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Trait Mindfulness, Affective Symptoms and Quality of Life in People with Non-Hodgkin's Lymphoma

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Abstract

Purpose: The construct of mindfulness has previously been examined in cancer patients, as has the efficacy of mindfulness-based treatments. However, it has not been examined in people with non-Hodgkin's lymphoma (NHL). NHL is one of the most distressing cancer diagnoses being associated with high levels of depression, anxiety and poor quality of life (QOL). In this study, we evaluated the experience of depression, anxiety, stress and QOL in people with NHL and the relationship of these states to a trait-based measure of mindfulness. Method: Participants were 125patients and survivors of NHL who had been diagnosed at least 2years ago. They completed an online questionnaire asking about their recent experiences of depression, anxiety, stress, QOL, mindfulness and its components, and the practice of mindfulness-meditation. Results: Controlling for disease status, high overall mindfulness and mindful-acceptance were related to lower levels of depression, anxiety, and stress. Mindful-attention, high overall mindfulness and mindful-acceptance were all related to better QOL, after controlling for disease and marital status. Conclusions: The results suggest that attending to one's thoughts and feelings may be sufficient to experience good quality of life, but it may be insufficient to buffer against the potential for psychological distress. However, the mindful-acceptance of unpleasant, threatening or painful thoughts and feelings may be necessary to prevent or reduce the impact of affective symptoms such as depression and anxiety. Implications for cancer survivors: understanding the potential role played by mindfulness in informing well-being outcomes in NHL patients and survivors may assist in the development of appropriate interventions, aimed at improving their mental health.

Keywords

Lymphoma, Oncology, Mindfulness, Depression, Anxiety, Stress, Quality of Life

1. Introduction

In this study, we evaluated patients and survivors of non-Hodgkin's lymphoma (NHL), in particular, a rare, indolent and mostly incurable subtype called Waldenstrom's Macroglobulinemia (WM), also known as lymphoplasmacytic lymphoma. NHL is the most common type of blood cell cancer, accounting for around 4% of all cancer diagnoses in Australia [1]. There are more than 30 subtypes of NHL including WM [2]. Most cases of NHL are diagnosed in later life, and the incidence tends to increase with advancing age, with a median age of onset of 66 years. WM comprises 1% of all diagnosed NHL cases, and has a similar median age of onset of 63 years [3]. The treatment of NHL varies dependent upon the disease category, with WM (being an indolent subtype) often involving a "watch and wait" therapeutic approach [4]. The mean 5-year survival rate for people diagnosed with NHL is around 69% [4], whereas the 5-year survival rate for people with WM is between 36 to 87%, depending on their risk category [5].

Many studies have examined the psychological experiences of cancer patients, but few have investigated the specific experiences of people with NHL or WM. Thus, it is unclear whether the illness experience of people with NHL is similar to or different from that of other forms of cancer. In the literature, cancer diagnosis and treatment is described as a psychologically challenging experience. Patients may have to deal with unpleasant symptoms, multiple tests, ongoing treatment, loss of functioning [6] [7], and uncertainty about their future health [8]. In some cases, the cancer experience overwhelms the patient's coping resources as they attempt to adjust to the disruptions caused by the illness and its treatment [8] [9].

As a consequence, a significant proportion of cancer patients report experiencing clinically-relevant *depression* and/or *anxiety* at some point during their illness or recovery [10]. Approximately 50% of cancer patients and survivors have been reported to experience significant distress at diagnosis, and around 30% were still distressed two or more years later [11]. However, more recent studies report lower prevalence estimates of psychological distress, for example, 20% to one-third of cancer patients across the illness trajectory [12] [13]. Nonetheless, a significant proportion of cancer patients and survivors continue to experience unpleasant psychological, emotional, spiritual, and social situations that may inhibit their ability to cope with cancer and its treatment [14]. Moreover, almost one-third of cancer survivors report experiencing trauma-related symptoms comparable to those who have survived catastrophic life-threatening events (e.g., violent interpersonal attack; [15]).

Only a small literature has examined psychological distress in patients and survivors of NHL, although NHL is rated among the top five cancers causing psychological distress out of 14 different cancer diagnoses (*i.e.*, prevalence of 36%; [16]), suggesting that lymphoma may be an especially distressing form of cancer to deal with. However, in another study, nearly two-thirds (63%) of NHL patients reported clinically significant depression or anxiety up to 1-year after diagnosis [17], and this NHL-specific distress was found to persist for up to 3-years after treatment [18].

The *correlates* of depression and anxiety have been examined in cancer patients. For example, depression and anxiety have been shown to be associated with poorer treatment adherence [6] [19] and treatment response [20]. In addition, depression has been shown to be strongly correlated with worse physical symptoms in cancer patients (e.g., pain; [21]), later cancer stage [22], shorter survival time [23], poorer QOL [24] [25], and prior depression and comorbid anxiety [26]. Similarly, high anxiety was related to increased pain, fear of recurrence [27], and worse QOL [6].

However, no studies have evaluated the correlates of depression, anxiety, stress, and QOL in NHL patients, although its treatment has been shown to impair QOL [28]-[30]. Nor have any psychological constructs with the potential to inform treatment of psychological distress in NHL been examined. Thus, in this study, we examined mindfulness and its subcomponents and their relationship to affective symptoms (*i.e.*, depression, anxiety), stress, and QOL in people with NHL.

Mindfulness has recently been explored as a construct of interest in the cancer literature, although the individual components of mindfulness have not been examined. For example, the expression of the trait is related to

better mental and physical health in cancer patients (e.g., less depression and anxiety; [31]). The concept of mindfulness originated in Eastern contemplative traditions, especially Buddhism, where it is recognized as the cornerstone of the path towards liberation from personal suffering [32]. The concept has recently been adopted by Western cultures, where it is somewhat differently described as the conscious awareness of and purposeful attention to one's present-moment experiences, in a non-judgmental and accepting way [33]. This approach is closely aligned with the original concept of mindfulness, but its integration into Western culture has led to several divergent conceptualizations of the construct. Thus, there are a variety of different approaches to the measurement of mindfulness. For example, Brown and Ryan [34] described mindfulness as a unidimensional factor related to the regulation of attention to present-moment experiences, and they therefore calculated a single total score on the Mindful Attention and Awareness Scale.

In contrast, some conceptualizations of the construct have evaluated multiple dimensions. For example, using an exploratory factor analysis, Baer, Smith, Hopkins, Krietemeyer, and Toney [35] showed that mindfulness was comprised of five factors, and this led to the development of the Five Factor Mindfulness Questionnaire. However, Bishop *et al*. [36] proposed that a two-component theoretical model of mindfulness better conceptualized the construct, with the two sub-components being mindful-attention and mindful-acceptance. The *attention* component relates to the deliberate regulation of attention to one's immediate experiences (e.g., thoughts, feelings, and physical sensations), while the *acceptance* component refers to an open, receptive, and accepting attitude to experience that does not involve minimizing, ignoring, or judging, especially when the experiences are distressing.

Consistent with the above theoretical approach, Coffey, Hartman, and Fredrickson [37] developed the Carolina Empirically Derived Mindfulness Inventory (CEDMI). This trait-based measure is comprised of two subscales, *present-centred attention* (*i.e*., mindful-attention) and *acceptance of experience* (*i.e*., mindful-acceptance). The authors reported that high mindful-attention was directly associated with wellbeing (e.g., flourishing) and indirectly related to low psychological distress (*i.e*., depression, anxiety) in university students. The results suggest that clarity of emotional experience may indirectly reduce a person's perception of distress and enhance their perceptions of wellbeing [37]. In contrast, high mindful-acceptance was strongly and directly correlated with low psychological distress and better wellbeing, suggesting that acceptance may directly buffer against the potential for psychological distress. However, only two studies have examined *trait* mindfulness in cancer patients, and none have evaluated the sub-components of mindfulness. Both of these studies showed that mindfulness was associated with lower depression, anxiety, and stress levels in breast and prostate cancer patients [34] and in a mixed sample of cancer patients [38]. However, no studies have evaluated mindfulness levels in lymphoma patients. Thus, in this study, we utilized the well-accepted two component theoretical model of mindfulness [36], and Coffey *et al*.'s [37] CEDMI trait measure of the construct to evaluate mindfulness-based predictors of affective symptoms (*i.e*., depression, anxiety), psychological stress, and QOL in patients and survivors of NHL.

Based on the aforementioned literature, it was expected that: 1) high overall mindfulness and mindful-acceptance will be associated with lower depression levels; 2) high overall mindfulness and mindful-acceptance will be associated with lower anxiety levels; 3) high overall mindfulness and mindful-acceptance will be associated with lower stress levels; and 4) high overall mindfulness, mindful-attention, and mindful-acceptance will be associated with better overall QOL.

2. Method

2.1. Participants

This study was conducted with full human research ethics committee approval from the University of New England. Potential participants were recruited by advertisements placed on two lymphoma support websites: WM Topics (www.wmtopics.com) from April to August 2011, and the Australian Leukaemia Foundation (www.leukaemia.org.au) from July to August 2011. An *a priori* power analysis using G*Power 3.1 [39] indicated that a sample of 123 was required, assuming a medium effect size of $f^2 = 0.15$, four predictors (*i.e*., two demographics, two mindfulness sub-scores), alpha set at 0.05, and power of 0.90 [40]. Thus, a sample size of 125 was considered adequate for the planned analyses. Inclusion criteria for the study were age 18 years or over and a diagnosis of NHL, including WM, two or more years ago.

Two-hundred-six people clicked on the study URL and entered the study information page. Of these, 81 failed

to progress to the study questionnaire; the non-responders were excluded from analysis, leaving 125 participants. Most participants (89.6%) were recruited via the WM Topics website and 10.4% were recruited via the Leukaemia Foundation website.

Seventy-one males (56.8%) and 54 (43.2%) females participated in the study, with ages ranging from 32 - 92 years (M = 63.91, SD = 9.60). Most participants were partnered (*i.e.*, married or in a de facto relationship, n = 103, 82.4%) and 17.6% were not partnered. Most had completed a trade certificate or university/postgraduate degree (n = 103, 82.4%), and the remainder had completed some or all of high school (17.6%). About one-half of the sample worked full-time, part-time, or casual (n = 64, 51.2%), and one-half were retired or unemployed (48.8%).

Most of the participants (n = 112, 89.6%) were survivors of WM, and the remainder (10.4%) were survivors of NHL, other than WM. Of the respondents, 30% (n = 37) confirmed their lymphoma diagnosis by uploading a medical report to the survey website, or agreed to have their doctor confirm the diagnosis. The remainder consented to their doctor providing the details but the doctors did not comply with the information requests. Time since diagnosis ranged from 2 to 18 years (M = 5.99, SD = 3.79). About three-quarters (n = 92, 73.6%) of the sample reported they were currently in remission or had stable disease. Most reported no prior or current cancer diagnosis (n = 75), although 40% (n = 50) indicated that they had another diagnosed medical illness (e.g., asthma, hypertension, diabetes mellitus type-2), and one-third (n = 42, 33.6%) were currently receiving treatment for their lymphoma.

2.2. Measures

The survey was delivered in an online format using the web-based survey software, Qualtrics (www.qualtrics.com). The survey asked about demographics (*i.e.*, sex, age, marital status, education level, employment), medical details (*i.e.*, type of lymphoma, time since diagnosis, disease status, current medication/ treatment, other cancer diagnoses, other medical diagnoses), the current practice of mindfulness-based meditation, and included the scales mentioned below.

2.2.1. Carolina Empirically Derived Mindfulness Inventory (CEDMI)

The CEDMI [37] was used to assess trait mindfulness. Two subscales, mindful-attention (8-item) and mindful-acceptance (14-item) assessed the constructs using 5-point Likert type scales ranging from 1 (*almost never*) to 5 (*almost always*), with high scores indicating greater expression of the trait. Subscale scores ranged from 8 to 40 (attention) and 14 to 70 (acceptance). The subscales have high reported construct validity and adequate to high internal consistencies, with Cronbach's alphas of 0.74 (attention) and 0.90 (acceptance; [37]). In the present study, the internal consistencies were 0.81 for overall mindfulness, 0.86 for attention, and 0.88 for acceptance.

2.2.2. Depression Anxiety and Stress Scales-Short-Form (DASS-21)

The DASS-21 [41] was used to assess depression, anxiety and stress symptoms over the past week. The DASS-21 comprises three 7-item subscales assessing depression, anxiety, and stress, using 4-point Likert type scales ranging from 0 (*did not apply to me at all*) to 3 (*applied to me very much/most of the time*), with high scores indicating greater distress levels. The scale has high concurrent validity [42], and its internal consistency is also high, with Cronbach's alphas of 0.92 for depression, 0.81 for anxiety, and 0.86 for stress [41]. In the present study, the internal consistencies were 0.86 for depression, 0.80 for anxiety, and 0.80 for stress.

2.2.3. Functional Assessment of Cancer Therapy-General Version 4 (FACT-G)

The FACT-G [43] was used to assess overall QOL. The 27-item scale is comprised of four subscales: physical, social, emotional and functional wellbeing, although in this study, only overall QOL was reported, consistent with prior approaches in the literature [44]. Participants were asked to respond to statements using 5-point Likert type scales ranging from 0 (*not at all*) to 4 (*very much*), with high scores indicating better QOL. The scale has high reported convergent and discriminant validity, and high internal consistency, with a Cronbach's alpha of 0.89 [43]. In this study, the internal consistency was high, 0.90.

2.3. Procedure

Interested participants clicked on the study URL to enter the study information page. They were informed that

their involvement was voluntary, their responses would be handled confidentially, and that they were free to withdraw from the study at any time. They were required to provide their consent to participate in the study prior to commencing the online survey. The survey was customized to permit participants to leave and re-enter as they wished, thereby enabling them to complete the survey over one or more sittings. They were requested to answer each survey item as honestly and openly as possible.

2.4. Statistical Analysis

All statistical analyses were conducted using Predictive Analytic Software (PASW) Statistics program, version 18 for Macintosh. Of the study variables, only overall mindfulness was normally distributed. Parametric and non-parametric tests were conducted and the results were compared. The same pattern of results was shown in all of the analyses, whether transformed or untransformed data were used. For ease of interpretation, only the raw data and parametric test results are reported here.

Four multivariate outliers were identified with Mahalanob is distance values greater than critical chi-squared values ($p < 0.001$), but all the Cook's distance maximum values were below 1.00 [45], and all were deemed to be clinically relevant (e.g., severe depression). All regressions were therefore conducted with and without the outliers. The same pattern of results was obtained in all the analyses, and so the outliers were retained in the regression analyses. All assumptions of normality, linearity, homoscedasticity, and independence were reviewed and were found to be tenable. There was no evidence of multi-collinearity in regression analyses, with all tolerance values above 0.96.

3. Results

Means and standard deviations of the key study variables are presented in **Table 1**. The participants reported high mean levels of trait mindfulness and QOL; relatively low levels of depression, anxiety, and stress; and moderate levels of mindful-attention. Only a minority of participants (9%) reported practicing mindfulness-based meditation more than three times per week.

A correlation matrix of the independent variables (*i.e.*, overall mindfulness, mindful-attention, and mindful-acceptance), possible covariates (*i.e.*, demographic and medical details) and dependent variables (*i.e.*, depression, anxiety, stress, and QOL) is provided in **Table 2**. Regarding possible third variables, anxiety and depression scores only had a small correlation with the demographic and medical variables, but high stress was correlated with disease status (*i.e.*, not in remission/unstable disease), and high QOL was correlated with marital status

Table 1. Descriptive statistics for mindfulness, psychological distress, and quality of life (N = 125).

Scale	*M*	*SD*	Range of Scores	
			Potential	Actual
Mindfulness (CEDMI)				
Overall	84.74	9.82	22 - 110	56 - 108
Mindful Attention	22.42	7.12	8 - 40	10 - 39
Mindful Acceptance	62.32	7.63	14 - 70	32 - 70
Psychological Distress (DASS-21)				
Depression	2.46	3.07	0 - 21	0 - 16
Anxiety	1.90	2.44	0 - 21	0 - 16
Stress	3.36	3.21	0 - 21	0 - 19
Quality of Life (FACT-G)				
Overall	85.14	13.37	0 - 108	50 - 106

Note: CEDMI = Carolina Empirically Derived Mindfulness Inventory; DASS-21 = Depression, Anxiety, Stress Scales-Short Form; FACT-G = Functional Assessment of Cancer Therapy-General Version.

Table 2. Pearson's correlations between demographic/medical variables, psychological distress, quality of life, and mindfulness variables.

Variable	Depression	Anxiety	Stress	QOL	Overall mindfulness	Mindful attention
Demographic variables						
Sex (1 = Male, 2 = Female)	−0.01	0.07	−0.02	0.08		
Age (Years)	−0.05	−0.08	−0.17	0.04		
Marital status (1 = Partnered, 2 = Not partnered)	0.08	0.11	0.13	−0.24**		
Education level (1 = Lower, 2 = Higher)	0.06	−0.03	0.09	0.01		
Employment (1 = Working, 2 = Not working)	0.06	0.12	0.10	−0.15		
Mindfulness-based meditation (1 = Yes, 2 = No)	0.08	−0.02	−0.12	−0.07		
Medical variables						
Diagnosis details (1 = WM, 2 = NHL)	−0.13	−0.09	−0.15	0.13		
Time since diagnosis (Years)	0.13	0.10	0.13	−0.16		
Disease status (1 = Not active, 2 = Active)	0.15	0.14	0.21*	−0.33**		
Medication/treatment (1 = Yes, 2 = No)	−0.01	−0.01	−0.07	0.17		
Other cancer diagnosis (1 = Yes, 2 = No)	0.02	0.01	−0.03	0.03		
Other medical illness (1 = Yes, 2 = No)	−0.07	−0.17	−0.03	0.11		
Depression						
Anxiety	0.73***					
Stress	0.64***	0.68***				
QOL	−0.73***	−0.54***	−0.57***			
Overall mindfulness	−0.48***	−0.21*	−0.31***	0.40***		
Mindful attention	−0.04	0.10	0.03	0.15	0.64***	
Mindful acceptance	−0.58***	−0.36***	−0.43***	0.38***	0.69***	−0.11

Note: QOL = Quality Of Life; WM = Waldenstrom's Macroglobulinemia; NHL = Non-Hodgkin's Lymphoma. $^*p < 0.05$, two-tailed; $^{**}p < 0.01$, two-tailed; $^{***}p < 0.001$, two-tailed.

(*i.e.*, partnered) and remission/stable disease. Thus, the above covariates were controlled at step 1 in the regression analyses for stress and QOL, respectively.

Eight hierarchical or standard multiple regression analyses were conducted to evaluate mindfulness-based predictors of depression, anxiety, stress, and QOL. Demographicor medical factors that were significantly correlated with dependent variables were entered at step 1 in the hierarchical regression analysis, and independent variables were entered as step 2. Overall mindfulness and mindfulness sub-scores were examined separately in these analyses.

3.1. Mindfulness and Depression

A standard multiple regression analysis was conducted to examine whether overall mindfulness was related to depression, see **Table 3**. Overall mindfulness explained 23.0% of the variance in depression score, $R = 0.48$, $F(1,123) = 36.98$, $p < 0.001$, indicating that high overall mindfulness was related to lower depression levels. A separate regression analysis evaluated whether mindful-attention and mindful-acceptance were related to depression score, see **Table 3**. Together, the variables explained 35.0% of the variance in depression score, $R = 0.59$, $F(2,122) = 32.91$, $p < 0.001$, but only high mindful-acceptance was significantly related to lower depression score.

Table 3. Standard multiple regressions for mindfulness variables predicting depression.

| Predictor | Unstandardized | | 95% CI | | β | sr^2 | R^2 |
	B	SE	LL	UL			
Model 1							0.23^{***}
Constant	15.20	2.11	11.03	19.37			
Overall mindfulness	−0.15	0.03	−0.20	−0.10	-0.48^{***}	0.23	
Model 2							0.35^{***}
Constant	18.41	2.06	14.33	22.48			
Mindful attention	−0.05	0.03	−0.11	0.02	−0.11	0.01	
Mindful acceptance	−0.24	0.03	−0.30	−0.18	-0.59^{***}	0.35	

Note: sr^2 = squared semi-partial correlation. $^{***}p < 0.001$.

3.2. Mindfulness and Anxiety

A standard multiple regression analysis was conducted to examine whether overall mindfulness was related to anxiety, see **Table 4**. Overall mindfulness explained 4.3% of the variance in anxiety score, $R = 0.21$ $F(1,123) = 5.59$, $p = 0.020$, indicating that high overall mindfulness was related to lower anxiety levels. A separate regression analysis evaluated whether mindful-attention and mindful-acceptance were related to anxiety score, see **Table 4**. Together, the variables explained 13.0% of the variance in anxiety score: $R = 0.36$, $F(2,122) = 9.25$, $p < 0.001$, but only high mindful-acceptance was significantly related to lower anxiety score.

3.3. Mindfulness and Stress

A hierarchical multiple regression analysis was conducted to examine whether overall mindfulness was related to high stress, see **Table 5**. At step 1, disease status explained 4.2% of the variance in stress scores, $R = 0.21$, $F(1,123) = 5.41$, $p = 0.022$. At step 2, overall mindfulness explained an additional 8.4% of variance in stress, $F_{Change}(1,122) = 11.68$, $p = 0.001$, and the overall variance explained by the model was 12.6%, $R = 0.35$, $F(2,122) = 8.78$, $p < 0.001$. Thus, after controlling for disease status, high overall mindfulness was related to lower stress scores. A separate regression analysis evaluated whether mindful-attention and mindful-acceptance were related to stress, see **Table 5**. At step 1, disease status explained 4.2% of the variance in stress, $R = 0.21$, $F(1,123) = 5.41$, $p = 0.022$. At step 2, mindful-attention and mindful-acceptance explained an additional 17.1% of variance in stress, $F_{Change}(2,121) = 13.16$, $p < 0.001$, and the overall variance explained by the model was 21.3%, $R = 0.46$, $F(3,121) = 10.93$, $p < 0.001$. Thus, after controlling for disease status, high mindful-acceptance (but not mindful-attention) was significantly related to high stress.

3.4. Mindfulness and Quality of Life

A hierarchical multiple regression analysis was conducted to examine whether overall mindfulness was related to higher QOL, see **Table 6**. At step 1, disease and marital status explained 14.5% of the variance in QOL, $R = 0.38$, $F(2,122) = 10.36$, $p < 0.001$. At step 2, overall mindfulness explained an additional 12.7% of variance in QOL, $F_{Change}(1,121) = 21.18$, $p < 0.001$, and the overall variance explained by the model was 27.2%, $R = 0.52$, $F(3,121) = 15.11$, $p < 0.001$. Thus, after controlling for disease and marital status, high overall mindfulness was significantly related to higher QOL. A separate regression analysis evaluated whether mindful-attention and mindful-acceptance were related to QOL, see **Table 6**. At step 1, disease and marital status explained 14.5% of the variance in QOL, $R = 0.38$, $F(2,122) = 10.36$, $p < 0.001$. At step 2, mindful-attention and mindful-acceptance explained an additional 14.5% of variance in QOL, $F_{Change}(2,120) = 12.25$, $p < 0.001$, and the overall variance explained by the model was 29.0%, $R = 0.54$, $F(4,120) = 12.26$, $p < 0.001$. Thus, after controlling for disease and marital status, high mindful-attention and mindful-acceptance were significantly related to better QOL, with mindful-acceptance being the strongest individual predictor of QOL.

Table 4. Standard multiple regressions for mindfulness variables predicting anxiety.

Predictor	Unstandardized		95% CI		β	sr^2	R^2
	B	SE	LL	UL			
Model 1							0.04[*]
Constant	6.29	1.87	2.59	9.99			
Overall mindfulness	−0.05	0.02	−0.10	−0.01	−0.21[*]	0.04	
Model 2							0.13[***]
Constant	8.48	1.89	4.73	12.22			
Mindful attention	0.02	0.03	−0.04	0.08	0.06	<0.01	
Mindful acceptance	−0.11	0.03	−0.17	−0.06	−0.36[***]	0.12	

Note: sr^2 = squared semi-partial correlation. [*]$p < 0.05$. [***]$p < 0.001$.

Table 5. Hierarchical multiple regressions for mindfulness variables predicting stress.

Predictor	Unstandardized		95% CI		β	sr^2	R^2
	B	SE	LL	UL			
Model 1							
Step 1							0.04[*]
Constant	1.48	0.86	−0.21	3.17			
Disease status	1.49	0.64	0.22	2.75	0.21*	0.04	
Step 2							0.13[***]
Constant	9.85	2.58	4.74	14.97			
Disease status	1.24	0.62	0.02	2.46	0.17[*]	0.03	
Overall mindfulness	−0.10	0.03	−0.15	−0.04	−0.29[**]	0.08	
Model 2							
Step 1							0.04[*]
Constant	1.48	0.86	−0.21	3.17			
Disease status	1.49	0.64	0.22	2.75	0.21[*]	0.04	
Step 2							0.21[***]
Constant	12.84	2.59	7.70	17.97			
Disease status	1.17	0.59	0.01	2.34	0.16[*]	0.03	
Mindful attention	<0.01	0.04	−0.08	0.07	−0.01	<0.01	
Mindful acceptance	−0.18	0.03	−0.24	−0.11	−0.42[***]	0.17	

Note: sr^2 = squared semi-partial correlation. [*]$p < 0.05$. [**]$p < 0.01$. [***]$p < 0.001$.

4. Discussion

The results of the present study suggest that high overall mindfulness and mindful-acceptance (but not mindful-attention) is related to lower depression, anxiety, and stress levels. The results are consistent with Hypotheses 1 to 3, and prior study results indicating that high overall mindfulness is related to lower depression [46], anxiety [47], and stress levels [48], in cancer patients, although the subcomponents of mindfulness have not previously been examined in this population.

Table 6. Hierarchical multiple regressions for mindfulness variables predicting quality of life.

Predictor	Unstandardized		95% CI		β	sr^2	R^2
	B	SE	LL	UL			
Model 1							
Step 1							0.15***
Constant	104.56	4.52	95.62	113.51			
Disease status	−9.05	2.56	−14.12	−3.98	−0.30**	0.09	
Marital status	−6.80	2.96	−12.65	−0.93	−0.19*	0.04	
Step 2							0.27***
Constant	61.20	10.31	40.79	81.61			
Disease status	−7.81	2.39	−12.53	−3.08	−0.26*	0.06	
Marital status	−6.51	2.74	−11.95	−1.08	−0.19*	0.03	
Overall mindfulness	0.49	0.11	0.28	0.70	0.36***	0.13	
Model 2							
Step 1							0.15***
Constant	104.56	4.52	95.62	113.51			
Disease status	−9.05	2.56	−14.12	−3.98	−0.30**	0.09	
Marital status	−6.80	2.96	−12.65	−0.93	−0.19*	0.04	
Step 2							0.29***
Constant	55.69	10.72	34.47	76.91			
Disease status	−7.67	2.37	−12.36	−2.99	−0.25**	0.06	
Marital status	−6.57	2.72	−11.96	−1.18	−0.19*	0.03	
Mindful attention	0.32	0.15	0.03	0.61	0.17*	0.03	
Mindful acceptance	0.64	0.14	0.37	0.91	0.36***	0.13	

Note: sr^2 = squared semi-partial correlation. *$p < 0.05$. **$p < 0.01$. ***$p < 0.001$.

These findings are also consistent with those of Coffey *et al*. [37] who found that mindful-acceptance was directly related to lower depression and anxiety levels, but mindful-attention was only *in*directly related to the states in university students. Similarly, better QOL was found to be related to higher overall mindfulness, mindful-attention and mindful-acceptance, after controlling for disease and marital status. These results are consistent with Hypothesis 4 and prior study results indicating that high overall mindfulness is related to better QOL in cancer patients [34] [49].

Taken together, the results suggest that *mindful-acceptance* was the key mindfulness component that informed and influenced the expression of affective symptoms (*i.e.*, depression, anxiety) and stress perceptions in study respondents. In contrast, high mindful-attention *and* mindful-acceptance were apparently relevant to their respondent's subjective assessment of QOL. Alternatively, the results may simply reflect that the experience of stress and distress interfered with the experience of mindfulness in some people, as they began to ruminate, worry or possibly catastrophize about their current medical situation. Additionally, it is possible that trauma-related symptoms (e.g., intrusions) may have reduced the capacity of some individuals to experience mindfulness, although it was beyond the scope of this study to assess these psychological symptoms. Finally, the indolent nature of WM and the common "watch and wait" strategy to disease management may have led some individuals to worry unduly about their situation.

Somewhat differently, Bishop *et al*. [36] has theorized that mindfulness encompasses both attention to and

acceptance of internal and external experiences, and that both psychological processes are beneficial to mental health. That is, regulating one's attention is believed to cultivate a non-elaborative awareness of thoughts and feelings as they emerge, rather than being caught up in ruminative thought processes about the origin or implications of the thoughts. Concurrently, embracing an attitude of acceptance towards unpleasant and painful thoughts and feelings is believed to alter the psychological context in which the events are experienced, thus, potentially reducing the perceived threat and unpleasantness of symptoms, and in turn, possibly leading to better affect tolerance and less reliance on avoidance strategies. However, our results and the results of Coffey *et al.* [37] suggest that it is ultimately the *acceptance* of one's current situation that is required to prevent the development of psychological distress in NHL patients and survivors and university students, respectively.

Nonetheless, *attention* to these thoughts and feelings will naturally precede the person's ability to accept the potentially stressful experiences. In this study, mindful-attention and mindful-acceptance were both associated with better QOL, suggesting that mindfully attending to one's thoughts and feelings may be sufficient to bolster one's sense of quality-of-life. However, it may be insufficient to buffer against the development of affective symptoms, in which case, mindful-acceptance of one's feelings, thoughts and events may be required.

The study results also generally accorded with those of experimental studies showing that acceptance-based treatments are effective in reducing psychological distress in end-stage cancer patients [50]. In addition, mindfulness-based stress reduction treatments have been shown to reduce depression, anxiety, distress [44] [46] [47], and high stress levels in cancer patients [48], as well as improve QOL [49] [51], sleep quality, energy levels, pain levels, and wellbeing [52]. However, in a recent randomized controlled trial of Tibetan yoga in patients with lymphoma that incorporated mindfulness techniques, depression and anxiety outcomes were *not* shown to improve, only some sleep parameters [53].

Finally, with regard to *clinical relevance*, the results of this study suggest that people with NHL may profit from the provision of psychological assistance to mindfully-accept their difficult situation, which may improve their ability to manage their feelings of distress. However, mindfully attending to one's thoughts and feelings may be sufficient to maintain QOL during times of high stress, although acceptance may be required, to buffer against the potential for distress. The study results also suggest that acceptance-based therapies may be most suitable for people with NHL, rather than other forms of mindfulness therapy (e.g., mindfulness-meditation, mindfulness-based stress reduction).

4.1. Study Limitations and Future Directions

The study results should be interpreted in light of several study limitations. First, the cross-sectional study design did not permit the analysis of causal relationships between the mindfulness constructs and other study variables. Thus, it is equally likely that depression, anxiety, high stress, and low QOL contributed to the experience of lower mindfulness levels, as it is that mindfulness levels impacted on the above states. Second, it is likely that variables such as emotion-regulation may have mediated the relationship between mindfulness and mental health, and may therefore have captured some of the variance in these psychological states, although such an enquiry was beyond the scope of this study. Third, most of the study participants were diagnosed with WM, a rare, indolent and mostly incurable form of NHL. Thus, the results may not be generalizable to patients with other forms of NHL.

Nonetheless, the sample size was adequate, the study employed psychometrically valid scales, and the mean age and medical characteristics of the participants were similar to prior published values. In terms of future indicated research, the relationship between mindfulness and mental health outcomes needs to be examined in a prospective longitudinal study or a randomized controlled trial of acceptance-based therapies, differing in terms of their clinical focus (e.g., mindfulness-based stress reduction vs. acceptance-based therapies). Second, to address other possible mechanisms, emotion regulation might be evaluated as a potential mediator or moderator of mindfulness to mental health outcome relationships. Third, future studies might also address experiences of trauma related psychological symptoms to determine if they co-vary with mindfulness levels, and examine whether mindfulness training may ameliorate symptoms of post-traumatic stress disorder.

4.2. Conclusions

Non-Hodgkin's lymphoma (NHL) patients and survivors reported relatively low mean levels of depression, anxiety and stress, and high levels of trait mindfulness and quality of life. However, some participants reported

ongoing anxiety and depression and impaired quality-of-life as a result of the illness, its treatment, or its implications. After controlling for potential third variables (*i.e.*, marital and remission status), high trait mindfulness, and especially high mindful-acceptance were shown to be related to lower stress, anxiety, and depression levels. In contrast, both mindful-attention and mindful-acceptance were related to better QOL.

The results suggest that attending to one's thoughts and feelings may be sufficient to experience good quality of life, but it may be insufficient to buffer against the experience of psychological distress. Thus, the mindful-acceptance of unpleasant, threatening or painful thoughts and feelings may be necessary to buffer against the potential for depression, anxiety, and high perceived stress symptoms to be experienced. The results also suggest that acceptance-based treatments such as Acceptance and Commitment Therapy may assist distressed people with NHL.

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