A Comparison of Fibromyalgia Symptoms in Patients with Healthy versus Depressive, Low and Reactive Affect Balance Styles

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Abstract

Background and Aims—Affect balance reflects relative levels of negative affect (NA) and positive affect (PA) and includes four styles: Healthy (low NA/high PA), Depressive (high NA/low PA), Reactive (high NA/high PA) and Low (low NA/low PA). These affect balance styles may have important associations with clinical outcomes in patients with fibromyalgia. Herein, we evaluated the severity of core fibromyalgia symptom domains as described by the Outcomes Research in Rheumatology-Fibromyalgia working group in the context of the four affect balance styles.

Methods—Data from 735 patients with fibromyalgia who completed the Brief Pain Inventory, Multidimensional Fatigue Inventory, Profile of Mood States, Medical Outcomes Sleep Scale, Multiple Ability Self-Report Questionnaire, Fibromyalgia Impact Questionnaire-Revised, Medical Outcomes Study Short Form-36, and Positive and Negative Affect Schedule were included in this analysis.

Results—The majority (51.8%) of patients in our sample had a Depressive affect balance style; compared to patients with a Healthy affect balance style, they scored significantly worse in all fibromyalgia symptom domains including pain, fatigue, sleep disturbance, dyscognition,

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depression, anxiety, stiffness, and functional status (P = <.001 - .004). Overall, patients with a Healthy affect balance style had the lowest level of symptoms, while symptom levels of those with Reactive and Low affect balance styles were distributed in between those of the Depressive and Healthy groups.

Conclusions and Implications—The results of our cross-sectional study suggest that having a Healthy affect balance style is associated with better physical and psychological symptom profiles in fibromyalgia. Futures studies evaluating these associations longitudinally could provide rationale for evaluating the effect of psychological interventions on affect balance and clinical outcomes in fibromyalgia.

1. Introduction

Negative affect encompasses undesirable emotional states such as anger, contempt, sadness, and fear and has been strongly associated with poor health outcomes [1]. In contrast, positive affect is defined by a person's capacity for positive emotion-bound processes like enthusiasm, determination, engagement and alertness[1].An association between both positive and negative affect has been established across a number of chronic pain states including osteoarthritis, rheumatoid arthritis, and chronic low back pain[2-9]; however, the relationship between affect and fibromyalgia may be particularly relevant.

For patients with fibromyalgia, not only are high rates of depression and anxiety commonly observed [10-12]and associated with greater symptom severity and poorer functional outcomes[13, 14], but such psychiatric comorbidity implies that the broader spectrum of negative affect is likely present and important. Negative affect has been found to predict clinical pain intensity [15-18], pain in subsequent weeks [19], symptom burden[20]and whether an individual meeting criteria for fibromyalgia is more likely to be a patient or a non-patient (not seek treatment) [21]. Yet, a large subset of fibromyalgia patients do not exhibit affective disturbance and may in effect be more resilient. It has been observed that in fibromyalgia, positive affect has been related to lower levels of pain [19], less pain catastrophizing [4],decreased levels of fatigue[22], greater pain tolerance[18] and increased levels of functioning [4, 18]. More importantly, it has been hypothesized that much more can be gleaned about a patient's potential vulnerability or resilience in regard to poor outcomes if both positive and negative affect are taken into consideration[4].

Individuals exhibit varying levels of both positive and negative affect; moreover, because positive and negative affect do not represent opposite ends of a continuum, a person may have elevated or diminished levels of both positive and negative affect simultaneously. Yet, negative affect and positive affect are typically studied in isolation. Another way to consider emotional functioning is affect balance style, which takes into account one's relative levels of positive and negative affect[4].Hassett and colleagues have described four patterns of affect balance styles[4]. These include *Healthy affect balance*(high positive affect and low negative affect), *Low affect balance* (low positive affect and low negative affect), *Reactive affect balance* (high positive affect and high negative affect), and *Depressive affect balance* (low positive affect and high negative affect) [4].

To date, only two studies have examined potential associations between affect balance styles and pain[4, 23]. In the first study, Hassett and colleagues demonstrated that Depressive and Reactive affect balance styles were predominant in patients with fibromyalgia and these affect balance styles were associated with significantly higher odds of having worse pain, poorer functional status and psychiatric comorbidity[4]. In the second study, Sibille and colleagues demonstrated lower levels of experimentally-induced pain sensitivity in healthy adults with Healthy affect balance styles compared to those with Reactive, Depressive or Low affect balance styles[23].

Both Sibille[23] and Hassett[4] reported an association between affect balance styles and measures of pain, but the symptom spectrum of fibromyalgia includes other important symptoms including fatigue, sleep disturbances and dyscognition[24]. It has been recommended by the Outcome Measures in Rheumatology (OMERACT) fibromyalgia working group that these and other symptoms including depression, anxiety, stiffness and multidimensional function be included in all fibromyalgia studies [25]. As such, we aimed to provide a comprehensive evaluation of associations between affect balance with both physical and psychological symptoms in fibromyalgia. Because depression and anxiety are themselves correlates of fibromyalgia outcomes, we also sought to understand the incremental predictive validity of affect balance on fibromyalgia symptoms after controlling for depression and anxiety[10, 14, 26, 27].

Based on the observations of Hassett[4], we hypothesized that the largest proportion of fibromyalgia patients would classify as Depressive affect balance styleand patients in both the Depressive and the Reactive affect balance styles would have more severe depression and anxiety, as compared to Healthy and Low affect balance styles. Also, we predict that the observed association between affect balance styles and the non-psychiatric OMERACT recommended symptoms will remain statistically significant after controlling for depression and anxiety.

2. Participants and Methods

Surveys were mailed to 1,303 randomly selected patients from a fibromyalgia registry established at Mayo Clinic in Rochester, Minnesota and is maintained annually [28]. Patients included in this registry had a current diagnosis or history of fibromyalgia present in their medical record at Mayo Clinic between January 2000-December 2010 (confirmed by chart review), completed the ACR Fibromyalgia Research Survey and agreed to be contacted for future research. The overall response rate to this survey was 65.5% (n=858).This study was approved by the Mayo Clinic Institutional Review Board.

2.1 Participants

Only respondents who met Fibromyalgia Research Survey Criteria[29]were included in the present analyses (n=735, 56.4% of the original sample). This is defined as having a widespread pain index (WPI) score of 7 and a Symptom Severity (SS) score 5 or a score on the WPI of 3-6 and SS score of 9.

2.2 Measures

For this analysis, we included all available OMERACT outcome measures including pain, fatigue, sleep disturbance, dyscognition, depression, anxiety, stiffness, and multidimensional functioning.

2.2.1 Pain-Brief Pain Inventory (BPI)—The BPI is a 15-item validated self-report measure of chronic, non-cancer pain and is considered an appropriate measure of pain in fibromyalgia [30, 31]. It has an internal consistency of 0.80-0.92. In this analysis both pain severity and pain interference subscales were selected to represent the OMERACT symptom domain of pain.

2.2.2 Fatigue-Multidimensional Fatigue Inventory (MFI)—The MFI-20 is a 20-item validated self-report measure of fatigue and assesses general fatigue, physical fatigue, reduced activity, reduced motivation, and mental fatigue and is considered an appropriate measure of fatigue in fibromyalgia [31, 32]. It has an internal consistency of 0.84. For this analysis, we selected the MFI physical fatigue subscale to represent the OMERACT symptom domain of fatigue.

2.2.3 Depression and Anxiety-Profile of Mood States (POMS)—The 30-item POMS is a validated, self-report measure of mood[33]. It has an internal consistency of 0.76-0.95. For this analysis, we selected the depression-dejection and the tension-anxiety subscales of POMS to represent the OMERACT symptom domains of depression and anxiety.

2.2.4 Sleep-Medical Outcomes Sleep Scale (MOS-Sleep)—The MOS- Sleep scale is a 12-item, validated, self-report measure of sleep. Ithas been used in several fibromyalgia clinical trials and is considered to be an appropriate measure of sleep in fibromyalgia [31, 34]. It has an internal consistency of 0.73. For this analysis, we selected the Sleep Problems Index II to represent the OMERACT symptom domain of sleep disturbance.

2.2.5 Dyscognition-Multiple Ability Self-Report Questionnaire (MASQ)—The MASQ is a 38-item self-report measure and assesses five cognitive domains: language, visual-perceptual, verbal memory, visual memory, and attention-concentration [35]. It has an internal consistency of 0.92. The MASQhas been used in several fibromyalgia clinical trials to measure changes in perceived cognitive difficulties[31]. For this analysis, we selected the MASQ total to represent the OMERACT symptom domain of dyscognition.

2.2.6 Stiffness and Overall measure of Fibromyalgia-Fibromyalgia Impact Questionnaire-Revised (FIQ-R)—The FIQ-R is a 21-item, validated self-report measure that assesses symptoms, physical functioning, and overall impact of fibromyalgia[36]. It has an internal consistency of 0.95. The FIQ-R is the most commonly used outcome measure in fibromyalgia clinical trials [31]. For this analysis, we selected the FIQ-R stiffness item to represent the OMERACT symptom domain of stiffness. Additionally, the FIQ-R total score, which represents overall fibromyalgia severity, was compared across the four affect balance subgroups.

2.2.7 Multidimensional Function-Medical Outcomes Study Short Form 36-item (SF-36)—The SF-36 is a 36-item, validated self-report measure that assesses disease burden[37]. It has an internal consistency of 0.80-0.90. The SF-36 yields eight subscales and two summary scores: physical and mental component scores and has been used in clinical trials of fibromyalgia[38]. For this analysis, we selected the SF-36 physical and mental component scores to represent physical and mental (multidimensional) function.

2.2.8 Affect Balance-Positive and Negative Affect Schedule (PANAS)—The PANAS is a 20-item self-report measure that assesses perceptions of positive and negative affect[1, 39]. It consists of two 10-item scales: one for positive affect and one for negative affect and has an internal consistency of 0.84-0.90. Normal values for positive affect are 35.0 and for negative affect are 18.1[39]. Affect balance was estimated per guidelines outlined by Hassett et al [4];positive affect of >35 and a negative affect of >18.1 were classified as high. The four affect balance categories were healthy (high positive affect, low negative affect), low (low positive affect, low negative affect), reactive (high positive affect, high negative affect), and depressive (low positive affect, high negative affect).

2.3 Statistics

Mean ±SD for continuous variables and frequency (%) for categorical variables were used to summarize the sample characteristics. One-Way Analysis of Covariance (ANCOVA) and Pearson Chi-Square tests were used to compare the 4 groups.Complex pairwise comparisons tested predicted differences between groups. An overall p-value less than 0.05 was considered statistically significant. All statistical analyses were conducted using SPSS version 19 and SAS software, version 9.3 [40, 41]. Copyright ©2011 SAS Institute Inc. SAS and all other SAS Institute Inc., Cary, NC, USA.

3. Results

Demographic characteristics, mean FIQ-R, and positive affect and negative affect scores for the total sample (n=735) and by affect balance style categories are presented in Table 1. On average, patients were 55.8 years of age (±12.6), female (92.9%), and Caucasian (90.5%) and had a BMI of 30.0 (±7.4). Patients exhibited moderate to severe symptom severity as evidenced by a total FIQ-R score of 55.9 (±19.0) (range 0-100). The distribution of affect balance style categories was as follows: 83 (12%) were classified as Healthy, 239 (32.5%) were classified as Low, 32 (4.4%) were classified as Reactive and 381 (51.8%) were classified as Depressive.

ANCOVA analyses examining our first hypothesis, controlling for age and BMI, revealed statistically significant differences across the groups on almost all OMERACT-recommended fibromyalgia domains (see Table 2 Model 1). Table 3 presents the mean and standard deviations for each OMERACT-recommended symptom domain by affect balance style category. Means are adjusted for age and BMI. Because Hassett's[4] findings showed worse symptoms for both Depressive and Reactive affect balance, three complex pairwise comparisons were computed to evaluate the difference between: 1) Depressive versus the average of Healthy and Low, 2) Reactive versus the average of Healthy and Low, and 3) the difference between Reactive and Depressive. Results showed that on all 11 outcomes,

Depressive affect balance style was significantly different from Healthy and Low affect balance styles. This was true for the difference between Reactive versus Healthy and Low affect balance styles on only 4 of the outcomes. Last, the difference between Reactive and Depressive affect balance styles was significant on 8 of the 11 outcomes.

To address our second hypothesis we examined group differences once again using a series of ANCOVA analyses again controlling for age and BMI, but also including the previous depression and anxiety outcomes as covariates. This reduced the effect size of group differences, but most differences did remain statistically significant, suggesting that affect balance style has predictive value above and beyond merely the effects of depression and anxiety. Test statistics and effect size estimates are provided in Table 2 under the Model 2 column.

4. Discussion

As anticipated, having a Healthy affect balance style was relatively rare in patients with fibromyalgia (12%). In our sample, 51.8% had a Depressive affect balance style and another 4.4% had a Reactive affect balance style. Moreover, consistent with our hypothesis, those with a Depressive affect balance style were more likely than those with a Healthy and Low affect balance style to have worse outcomes across all OMERACT domains, including higher levels of pain, and stiffness, greater sleep disturbance and dyscognition,greater fatigue, higher levels of depression and anxiety, and worse functional. Differences between Reactive styles and Healthy and Low styles were not nearly as common, but importantly, did occur for anxiety, depression, global mental health, and fibromyalgia symptoms. It was also shown that patients with a Depressive affect balance style had significantly worse fibromyalgia symptoms as compared to those with a Reactive style.

When compared with other assessments of negative affect and positive affect in fibromyalgia, our sample had similar ranges of negative affect and positive affect[4, 19]. Additionally, our findings regarding affect balance style were consistent with Hassett and colleagues who reported that patients with fibromyalgia disproportionately had a Depressive affect balance style (54.4%), and a similarly uncommon Healthy affect balance style (10.1%)[4]. In addition, we found comparable associations between affect balance styles and psychiatric symptoms and other fibromyalgia outcomes. Lastly, confirming findings of Hassett and Sibille et al. who evaluated affective balance style in healthy adults, we also found that having a Reactive style wasassociated with worse health outcomes[4, 23].

Previous research [4] has shown that both Depressive and Reactive affect balance styles are associated with poorer fibromyalgia outcomes, and it was based on these findings that we focused on these two groups in our group contrasts. However, our results also demonstrated that, in most cases, those in the Low affect balance group had worse outcomes as compared to those in the Healthy affect balance group. This finding suggests that simply having a low level of negative affectmay not be optimal if not accompanied by high positive affect. Previous data has suggested that a positive affective disturbance may be present in fibromyalgia [8].Our present data provides evidence for this theory as 84% of the sample fell into the two low positive affect categories.Traditionally, psychotherapy has targeted the

elimination of negative affect; however, our findingsimply that having higher levels of positive affect may be equally important for psychological and physical well-being in individuals with fibromyalgia. In support of this, Frederickson's undoing hypothesis suggests that positive affect may buffer an individual's physical health from the negative effects of stress as demonstrated in studies of patients with cardiovascular diseases, high blood pressure, and other medical conditions[19, 42-45]. Recent evidence has demonstrated that acceptance and commitment theory (ACT) may be one way of helping patients with fibromyalgia to improve in functioning and response (positive affect) rather than solely focusing on reducing pain or distress (negative affect) [46, 47]. The results of our study add to the growing body of literature that suggest building positiveaffective resources offer as much of a benefit to patients with fibromyalgia, if not more, as reducing negative affect.

Our study is limited by a number of factors. First, the cross-sectional design limits the interpretation of the directionality of the relationship between affect balance style and the manifestation of symptoms and functional disability. We cannot ascertain whether affect balance style is simply contributory, or whether those with more symptoms and worse functional status are prone to having a depressive affect balance style (higher levels of negative affect and lower levels of positive affect). Second, our results cannot be generalized to all patients with fibromyalgia. Our sample likely represents patients with fibromyalgia who are more ill and seek subspecialty care in tertiary care centers. Similar analyses will need to be conducted in community samples (patients with lesser symptoms) to examine if distribution of affect balance stylessimilar to our sample are observed.

5. Conclusions and Implications

To conclude, our results suggest that having a Healthy affect balance is cross-sectionally associated with both better physical and psychological health outcomes. Our results provide rationale for the longitudinal study of affect balance and its relationship to fibromyalgia symptoms and for the evaluation of psychological interventions, particularly those that enhance positive affect such as positive psychotherapy[48],ACT [46, 47] and mindfulness interventions [49]to symptom burden and enhance psychological well-being in patients with fibromyalgia.

Acknowledgments

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Highlights

- Compared symptoms across affect balance styles in a large sample of patients with FM.

- Patients with a depressive style had significantly worse symptom profiles.

- Patients with a healthy style had the most favorable symptom profile.

- Having high positive affect is as important as having low negative affect.

Table 1

Characteristics of study sample as a whole and by affect balance style.

Demographics	Total (n = 735)	Healthy (n = 83)	Low (n = 239)	Reactive (n = 32)	Depressive (n = 381)	*P* Value
Age	55.8 ± 12.6	59.2 ± 14.2	57.6 ± 12.4	57.4 ± 14.9	53.9 ± 11.8	<.001
BMI	30.0 ± 7.4	28.5 ± 7.7	30.6 ± 7.3	28.7 ± 6.8	30.1 ± 7.5	0.10
Sex						0.78
Female	683 (93%)	76 (92%)	223 (93%)	31 (97%)	353 (93%)	
Male	52 (7%)	7 (8%)	16 (7%)	1 (3%)	28 (7%)	
Race						0.26
White	665 (90%)	81 (98%)	218 (91%)	27 (84%)	339 (89%)	
Other	17 (2%)	1 (1%)	5 (2%)	1 (3%)	10 (3%)	
Unknown	53 (7%)	1 (1%)	16 (7%)	4 (13%)	32 (8%)	
FIQ-R	55.9 ± 19.0	40.2 ± 17.5	48.0 ± 16.3	53.0 ± 18.9	64.6 ± 16.3	<.001
Positive Affect	26.8 ± 8.4	39.5 ± 3.1	26.3 ± 7.7	38.8 ± 2.1	23.3 ± 6.2	<.001
Negative Affect	21.5 ± 8.5	13.8 ± 2.4	13.6 ± 3.5	26.6 ± 5.5	27.6 ± 6.1	<.001

[a] Values are given as the number (percentage) or mean± standard deviation.

BMI = Body Mass Index; FIQ-R = Revised Fibromyalgia Impact Questionnaire.

Table 2

F-tests, p-values, and eta squared (effect size) for affect balance group differences on all OMERACT outcomes controlling for Age and BMI (Model 1) and Age, BMI, Anxiety, and Depression (Model 2)

Dependent Variable	Model 1			Model 2		
	F	p	Eta	F	p	Eta
Anxiety	113.256	<.001	.375			
Depression	102.567	<.001	.352			
SF-36 Physical	2.418	.065	.013	2.455	0.062	.013
SF-36 Mental	104.612	<.001	.357	13.144	<.001	.065
Fatigue	29.386	<.001	.135	13.342	<.001	.066
Sleep Disturbance	17.509	<.001	.085	3.602	0.013	.019
BPI Pain Severity	14.549	<.001	.072	2.851	0.037	.015
BPI Pain Interference	49.459	<.001	.208	10.526	<.001	.053
Fibromyalgia Overall	64.316	<.001	.254	11.422	<.001	.057
Dyscognition	34.246	<.001	.154	7.895	<.001	.040
Stiffness	9.059	<.001	.046	0.365	0.778	.002

Table 3

Means and Standard Deviations for OMERACT Outcomes by Affect Balance Groups, controlling for Age and BMI

		1: Healthy	2: Low	3: Reactive	4: Depressive	Group 4 vs. 1 & 2	Group 3 vs. 1 & 2	Group 3 vs 4
Anxiety	M	3.378	4.145	8.727	9.662	<.001	<.001	.234
	SD	.441	.272	.757	.210			
Depression	M	2.093	3.82	6.438	9.379	<.001	<.001	.001
	SD	.490	.302	.842	.234			
SF-36-Physical	M	32.674	30.218	30.429	29.635	.020	.582	.662
	SD	1.018	.628	1.749	.485			
SF-36-Mental	M	52.506	46.591	42.699	33.521	<.001	.002	<.001
	SD	1.202	.741	2.064	.573			
Fatigue	M	13.345	15.174	14.153	16.919	<.001	.880	<.001
	SD	.390	.240	.669	.186			
Sleep Disturbance	M	44.891	50.813	50.88	59.563	<.001	.438	.024
	SD	2.150	1.327	3.694	1.025			
Pain-Severity	M	4.627	4.587	4.558	5.539	<.001	.896	.008
	SD	.206	.127	.353	.098			
Pain-Interference	M	3.869	4.816	5.005	6.598	<.001	.139	<.001
	SD	.247	.152	.423	.117			
Fibromyalgia Symptoms	M	40.734	47.171	51.019	64.228	<.001	.047	<.001
	SD	1.953	1.205	3.354	.930			
Dyscognition	M	78.223	89.664	88.204	102.288	<.001	.332	.001
	SD	2.418	1.492	4.154	1.152			
Stiffness	M	6.628	6.644	7.257	7.61	<.001	.191	.450
	SD	.261	.161	.449	.125			