expected based on previous findings from CPT based ITPs, PTSD symptoms decreased from baseline to 6-month follow-up, consistent with a large effect ($d = 1.02$). This represents a clinically meaningful reduction in PTSD symptoms (Marx et al., 2022). Depression symptoms decreased by an average of 4.27 points from baseline to 6-month follow-up, indicating a medium effect ($d = 0.70$), representing a clinically meaningful change in depression symptoms (Turkoz et al., 2021). Improvement on both symptom measures showed little decay, remaining stable from the post-treatment assessment time point to 6-month follow-up assessment, indicating that veterans maintained their gains following treatment. Overall FFMQ scores increased during treatment and maintained their gains at 6-month follow-up, indicative of a small effect ($d = 0.36$). The largest changes were seen in the Non-judgement and Describe subscores, though Acting with Awareness and Non-reactivity subscores also increased. All subscore changes indicated small effects ($d = 0.32$ to 0.44). Scores on the overall FFMQ and all subscores remained stable from the post-treatment assessment time point to 6-month follow-up assessment, indicating that veterans maintained their gains following treatment. While no other intensive programs have used this exact blend of mindfulness programing and CPT, greater increases in mindfulness scores have been observed in veteran cohorts completing Mindfulness-based Stress Reduction, the program on which the mindfulness programing provided in the current study is based (Kearney et al., 2012; Serpa et al., 2014). However, previous studies included all five subscores, which may slightly inflate the overall FFMQ change noted in their studies compared to the current study.

The findings of this study supported the hypothesis that overall changes in dispositional mindfulness would significantly relate to PTSD and depression symptoms at 6-month follow-up. Veterans with higher mindfulness scores at baseline and post intervention maintained their higher levels of dispositional mindfulness 6 months post treatment. With just 3 weeks of intensive treatment that included mindfulness skills, veterans saw long-lasting changes in their self-reported mindfulness. Those who increased their dispositional mindfulness scores were also likely to also have decreased their symptoms of PTSD and depression from baseline to 6-month follow-up. The current study also found that within-subject change of mindfulness scores was significantly associated with PTSD and depression symptoms, suggesting that greater improvement in mindfulness scores within each participant was associated with lower symptom severity on both outcome measures. For instance, a 10-point change in overall FFMQ score (excluding the Observe subscale) was associated with a 4-point decrease in PTSD severity and a 1.3-point decrease in depression severity. Veterans learned mindfulness skills during the 3-week program and were able to maintain them six months later. This suggests promise for such "intensive" treatment methods. Moreover, results show that increases in mindfulness skills predicted reduced PTSD and depression severity, supporting prior work that showed this relationship.

When examined at the level of subscores, all four facets of mindfulness that we examined (i.e., Describe, Acting with Awareness, Non-judge, Non-react) were predictive of 6-month follow-up PTSD severity, and all but the Describe scores were predictive of 6-month follow-up depression scores. Each of the facets that were found to be significant explained unique variance in the outcome measures; meaning each facet partially explained the outcomes, even when controlling for portions already explained by the other facets in the model. The strongest predictors for both PTSD and depression symptoms were the Acting with Awareness and Non-judgement subscores, which replicates previous findings with mindfulness-based programing for participants with PTSD (Boden et al., 2012; Owens et al., 2012; Possemato et al., 2016; Stephenson et al., 2017; Vujanovic et al., 2009). No satisfying theory has been presented explaining why these specific components may be more frequently related to improved PTSD symptomology. Vujanovic et al. (2009) pointed to one of the most prominent definitions of mindfulness presented by Bishop et al. (2004), and we add the similarly prominent definition provided by Kabat-Zinn (2013), and both definitions' focus on awareness of the present moment and non-judgmental acceptance as the essential features of mindfulness. Perhaps these most essential features, best captured by their respective subscores (i.e., Acting with Awareness and Non-judgement), represent the most essential facets of mindfulness in relation to the reduction of PTSD and depression in survivors of trauma. We hypothesize that Non-judgement may be negatively related to certain PTSD symptoms such as self-blame. Further, we hypothesize that Acting with Awareness is negatively related to intrusion symptoms, as these symptoms represent getting swept up in memories and reactions related to the past, while Acting with Awareness represents an open awareness of the

present. However, this was not tested in the current study and warrants further investigation before drawing conclusions.

While reviews have shown that mindfulness-based interventions ameliorate trauma symptoms when utilized as stand-alone and adjunctive intervention (Hopwood & Schutte, 2017; Szoke et al., 2022), few studies have tested whether the relationship between cultivated mindfulness and symptom improvement holds up over time (Earley et al., 2014). Findings in the current study suggest the continued relationship between higher mindfulness and lower trauma symptoms at 6-month follow-up. Not only did the intensive format yield significant, lasting increases in self-reported dispositional mindfulness, but also those increases were directly related to significant, lasting decreases in PTSD and depression symptoms. Intensive practice of mindfulness skills did not solely lead to temporary changes in symptom severity; it was related to long-lasting symptom relief for survivors of trauma. The findings suggest that integrating mindfulness programming into an ITP is not only tolerable (as described by Miller et al., 2020) but also that cultivated mindfulness is associated with reduced follow-up symptom severity and may thus support the maintenance of treatment gains. These findings can guide clinicians when integrating intensive mindfulness training in ITPs for PTSD alongside first-line psychotherapies for long-lasting relief from PTSD and depression symptoms.

Limitations and Future Directions

The current study included mindfulness-based programing that was based upon a well empirically supported program, MBSR, and was facilitated by qualified MBSR instructors. The high level of training and fidelity to the principles of MBSR provide assurances that practices were well representative of other evidence-based mindfulness interventions. While many studies have found correlations between dispositional mindfulness traits and PTSD and depression symptoms, the current intervention study is able to report on cultivated mindfulness and its predictive ability of symptoms 6 months post-treatment. This study provided longitudinal evidence of the relationship between cultivated mindfulness and PTSD and depression symptoms.

While mindfulness-based programming was a major component of the 3-week IPT in the current study, CPT was the primary psychotherapy intervention. Findings therefore cannot differentiate increases in dispositional mindfulness due to participation in mindfulness-based programing from increases in dispositional mindfulness due to CPT or other features of the nearly 8-h daily programming. However, previous findings have continuously found that the practice of mindfulness meditation and mindful yoga increases levels of dispositional mindfulness (Khoury et al., 2015), so there is reason to believe that increases observed in this sample were related to mindfulness practices in the ITP.

Although yet to be examined in research, theoretically, some components of CPT may be well in line with mindfulness tenants and logically would result in increases in self-reported mindfulness. For example, CPT encourages awareness of one's perception of a situation, namely the traumatic experience, and awareness of the larger context to examine the veracity of the conclusions being drawn. While a CPT therapist may describe the process as gathering evidence and establishing an alternative belief, a mindfulness-based therapist may describe the exact same process as "disengaging and reappraising" as described in Mindfulness-to-Meaning Theory (Garland et al., 2015). While techniques may look starkly different (e.g., completing a thought record in CPT vs. a "turning toward difficulty" meditation), both CPT and mindfulness-based approaches may aim towards the same target. From a theoretical comparison, the awareness gained from mindfulness practices allows for easier identification of stuck points and evidence for those stuck points, acerating and enhancing CPT sessions. Regardless of similarities and differences between mindfulness-based interventions and CPT, findings in the current study can only conclude that when presented in this specific combination, higher dispositional mindfulness and greater changes in dispositional mindfulness are each related to lower trauma symptom severity 6 months post-treatment.

Another strong limitation to the current findings resulted from the sample collected in the study. Our sample was limited to veterans and included predominately White-identified individuals; researchers and clinicians should proceed with caution when inferring relationships between cultivated mindfulness and trauma-symptom severity with other populations. Further, only half of those who completed the ITP completed 6-month follow-up surveys. Baseline PCL-5 and PHQ-9 scores did not differ between those who completed 6-month surveys and those who did not. However, it is possible that only those who still had favorable views of the program, or sustained symptom improvement, self-selected into the 6-month follow-up sample. Also, the use of PCL-5 self-report assessments, rather than clinician administered rating scales, further limit the implications of the results. Finally, while temporal precedence was established, this study also falls short of establishing causality due to a lack of control group comparison.

By showing that intensive mindfulness practice can lead to enduring relief from PTSD and depression symptoms, this study underscores the potential for mindfulness to be a component of effective trauma programs. When considering elements for ITPs for PTSD, clinics can look to the current study for evidence concerning the positive role that mindfulness skills may provide for survivors of trauma, and justification for providing mindfulness skills in intensive

formats. The program did not monitor whether veterans engaged in formal practices outside of group sessions; however, group sessions provided a space for guided practice every day, which is not the case in traditional weekly delivery of MBSR, possibly resulting in more consistent practice. Adding mindfulness-based programing may have the benefit of not only building mindfulness skills that can aid in the delivery of individual interventions, but also may provide a space for community and stress-reduction in the midst of challenging intensive treatment.

Future studies should explore the utility of adding mindfulness-based practices to first-line treatments for PTSD in ITPs by creating an active control group who are offered alternative adjunctive programming that would not be expected to lead to increases in dispositional mindfulness, such as health education sessions (e.g., MacCoon et al., 2012). Other research may consider expanding on the current study by exploring potential mechanisms of change of mindfulness-based interventions for trauma such as increased natural exposure to feared stimuli (Follette et al., 2006), mindful reappraisal of negative cognitions (Garland et al., 2015), and calming of the sympathetic nervous system (Kelly & Garland, 2016).

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Data Availability Data not available—participant consent.

Declarations

Ethics Statement The Rush University Medical Center Institutional Review Board approved all study procedures.

Informed Consent A waiver of consent was obtained as all data collection occurred as part of routine clinical care.

Artificial Intelligence Artificial intelligence was not used.

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