HHS Public Access

Author manuscript

Psychooncology. Author manuscript; available in PMC 2021 February 01.

Published in final edited form as:

Psychooncology. 2020 February ; 29(2): 263–270. doi:10.1002/pon.5223.

Greater Mindfulness Associated With Lower Pain, Fatigue, and Psychological Distress in Women with Metastatic Breast Cancer

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Abstract

Objective: Women with metastatic breast cancer (MBC) report high levels of disease-related symptoms including pain, fatigue, psychological distress, and sleep disturbance. Mindfulness may be particularly relevant to women with MBC given the high symptom burden and psychological toll of this disease; however, the topic is understudied among this patient population. Therefore, we aimed to test the associations between mindfulness and patient-reported symptoms among a sample of women with MBC.

Methods: 64 women with MBC completed baseline questionnaires of mindfulness (FFMQ-SF) and symptoms of pain severity and interference, fatigue, psychological distress, and sleep disturbance as part of a randomized controlled trial of a Mindful Yoga intervention. Correlational analyses of data collected at baseline tested associations between the five mindfulness facets (observing, describing, acting with awareness, nonjudging, nonreactivity) and patient-reported measures of symptoms.

Results: Overall, higher mindfulness was associated with lower symptom levels including lower pain severity, pain interference, fatigue, anxiety, depression, and sleep disturbance. However, degree of association varied by mindfulness facet. Nonreactivity, nonjudging, and describing showed the most frequent associations and largest effect sizes across symptoms, while observing showed the least frequent associations and lowest effect sizes.

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Clinical Trial Number:

Conflicts of Interest: The authors have no conflicts of interest to disclose.

Data Availability Statement: The data supporting the findings are available from the corresponding author upon reasonable request.

Conclusions: Mindfulness – and in particular nonreactivity, nonjudging, and describing – may be a personal resource for women with MBC in coping with complex symptoms of this life-threatening illness. Findings are discussed relative to their implications for interventions aimed at increasing mindfulness in this vulnerable population.

Keywords

anxiety; cancer; depression; fatigue; metastatic breast cancer; mindfulness; pain; sleep

Background

The enhanced quality and efficacy of cancer treatment over recent years has improved prognosis for many breast cancer patients, shifting the focus of clinical care to not only increasing quantity of life but quality of life. This is especially true among women living with metastatic disease, as symptom burden is high yet survival rates are improving. About one in eight women will be diagnosed with breast cancer at some point throughout their life.[1] It is estimated that about 155,000 women are living with metastatic breast cancer (MBC) in the US, with roughly 75% originally diagnosed with earlier stage disease.[2] With improvements in cancer care, it is estimated that 5-year survival rates of women with MBC will double from 18% to 36%.[2]

Women with MBC suffer from difficult disease- and treatment-related symptoms that negatively impact quality of life, including psychological distress, sleep disturbance, fatigue, and pain.[3, 4] These symptoms can have a significant impact on social, occupational, and emotional functioning; thus, there is a need for understanding dispositional factors (i.e. psychological traits) that may be associated with symptom levels among women with MBC. One such factor is mindfulness, which is defined as nonjudgmental attention to the present moment.[5] Mindfulness can be conceptualized not only as a trainable skill, but as a dispositional trait that varies from individual to individual.[6] Theoretically, mindfulness is considered to be multidimensional, including five key facets of observing, describing, acting with awareness, nonjudging, and nonreactivity[7–9]. Observing refers to noticing and attending to internal and external present moment stimuli (sensations, thoughts, and emotions).[9] Describing refers to labeling these sensations, thoughts, and emotions with words.[9] Acting with awareness refers to focusing one's attention on the present activity, as opposed to being on "auto-pilot" with attention focused elsewhere.[9] Nonjudging of internal experiences refers to experiencing thoughts and emotions without evaluating them.[9] Last, nonreactivity to internal experiences refers to allowing thoughts and emotions to come and go without getting carried away with them.[9]

While mindfulness has been associated with lower levels of psychological symptoms in non-metastatic breast cancer patients[10] and other oncology populations,[11, 12] there is a paucity of research investigating mindfulness among patients with MBC, with studies generally including small numbers or excluding metastatic patients from their samples.[4, 10] Nevertheless, understanding the associations between dispositional mindfulness and its key facets remains particularly important among those with advanced disease. The non-judgmental present-moment nature of mindfulness may be a powerful tool for coping with

the especially challenging journey of metastatic disease, given the underlying life threat of active disease, coupled with the need to manage symptoms and treatment side effects while pursuing meaningful life goals and daily life.[4] However, the high symptom burden often experienced by women with MBC may challenge their ability to remain mindful and non-judgmental in the present moment.

Furthermore, given prior research suggesting that the mindfulness facets may vary in their strength and direction of association with patient-reported symptoms,[8, 9, 11–14] some mindfulness facets may be more relevant than others in the context of symptom management and quality of life for women with MBC. For example, nonjudging, acting with awareness, and nonreactivity have been found to relate to positive psychological outcomes among cancer samples, including improved mood and stress levels, as well as decreased anxiety and depression.[11, 12, 15] Further, a number of studies have found that the observing subscale is associated with maladaptive psychological functioning (e.g. thought suppression, mood disturbance) and is not highly correlated with the other mindfulness facets, but only among people with little meditation experience.[8, 9, 13, 14] In other words, observing one's internal experiences may be either reactive and judgmental, or open and curious, thus leading to differential associations with psychological outcomes among non-meditating versus meditating samples.[8, 9, 13, 14] As such, there is an important gap in the literature regarding the degree to which mindfulness facets are associated with the common, but difficult, symptoms that women with MBC face.

The aim of the current study was to examine the strength and direction of baseline associations between mindfulness facets and patient-reported symptoms including pain, fatigue, psychological distress, and sleep disturbance in a sample of women with MBC who participated in a randomized controlled trial of a Mindful Yoga intervention.[16] We hypothesized that higher mindfulness across the facets would be associated with lower levels of symptoms. Consistent with previous literature, we hypothesized that the nonreactivity, nonjudging, and acting with awareness facets would demonstrate the strongest associations with symptoms, and that the observing facet would show weaker associations.

Methods

Participants

Participants were 64 women diagnosed with MBC (Stage IV breast cancer or recurrent MBC). Findings are based on data collected at baseline (prior to randomization) from all participants enrolled in a Mindful Yoga randomized trial (ClinicalTrials.gov registry). Eligibility criteria included a life expectancy ≥ 9 months as estimated by their treating oncologist and the ability to speak and read English. Patients were excluded if they had significant cognitive impairment, had received treatment for serious psychiatric illness (e.g., schizophrenia, severe depression) in the past 6 months, were too sick to participate as indicated by an Eastern Cooperative Oncology Group rating of ≥ 3, Karnofsky Performance Status < 60, or as determined by the treating oncologist, or were currently practicing yoga ≥ 1 day per week. Participants were recruited from the Duke Breast Oncology Program. Medical information was extracted from the patient's medical record. All patients who met medical eligibility criteria and lived within 50 miles of the medical center were approached

and invited to participate. All procedures were approved by the Duke University Medical Center Institutional Review Board (IRB# Pro00044446); all participants provided informed consent.

Measures

Mindfulness was assessed with the Five Facet Mindfulness Questionnaire-Short Form (FFMQ-SF).[17] The FFMQ-SF is a 24-item short form of the Five Facet Mindfulness Questionnaire, a comprehensive measure for assessing mindfulness.[9] The FFMQ-SF includes five mindfulness subscales: observing of internal and external present moment stimuli ("observing"), describing these experiences with words ("describing"), acting with awareness rather than automatically ("acting with awareness"), nonjudging internal experiences ("nonjudging"), and nonreactivity to internal experiences ("nonreactivity").[7–9] The FFMQ-SF has demonstrated reliability and validity as well as sensitivity to change in samples of adults with anxiety and depression as well as chronic illness.[17] Consistent with the measure development, the facets were used separately in analyses rather than a total score.[8, 9, 17] In light of the high validity of the subscales in the short form version,[17] the current version was selected in order to reduce patient burden. In this current sample, the five facets showed acceptable to good internal consistency (Cronbach alpha: observing=0.78; describing=0.77; acting with awareness=0.86; nonjudging=0.79; nonreactivity=0.73).

Pain was assessed with the Brief Pain Inventory-Short Form (BPI), a 9-item self-report measure that assesses worst, least, and average levels of pain and the degree in which pain interferes in activities, mood, relationships, sleep, and enjoyment of life. This measure is widely used with cancer patients, has evidence of reliability and validity, and is considered the preferred method of assessing pain endpoints.[18, 19] In this current sample, BPI subscales showed good to excellent internal consistency (Cronbach alpha: pain severity=0.87; pain interference=0.94).

Fatigue was assessed with the Brief Fatigue Inventory (BFI). The BFI consists of 9 items assessing self-reported levels of current, worst, and usual fatigue, and interference due to fatigue on a 0 to 10 scale. Factor analysis has shown that 75% of the variance on the BFI can be explained by a single factor suggesting that it measures a single construct. This measure has also shown good evidence of concurrent and discriminant validity as well as excellent internal consistency (Cronbach alpha=0.96.).[20] In this current sample, BFI showed excellent internal consistency (Cronbach alpha=0.96).

Sleep quality was assessed by the Pittsburgh Sleep Quality Index (PSQI), a 19-item self-report measure that produces a total sleep quality score and seven sleep component scores.[21] Higher scores indicate poorer sleep quality. The scale has been widely used with breast cancer patients with internal consistency for the total scale reported as 0.78.[22] In this current sample, PSQI showed questionable to acceptable internal consistency (Cronbach alpha=0.69).

Psychological distress, including depression and anxiety symptoms, was assessed with the Hospital Anxiety and Depression Scale (HADS). The HADS is a 14-item, two-domain

(depression and anxiety) scale with evidence of reliability, validity, and responsiveness among cancer patients.[23, 24] Domain scores ≥ 8 indicate either likely depression or anxiety. In this current sample, HADS showed good to excellent internal consistency (Cronbach alpha: depression subscale=0.81; anxiety subscale=0.88).

Statistical Analyses

Descriptive statistics were used to describe scores on study measures and information on demographics and medical variables collected from the study sample. We used Spearman correlations to first examine intercorrelations between each of the five mindfulness facets and then test associations between mindfulness scales and symptom measures. Non-parametric (i.e., Spearman) correlations were used since the data did not fully meet assumptions necessary to compute Pearson correlations. Values were reviewed to interpret effect sizes.[25]

Results

Patient characteristics and study measures are shown in Tables 1 and 2, respectively. Spearman intercorrelations between mindfulness facets are shown in Table 3. All subscales were significantly intercorrelated with the exception of observing with nonjudging (non-significant), which is consistent with previous findings among non-meditating samples.[13, 14]

Mindfulness Associations with Symptom Levels

Results of Spearman correlation analyses between mindfulness facets and symptom levels are shown in Table 4. Overall, there were significant associations between all five mindfulness facets and a number of the symptom measures, such that higher mindfulness was correlated to lower levels of pain severity and interference, fatigue, anxiety, depression, and sleep disturbance. Further, the strength of associations differed across facets. The mindfulness facets of nonreactivity, nonjudging, and describing showed the most frequent and strongest associations (medium to large effect sizes) across symptoms, while observing showed the least number of significant associations and had relatively low effect sizes. Among the symptom measures, depression and anxiety were related to the greatest number of mindfulness facets and showed the largest effect sizes across the other symptom measures. Each mindfulness facet is presented below in descending order based on strength of associations across the patient-reported symptoms.

Nonreactivity.

The mindfulness nonreactivity scale was the only facet that was significantly related to all outcome measures. Patients who reported higher levels of nonreactivity (e.g., the ability to allow thoughts and emotions to come and go without getting carried away with them) also reported significantly lower pain severity, pain interference, fatigue, anxiety, depression, and sleep disturbance. The nonreactivity scale was most strongly correlated to anxiety and depression ($r<-.50$).

Nonjudging.

The mindfulness nonjudging scale was significantly associated with all measures except sleep disturbance. Patients who reported higher levels of nonjudging scale also reported significantly lower pain severity, pain interference, fatigue, anxiety, and depression. The nonjudging scale was most strongly correlated with anxiety ($r<-.50$).

Describing.

The mindfulness describing scale was significantly associated with all measures except pain severity. Patients who reported a greater tendency to label their sensations, thoughts, and emotions with words reported significantly lower pain interference, fatigue, anxiety, depression, and sleep disturbance. The describing scale was most strongly correlated with anxiety and depression ($r<-.45$)

Acting with Awareness.

The mindfulness acting with awareness scale was significantly associated with distress and sleep, but not pain and fatigue. Patients who reported more often acting with awareness (e.g., focusing their attention on their present activity, as opposed to being on “auto-pilot”) reported significantly lower anxiety, depression, and sleep disturbance. The acting with awareness scale was most strongly correlated with anxiety ($r<-.40$).

Observing.

The mindfulness observing scale was only significantly associated with depressive symptoms; there were no significant associations between the observing subscale and anxiety, pain, fatigue, or sleep disturbance. Patients who reported a greater tendency to notice and attend to present-moment internal and external stimuli reported significantly less depression.

Conclusions

Findings from this study indicate that, among patients with metastatic breast cancer, greater mindfulness was significantly associated with lower levels of symptoms including pain severity and interference, fatigue, anxiety, depression, and sleep disturbance. These results extend the previous knowledge of the positive associations of mindfulness with lower symptom levels to this unique population of advanced disease patients. Importantly, the overall pattern of our findings suggests that the mindfulness facets reflected consistent – but distinct – associations with lower symptom levels across a variety of common symptoms reported by women with MBC. Overall, every facet was negatively associated with at least one symptom, and none of the facets showed a positive relationship to higher symptom burden. Further, the intercorrelations among the facets in this sample demonstrated moderate positive relationships, suggesting that each of the facets were capturing distinct, but related, aspects of mindfulness, which is consistent with the FFMQ measure development.[8, 9, 17] In line with this notion, we found that the facets varied in their degree of association with patient-reported symptoms. Our findings supported our hypotheses that nonreactivity and nonjudging facets would demonstrate some of the strongest associations with patient-reported symptoms, while the observing facet demonstrated the least. However, contrary to

our predictions, the describing facet – not the acting with awareness facet – showed strong associations with patient symptoms as well.

These findings add to the growing literature regarding the relative importance of the various facets of mindfulness. Of the five subscales, only nonreactivity was significantly associated with less symptom burden across all symptoms measured. Indeed nonreactivity has emerged as a potentially strong facet of mindfulness in relationship to self-reported symptoms among cancer patients in other studies.[11, 15, 26] For women with MBC, nonreactivity may be particularly useful for noticing and stepping back from – as opposed to getting overtaken by – distressing thoughts and feelings. Women high in nonreactivity may be able to redirect their attention to the present moment more effectively, while letting any thoughts or feelings that may cause significant distress exist in the background. Such nonreactivity may promote a more balanced and calm mental response to typically distressing stimuli, thus lowering sympathetic nervous system arousal, hypothalamic-pituitary-adrenal (HPA) axis dysregulation, and downstream immune dysregulation.[27] Such physiological processes are thought to be mechanisms by which meditation interventions produce beneficial outcomes.[27, 28] In light of these results, it is worth noting that ‘nonreactive’ responses such as emotional numbing or avoidance may occur in instances of high stress such as coping with a breast cancer diagnosis.[29] However, evidence suggests that mindful nonreactivity and emotional numbing are negatively correlated constructs,[8, 17] with emotional numbing/avoidance being associated worse psychological and physical symptoms[30, 31] Our findings suggest that building the ability to be nonreactive to one’s thoughts and feelings may be a particularly valuable skill for broad symptom management for a patient with MBC.

Similarly, the mindfulness facet of nonjudging one’s internal or external experiences was associated with less depressive and anxious symptoms, less pain severity and interference, and less fatigue. Nonjudging involves accepting thoughts and feelings as they come, without telling oneself that such experiences are “bad” or not allowed. Indeed other studies among cancer patients have found that those who were more nonjudgmental towards themselves endorsed fewer symptoms of anxiety and depression.[12, 15] However, we found that greater nonjudgement among women with MBC not only was associated with fewer psychological symptoms, but also extended to fewer symptoms of pain and fatigue. This is notable given that nonjudging may be particularly challenging for patients with advanced cancer due to the common misconception that a positive attitude is critical to a good prognosis. It may be that women who endorsed greater nonjudgement may have reframed their symptoms of distress, pain, and fatigue as relatively normal given their circumstances, rather than trying to avoid these experiences. Interestingly, nonjudgement was also most highly related to anxiety, a common symptom among women with MBC. As anxiety typically consists of worry and physical symptoms (e.g. heart racing, jitteriness), taking a nonjudgmental attitude towards these experiences may have helped women tolerate anxiety symptoms and increased their ability to cope with them.

The mindfulness facet of describing one’s feelings through identifying and labeling was also strongly related to several symptoms, including pain and fatigue, but especially anxiety and depression. Indeed, greater skills in describing have been associated with fewer psychological distress symptoms among cancer patients.[11, 15] Among women with MBC,

describing internal experiences and emotions may be of particular importance as they search to make meaning of their diagnosis of a life-limiting illness and communicate their experiences to friends, family, and medical professionals. Taken together, the skills represented by the describing facet may help MBC patients navigate complex emotional, physical, and medical experiences by making meaning on a personal level, as well as communicating about these experiences with others.

Acting with awareness was also strongly related to less anxiety and depression, a finding which has been previously noted among other cancer samples.[11, 15] This subscale reflects an ability to be aware of the present moment as one takes action, thus avoiding "autopilot" tendencies or mental time-travel to the future (e.g. anxiety) or past (e.g. depressive ruminations). One of the greatest challenges of metastatic disease is managing worries regarding mortality and uncertainty. Acting with awareness may be a key skill for redirecting attention to the present moment and connecting with valued life domains rather than getting pulled into distressing thoughts of uncertainty. As a foundational component of mindfulness, acting with awareness may allow women with MBC to create purposeful and present connection to their current experiences and thus feel less anxiety and depressive symptoms.

Last, the mindfulness subscale of observing was only associated with depressive symptoms, and indeed this facet also showed low correlations with the other mindfulness subscales. As this sample was comprised of patients not currently engaged in yoga or meditation practices, these findings are consistent with previous literature noting that observing differentially relates to other mindfulness subscales and psychological outcomes among non-meditators.[8, 9, 13, 14] Nevertheless, patients who reported a greater tendency to notice and attend to present-moment internal and external stimuli still also reported significantly fewer depressive symptoms. As the observing items assess ability to notice sensations such as during a shower, when eating or drinking, or feeling of sun or wind on the skin, the items on this facet may be capturing elements of behavioral activation, which may relate to fewer depressive symptoms among those with advanced disease.

Study Limitations

These findings should be interpreted in the context of several study limitations. First, this study used correlational methods, thus causality between mindfulness and symptoms of interest cannot be established. Future experimental and randomized trials targeting mindfulness and its relevant pathways will help to elucidate mechanisms and outcomes associated with increased mindfulness skills. Further, our study sample may have been unique, given their willingness and ability to enroll in a yoga-based intervention trial, and thus generalizability may be limited. Given that our sample was experiencing somewhat low levels of symptoms at baseline, which is unusual among advanced cancer populations, the intervention study demands (i.e. 12 in-person study visits) may have prevented patients with higher symptom burden from enrolling.[32] Given that this patient pool may have unique configurations of mindfulness facet scores due to this, further research is needed to establish generalizability to more diverse MBC samples, as well as men and patients diagnosed with other advanced cancers.

Clinical Implications

Among healthcare professionals in oncology, assessing mindfulness among patients with metastatic disease may help identify patients who are at risk for experiencing greater symptoms such as pain, fatigue, mood disturbance, or sleep difficulties. Our findings indicate that higher baseline levels of mindfulness may be considered a personal resource among women with MBC, which was associated with better functioning across several common symptom domains. In particular, assessing for certain dimensions of mindfulness – nonreactivity, nonjudging, and describing - may be particularly useful given their associations across varied symptoms. Brief education on mindfulness skills or referrals to behavioral health professions to help patients build these mindfulness facets may be one clinical avenue for improving symptom management.

Randomized-controlled trials of mindfulness-based interventions should be tested in samples comprised of patients with advanced cancer, given their unique psychosocial needs and high symptom burden. As there are very few psychosocial interventions targeting patients with MBC,[33] our findings suggest a potentially clinically important role of mindfulness-based interventions for patients with MBC and potentially other advanced cancers. Given our findings that certain facets of mindfulness were more strongly associated with patient-reported symptoms, future research may choose to target key facets (for example, nonreactivity). Further, exploring the facet-specific biological (i.e. HPA regulation) and psychological (i.e. self-compassion) pathways among patients with MBC could help bolster our understanding of mindfulness mechanisms in advanced disease. For example, as HPA dysregulation is associated with early mortality among patients with MBC,[34] mindfulness – and in particular, nonreactivity – may hold relevance to psychoneuroendocrine pathways of clinical outcomes for these patients.

This study helps to set a foundation for future research on mindfulness specifically among women with MBC. Although mindfulness has well-known associations with psychological and physical benefits, there is little prior research specifically among patients with MBC. However, a great need exists among women with metastatic disease given complex and wide-ranging concerns relevant to coping with an active and life-threatening illness, including physical, psychological, interpersonal, spiritual/existential challenges, and practical concerns.[4] This study highlighted that greater mindfulness was associated with lower anxiety, depression, pain (severity and interference), fatigue, and sleep disturbance. Nonreactivity, along with nonjudging and describing, emerged as particularly valuable mindfulness facets for coping with the broad range of symptoms that these patients may face. Future studies should focus on mindfulness-based interventions among this sample and the relevant biological and psychological mediators of psychosocial and clinical outcomes. If mindfulness-based interventions are found to be effective, clinical settings could consider offering more mind-body integrative services that incorporate mindfulness for these patients, beginning at diagnosis and throughout the cancer journey.

Acknowledgements:

Funding for the current study was provided to Dr. Porter by the National Center for Complementary and Integrative Health, grant number R01 AT007572. Dr. Zimmaro is funded by 2T32-CA-009035 at Fox Chase Cancer Center.

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Table 1.

Participant Characteristics

Variable	Frequency(%)
Age *(M, sd)*	57.3(11.4)
Partner Status	
Married/Living Together	40(63.5)
Other	22(34.9)
Missing	1(1.6)
Has Dependent Children	22(34.4)
Race	
White	47(74.6)
Other	16(25.4)
Education	
High School/Some College	18(28.6)
Other	45(71.4)
Employment	
Working Part-time/Full-time	18(28.6)
Other	45(71.4)
Household income	
≤$49K	25(39.7)
>50K	36(57.1)
Missing	2(3.2)
Currently on Active Cancer Treatment	56(88.9)
Missing	3(4.8)
Surgery in Past 6 Months	17(27.0)
Missing	1(1.6)
Originally Diagnosed with Stage IV	18(28.6)
Years from Diagnosis (*Median, IQR*)	5.4(11.0)
Recurrent Disease	22(34.9)
Missing	6 (9.5)

Table 2.

Study Measures

Variable	Mean (SD)
FFMQ-SF	
Observing	15.1(3.5)
Describing	18.6(3.5)
Acting with Awareness	17.8(3.8)
Nonjudging	16.5(4.2)
Nonreactivity	16.8(3.6)
BPI	
Pain Severity	2.0(1.5)
Pain Interference	2.6(2.4)
BFI	3.4(2.4)
HADS	
Anxiety	6.7(4.2)
Depression	4.4(3.3)
Total	11.1(6.8)
PSQI	8.5(3.9)

Note. FFMQ-SF=Five Facet Mindfulness Questionnaire-Short Form; BPI=Brief Pain Inventory; BFI=Brief Fatigue Inventory; HADS=Hospital Anxiety and Depression Scale; PSQI=Pittsburgh Sleep Quality Index

Table 3.

Spearman Intercorrelations Between Mindfulness Facets

	Observing	Describing	Acting with Awareness	Nonjudging	Nonreactivity
Observing	--	0.27*	0.26*	0.18	0.31*
Describing	0.27*	--	0.46***	0.26*	0.45***
Acting with Awareness	0.26*	0.46***	--	0.42***	0.33**
Nonjudging	0.18	0.26*	0.42***	--	0.30*
Nonreactivity	0.31*	0.45***	0.33**	0.30*	--

Note.

* p≤.05

** p<.01

*** p<.001.

Table 4.

Spearman Correlations of Mindfulness and Symptom Measures

	FFMQ-SF Mindfulness Facets				
	Nonreactivity	**Nonjudging**	**Describing**	**Acting with Awareness**	**Observing**
BPI (Pain Severity)	−0.26 *	−0.28 *	−0.09	−0.07	−0.04
BPI (Pain Interference)	−0.44 ***	−0.32 **	−0.29 *	−0.16	−0.15
BFI	−0.31 *	−0.25 *	−0.24 *	0.02	−0.13
HADS – Anxiety	−0.50 ***	−0.55 ***	−0.47 ***	−0.40 ***	−0.18
HADS – Depression	−0.51 ***	−0.33 **	−0.44 ***	−0.37 **	−0.36 **
PSQI	−0.31 *	−0.23	−0.26	−0.27 *	−0.06

Note. FFMQ-SF=Five Facet Mindfulness Questionnaire-Short Form; BPI=Brief Pain Inventory; BFI=Brief Fatigue Inventory; HADS=Hospital Anxiety and Depression Scale. PSQI=Pittsburgh Sleep Quality Index.

* p≤.05

** p<.01

*** p<.001