Journal of Psychosomatic Research 64 (2008) 159–167

Emotions and emotional approach and avoidance strategies in fibromyalgia

Henriët van Middendorp[a,*], Mark A. Lumley[b], Johannes W.G. Jacobs[c], Lorenz J.P. van Doornen[a], Johannes W.J. Bijlsma[c], Rinie Geenen[a,c]

[a]*Department of Clinical and Health Psychology, Utrecht University, Utrecht, The Netherlands*
[b]*Department of Psychology, Wayne State University, Detroit, MI, USA*
[c]*Department of Rheumatology and Clinical Immunology, University Medical Center Utrecht, Utrecht, The Netherlands*

Received 6 April 2007; received in revised form 30 July 2007; accepted 9 August 2007

Abstract

Objective: Disturbances in emotional functioning may contribute to psychological and physical symptoms in patients with fibromyalgia. This study examined emotions and emotion-regulation strategies in women with fibromyalgia and in controls, and how these variables relate to symptoms of fibromyalgia. **Methods:** We compared 403 women with fibromyalgia to 196 control women using self-report questionnaires. **Results:** Negative emotions and the use of emotional-avoidance strategies were elevated, and positive emotions were reduced, in fibromyalgia patients; the alexithymia scale "difficulty identifying feelings" showed a large deviation from normal. Emotional-approach measures were not deviant. In the fibromyalgia sample, emotional-avoidance strategies were highly correlated with more mental distress and were modestly correlated with more pain and fatigue, while emotional-approach strategies were only minimally related to better functioning. We tested two interaction models. The intense experiencing of emotions was related to more pain only in patients who lack the ability to process or describe emotions. Although fibromyalgia patients showed deficits in the experiencing of positive affect, positive affect did not buffer the association between pain and negative affect. **Conclusion:** This study demonstrates increased negative emotions and decreased positive emotions, as well as increased emotional-avoidance strategies, in women with fibromyalgia. Research should test whether interventions that reduce emotional avoidance lead to health improvements in women with fibromyalgia.

Keywords: Alexithymia; Emotion regulation; Emotions; Fatigue; Fibromyalgia; Pain

Introduction

Fibromyalgia is characterized by widespread musculoskeletal pain, tender points, and complaints of fatigue, sleeping problems, and disturbed mood [1]. Emotions such as sadness and anger, as well as strategies to regulate those emotions either by approaching (e.g., emotional processing and expression) or by avoiding (e.g., alexithymia and suppression) them, may play a role in the maintenance or exacerbation of fibromyalgia symptoms. The disabling consequences of fibromyalgia and the lack of a clear etiology and pathophysiology may also impact emotions and the use of emotion-regulation strategy. Compared with controls, people with fibromyalgia or related syndromes report increased negative emotional disturbances, including depression and anxiety [2,3], and increased use of emotional-avoidance strategies [4–6]. Furthermore, these emotional characteristics have been associated with higher symptom levels [5,7,8], whereas fewer symptoms occur in patients with more positive affect [9] and who engage in an emotional-approach strategy of expressing their emotions in a writing intervention [10].

In addition to general relationships between emotional factors and symptoms, it is likely that relationships are

* Corresponding author. Department of Clinical and Health Psychology, Utrecht University, Heidelberglaan 1, PO Box 80.140, 3508 TC Utrecht, The Netherlands. Tel.: +31 30 253 3027; fax: +31 30 253 4718.
E-mail address: h.vanmiddendorp@uu.nl (H. van Middendorp).

0022-3999/08/$ – see front matter © 2008 Elsevier Inc. All rights reserved.
doi:10.1016/j.jpsychores.2007.08.009

limited to some subsets of patients. For example, according to the dynamic model of affect, negative emotions will be related to pain (and perhaps fatigue) only among patients who experience low levels of positive affect [9,11]. Among patients with fibromyalgia, a deficit in positive affect regulation, which may account for the high co-occurrence of pain and negative affect in this population, has been demonstrated [12].

A second model that specifies for whom certain emotional factors are important suggests that emotional-approach and emotional-avoidance strategies may interact with the intensity of emotional experiencing in predicting symptoms [13,14]. Intensely experienced emotions that are avoided and not expressed can lead to physiological hyperreactivity and physical symptoms [15,16], whereas strongly experienced emotions that are approached and processed may not be problematic.

The few available studies of emotional functioning in fibromyalgia have various limitations, including small samples, heterogeneous samples that include other medically unexplained or chronic pain conditions, and the use of only a limited set of emotion-related measures. This study sought to advance extant knowledge regarding emotional functioning and symptoms in fibromyalgia by redressing these limitations and by explicitly testing hypotheses regarding the interactive effects of emotion measures on symptoms.

The first aim of this study was to examine differences between large samples of women with fibromyalgia and control women in a broad array of emotions and emotion-regulation strategies that differ in valence, intentionality, and degree of awareness. A second aim was to examine how these emotion measures, separately and in interaction, relate to symptoms of fibromyalgia. We hypothesized that women with fibromyalgia would show higher levels of negative affect and lower levels of positive affect, and would make more use of emotional-avoidance strategies and less use of emotional-approach strategies. We hypothesized that negative emotions and emotional-avoidance strategies would be related to higher mental distress, pain, and fatigue among women with fibromyalgia, whereas positive emotions and emotional-approach strategies would be related to lower symptoms. The association of negative emotions with pain was expected to be mitigated by the level of positive emotions experienced. Affect intensity was expected to be related to higher symptom levels in individuals who are high on emotional avoidance and low on emotional processing.

Methods

Participants

Adult women with fibromyalgia (n=403) were recruited at three hospitals in Utrecht and Almere, The Netherlands. All patients were classified with fibromyalgia by their rheumatologist according to American College of Rheumatology criteria [1], and no other eligibility criterion was applied to increase generalizability. To obtain a sample of at least 300 participants, rheumatologists sent an information letter to approximately 900 patients, who responded by returning a participation form or a nonparticipation form. The nonparticipation form asked for anonymous demographic and health-related data. We received 454 participation forms (±50% response) and 109 nonparticipation forms (±12%). Due to confidentiality of address information, reminder letters could not be sent to nonresponders (38%). A questionnaire booklet was sent to participants, of which 403 were returned (89%). The nonparticipants who sent back demographic information were older than the participants (mean=49.7 years, S.D.=14 vs. mean=46.5 years, S.D.=12; t=2.27, P=.02) and had a shorter history of fibromyalgia symptoms (mean=8.8 years, S.D.=7.1 vs. mean=10.9 years, S.D.=8.7; t=−2.07, P=.04). They did not differ on years since diagnosis, marital status, ethnicity, and educational level.

We sought to recruit a cross-sample of women outside the health care setting who would have whatever health problems that might occur in a representative community sample and would be comparable to the patient sample with regard to region of country, age, gender, and socioeconomic circumstances. To this aim, we strategically accessed various associations (e.g., of housewives), as well as work-related settings such as supermarkets, restaurants, and nursing homes, and recruited both staff and clients. Of the 300 control women approached for participation, 196 completed the questionnaires (65%). The recruitment of both samples occurred from July 2005 to February 2007. The study was approved by the research and ethics committee of the University Medical Center Utrecht, and all participants provided informed consent.

Measures

The questionnaire booklet included demographic and health-related questions and eight questionnaires. The demographic variables were age, marital status, ethnicity, and education. Health-related questions addressed years since onset of fibromyalgia symptoms and formal diagnosis, work status, medical and psychological diagnoses besides fibromyalgia, medication use, and nonpharmacological treatments.

Emotions

To assess the experience of various emotions during the past month, we used scales of the Positive and Negative Affect Schedule—Expanded Form (PANAS-X) [17]: the broad dimensions of negative affect (10 items; e.g., “afraid”) and positive affect (10 items; e.g., “active”), as well as the basic negative emotion scales of fear (6 items; e.g., “scared”), hostility (6 items; e.g., “angry”), guilt (6 items; e.g., “ashamed”), and sadness (5 items; e.g., “blue”), and the

basic positive emotion scales of joviality (8 items; e.g., "happy"), self-assurance (6 items; e.g., "proud"), and attentiveness (4 items; e.g., "alert"). Items were rated from 1 (*very slightly or not at all*) to 5 (*extremely*).

Emotional-approach strategies

Emotional processing was assessed with a four-item scale of the Emotional Approach Coping Scales (EACS) [18], which assesses active attempts to explore meanings and to understand one's emotions (e.g., "I take the time to figure out what I'm really feeling.") on a scale from 1 (*I usually don't do this at all*) to 4 (*I usually do this a lot*).

Cognitive reappraisal was assessed with a six-item scale of the Emotion Regulation Questionnaire (ERQ) [19], which assesses the ability to achieve or maintain a positive mood [e.g., "When I want to feel less negative emotion (such as sadness or anger), I change what I'm thinking about."] on a scale from 1 (*strongly disagree*) to 7 (*strongly agree*).

General emotional expression was assessed with a four-item scale of the EACS [18], which assesses whether emotions are generally expressed in both interpersonal and intrapersonal forms (e.g., "I let my feelings come out freely.") on a scale from 1 (*I usually don't do this at all*) to 4 (*I usually do this a lot*).

The expression of anger was assessed by a 10-item scale of a Dutch questionnaire based on the State–Trait Anger Expression Inventory [20], the Self-Expression and Control Scale (SECS) [21], which assesses the externalization of anger (e.g., "When angry or furious, I say nasty things to others.") on a scale from 1 (*almost never*) to 4 (*almost always*).

Emotional-avoidance strategies

Alexithymic features were assessed with two scales of the Toronto Alexithymia Scale-20 (TAS-20) [22]. "Difficulty identifying feelings" (seven items) measures inability to distinguish between specific emotions and between emotions and bodily sensations of emotional arousal (e.g., "I am often confused about what emotion I am feeling."). "Difficulty describing feelings" (five items) measures inability to verbalize one's emotions to other people (e.g., "It is difficult for me to find the right words for my feelings."). We excluded the third TAS-20 scale, externally oriented thinking, because it has a strong cognitive component, tends to correlate with criteria differently than the other scales, and has rather low internal consistency [23,24]. Items were rated from 1 (*strongly disagree*) to 5 (*strongly agree*).

Emotional suppression was assessed with a four-item scale of the ERQ [19], which measures the tendency to inhibit one's emotions (e.g., "I control my emotions by not expressing them.") on a scale from 1 (*strongly disagree*) to 7 (*strongly agree*).

The suppression of anger was assessed by a 10-item scale of the SECS [21], which assesses the internalization of anger (e.g., "When angry or furious, I'm angrier than I appear to be.") on a scale from 1 (*almost never*) to 4 (*almost always*).

Affect intensity

Affect intensity, or the strength of emotional experiencing, was assessed with the impulse strength scale of the Berkeley Expressivity Questionnaire (BEQ) [25] (e.g., "I experience my emotions very strongly."). The six items were rated from 1 (*strongly disagree*) to 7 (*strongly agree*).

Symptoms

Mental distress was assessed by averaging the standardized scores of the anxiety and depression items of the Fibromyalgia Impact Questionnaire (FIQ) [26] and the disturbed mood scale of the Multidimensional Pain Inventory (MPI) [27]. The internal consistency of this combined scale was α=.84.

Pain was assessed by averaging the standardized scores of the pain and stiffness items of the FIQ and the pain intensity scale of the MPI, and fatigue was assessed by averaging the standardized scores of the fatigued and rested items of the FIQ. Internal consistencies were α=.80 for pain and α=.73 for fatigue.

Statistical analyses

Data were screened for deviations from normal distributions and nonlinear associations between emotion variables and symptoms; none was noted. Given the relatively large sample sizes and multiple testing, a conservative P value of .01 was used. Our first major set of analyses examined the effect sizes (in standard deviations) of the group differences in emotional functioning between the fibromyalgia and control groups using multivariate analyses of covariance, adjusting for demographic characteristics that differed between groups. Effect sizes of 0.2, 0.5, and 0.8 represent small, moderate, and large group differences, respectively [28]. Next, correlations between negative affect and the strategies of emotional avoidance and approach were calculated, and multivariate analyses of covariance were repeated with negative affect as an additional covariate. To gain insight into the unique contribution of fibromyalgia to emotional functioning, these group comparisons were repeated on only those participants with no other condition (i.e., 142 patients and 136 controls).

Our second major set of analyses was conducted within only the fibromyalgia group by examining the correlations of emotions and emotional-approach and emotional-avoidance strategies with mental distress, pain, and fatigue. Our specific hypotheses regarding the interactive effects of emotional measures on symptoms were examined next: the moderating role of positive affect in the relationship between negative affect and fibromyalgia symptoms, and the moderating role of emotional avoidance and processing in the relationship between affect intensity and symptoms. To test these interactions, hierarchical regression analyses were performed on the centered emotion variables, with the interaction term added at the second step. To interpret significant interactions, regression lines for individuals low

(−1 S.D.) and high (+1 S.D.) on the moderator variable were plotted for low (−1 S.D.) and high (+1 S.D.) values of the predictor variable [29]. All analyses were performed with SPSS for Windows 14.0 (SPSS Inc., Chicago, IL, USA).

Results

Participants

Table 1 shows the demographic and health-related data of patients and controls. Patients with fibromyalgia had a mean symptom duration of 11 years (range, 0.5–50 years) and were first diagnosed with fibromyalgia, on average, 3 years before the study (range, 0–45 years). As expected, patients and controls differed with regard to medical history. Patients used more prescribed (χ^2=54.02, P<.001) and over-the-counter (χ^2=59.62, P<.001) medications, and received more nonmedical treatment (χ^2=113.14, P<.001), such as physiotherapy (53% vs. 5%), psychological or psychiatric treatment (13% vs. 0%), and alternative medicine, including acupuncture, chiropractic, and yoga (22% vs. 4%). They also were less often fully employed than controls (χ^2=122.66, P<.001), most often due to fibromyalgia. Patients and controls did not differ in the prevalence of diabetes, cancer, or cardiovascular disease (P>.08), but patients were more likely to have another rheumatic condition (χ^2=13.17, P<.001), lung disease (χ^2=13.35, P<.001), psychological or psychiatric problem (χ^2=21.94, P<.001), and other condition (χ^2=16.18, P<.001).

We did not expect demographic differences between the groups, and the two groups did not differ in age and ethnicity. However, patients with fibromyalgia were more likely to be single (χ^2=19.64, P=.001) and had less education (χ^2=12.81, P=.002) than controls, so these two variables were controlled in subsequent analyses.

Differences in emotions and use of emotional-approach and emotional-avoidance strategies

Table 2 shows descriptive data on the emotions and emotion-regulation strategies of both groups. All Cronbach's α coefficients (except for attentiveness, which was <.70) reflect good internal consistency of the scales.

With regard to emotions, the fibromyalgia group reported higher negative affect and lower positive affect than the control group. Of the negative emotions, all group differences were of moderate size, except for hostility (small effect). Of the positive emotions, a moderately sized difference was found for joviality, while the other differences were small.

With respect to emotional-avoidance strategies, patients used all four strategies more often than controls, with a large difference in difficulty identifying feelings. In contrast, none of the group differences in the use of emotional-approach strategies reached a small effect size, even though statistical significance indicated that patients expressed their emotions somewhat less than controls. Patients had greater emotional intensity than controls (small effect). All group differences discussed were significant at P<.01.

Table 1
Demographic and health-related characteristics of female patients with fibromyalgia (n=403) and female controls (n=196)

Characteristics	Fibromyalgia	Controls
Demographic		
Age (years) [mean (S.D.)]	46.5 (12.3)	45.6 (13.8)
Marital status ** [n (%)]		
Single	46 (11)	16 (8)
Partner; not living together	18 (5)	16 (8)
Married or living together	279 (69)	155 (79)
Divorced	46 (11)	7 (4)
Widowed	13 (3)	2 (1)
Ethnicity (indigenous) [n (%)]	381 (95)	190 (97)
Educational level * [n (%)]		
Primary	22 (6)	2 (1)
Secondary	312 (77)	141 (72)
Tertiary	69 (17)	52 (27)
Health related		
Fibromyalgia complaints (years) [mean (S.D.)]	10.9 (8.6)	
Fibromyalgia diagnosis (years) [mean (S.D.)]	3.5 (4.4)	
Work status ** [n (%)]		
Employed full time	47 (12)	45 (23)
Employed part time	131 (33)	95 (49)
Retired (including early retirement)	20 (5)	18 (9)
Unemployed	54 (13)	6 (3)
Homemaker	26 (7)	24 (12)
Student	5 (1)	4 (2)
Workmen's Compensation Act	137 (34)	2 (1)
Receiving benefit	21 (5)	1 (1)
Reduced work status due to health ** [n (%)]	201 (60)	13 (7)
Comorbidity [n (%)]		
Rheumatic condition (besides fibromyalgia) **	65 (16)	11 (6)
Lung disease **	46 (11)	5 (3)
Diabetes	11 (3)	3 (2)
Cancer	14 (4)	3 (2)
Cardiovascular disease	47 (12)	17 (9)
Psychological or psychiatric problems (e.g., depression, posttraumatic stress symptoms) **	69 (17)	7 (4)
Other comorbidity (e.g., endocrine, dermatological, internal, medically unexplained syndromes) **	123 (31)	30 (15)
Prescribed medication use ** [n (%)]	271 (67)	70 (36)
Unprescribed medication use (e.g., analgesics) ** [n (%)]	283 (71)	74 (38)
Nonmedicated treatment (e.g., physiotherapy, psychotherapy, alternative medicine) ** [n (%)]	232 (58)	23 (12)

Group differences were measured by chi-square tests, except for age (independent-samples t test).

* P<.01.

** P<.001.

Negative affect was slightly associated with emotional-approach measures, with small negative correlations with emotional processing (r=−.13), reappraisal (r=−.13), and emotional expression (r=−.17), and a positive association with externalization of anger (r=.15). Negative affect showed moderate to strong positive associations with emotional-avoidance strategies (difficulty identifying feelings: r=.56;

Table 2
Internal consistency (α), mean, and standard deviation of emotions and emotional-approach and emotional-avoidance scales of female patients with fibromyalgia (n=403) and control participants (n=196), and effect size (d) of group difference after controlling for marital status and educational level

	Fibromyalgia (n=403)		Controls (n=196)		
	α	Mean (S.D.)	α	Mean (S.D.)	d [a]
Emotions (PANAS-X)					
Negative affect	.88	2.20 (0.81)	.85	1.70 (0.57)	.62**
Fear	.89	2.19 (0.98)	.86	1.64 (0.67)	.68**
Hostility	.76	1.88 (0.68)	.77	1.65 (0.57)	.32**
Guilt	.87	2.09 (0.93)	.84	1.57 (0.63)	.57**
Sadness	.89	2.51 (1.03)	.84	1.80 (0.75)	.70**
Positive affect	.81	3.17 (0.64)	.76	3.47 (0.51)	.41**
Joviality	.86	3.01 (0.70)	.85	3.55 (0.59)	.76**
Self-assurance	.79	2.87 (0.76)	.70	3.14 (0.61)	.36**
Attentiveness	.55	3.26 (0.70)	.52	3.47 (0.58)	.26
Emotional approach					
Emotional processing (EACS)	.77	2.47 (0.75)	.82	2.60 (0.75)	.09
Reappraisal (ERQ)	.80	4.64 (1.13)	.78	4.58 (1.08)	.07
Emotional expression (EACS)	.85	2.48 (0.81)	.84	2.64 (0.73)	.18*
Externalization of anger (SECS)	.85	1.95 (0.54)	.84	1.97 (0.50)	.05
Emotional avoidance					
Difficulty identifying feelings (TAS-20)	.86	18.76 (6.62)	.88	12.55 (5.45)	.96**
Difficulty describing feelings (TAS-20)	.77	13.21 (4.68)	.78	11.59 (4.15)	.30*
Suppression (ERQ)	.78	3.38 (1.40)	.75	2.99 (1.24)	.23*
Internalization of anger (SECS)	.90	2.36 (0.68)	.86	2.11 (0.55)	.36**
Affect intensity (BEQ)	.74	5.12 (1.13)	.69	4.84 (1.05)	.24*

[a] An effect size of .20, .50, and .80 represents a small, medium, and large difference between groups, respectively.
* P<.01.
** P<.001.

difficulty describing feelings: r=.37; suppression: r=.24; internalization of anger: r=.42) and affect intensity (r=.37). After controlling the emotion-regulation scores for negative affect, only difficulty identifying feelings still differentiated patients from controls (d=.74).

When the analyses were repeated for those patients and controls without other chronic conditions, the effect sizes of the group differences decreased, with the group difference in hostility being no longer significant and small in magnitude. All other group differences remained moderate to small in magnitude and even large for difficulty identifying feelings (also after partialing out negative affect, d=.85), and the effect sizes for the positive affect indices (with d varying from .39 for attentiveness to .69 for joviality) turned out to be somewhat higher than for the negative affect indices (with d varying from .14 for hostility to .54 for sadness).

Associations of emotional measures and symptoms in fibromyalgia

Associations between emotional measures and symptoms are reported in Table 3. Almost all emotion variables were related to mental distress. High (r≥.50) positive correlations occurred between all negative emotion scales and mental distress, and moderate (r≥.30) inverse correlations occurred between most positive affect scales and distress. Emotional

Table 3
Correlations of emotions, emotional approach, and emotional avoidance with symptoms in 403 female patients with fibromyalgia, controlling for marital status and educational level

	Mental distress	Pain	Fatigue
Emotions (PANAS-X)			
Negative affect	.74**	.20**	.21**
Fear	.66**	.17**	.17**
Hostility	.57**	.20**	.18**
Guilt	.59**	.26**	.28**
Sadness	.64**	.20**	.23**
Positive affect	−.30**	−.10	−.23**
Joviality	−.44**	−.20**	−.27**
Self-assurance	−.31**	−.07	−.17**
Attentiveness	−.23**	−.09	−.20**
Emotional approach			
Emotional processing (EACS)	−.20**	−.06	−.04
Reappraisal (ERQ)	−.09	.06	.06
Emotional expression (EACS)	−.23**	−.12	−.13*
Externalization of anger (SECS)	.10	−.03	−.01
Emotional avoidance			
Difficulty identifying feelings (TAS-20)	.45**	.17**	.20**
Difficulty describing feelings (TAS-20)	.30**	.07	.08
Suppression (ERQ)	.21**	.08	.05
Internalization of anger (SECS)	.34**	.11	.11
Affect intensity (BEQ)	.29**	.08	.06

* P<.01.
** P<.001.

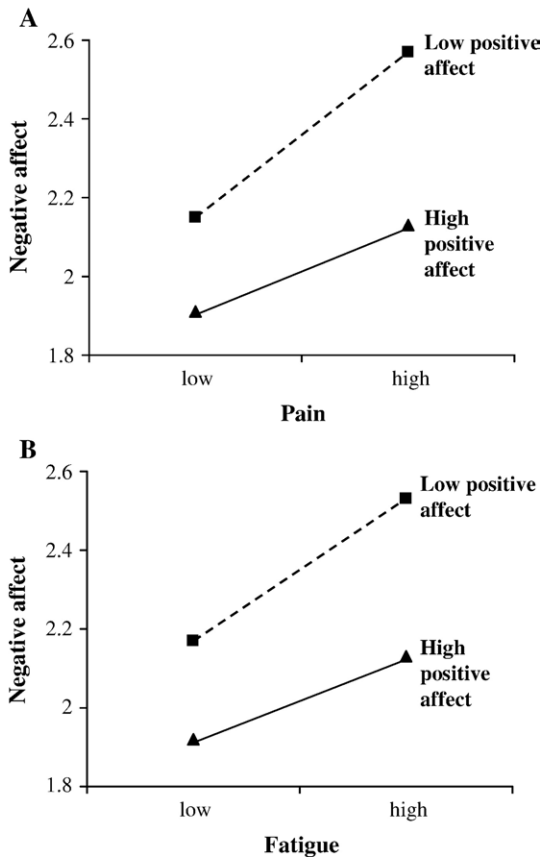

Fig. 1. Associations of negative affect with pain (A) and fatigue (B) for different levels of positive affect in patients with fibromyalgia.

avoidance and affect intensity were moderately to slightly associated with a higher level of mental distress. Of the emotional-approach measures, emotional processing and expression showed a small ($r \geq .10$) inverse correlation with distress.

There were many significant correlations between emotion variables and symptoms of pain and fatigue, but all correlations were of small magnitude. The strongest correlations ($r > .20$) occurred between negative emotion scales and higher pain and fatigue, and between positive emotion scales and lower fatigue. Of the emotional-approach and emotional-avoidance measures, only difficulty identifying feelings correlated with more pain and fatigue, while emotional expression showed a small inverse correlation. Controlling for the level of negative affect in the association between emotion regulation and symptoms made all correlations decrease in size, and only the correlations of emotional processing ($r = -.14$) and expression ($r = -.14$) with less distress, and of difficulty identifying feelings with more distress ($r = .14$), remained significant at the $P < .01$ level.

Moderator analyses

No support was found for the hypothesis that the association between negative affect and pain or fatigue was dependent on positive affect (Fig. 1A, pain: interaction term: $t = -1.47$, $P = .14$; $\beta = .13$, $P < .05$ and $\beta = .26$, $P < .001$ for high and low positive affect, respectively; Fig. 1B, fatigue: interaction term: $t = -1.12$, $P = .27$; $\beta = .13$, $P < .05$ and $\beta = .23$, $P = .001$ for high and low positive affect, respectively).

As hypothesized, the association between affect intensity and pain or fatigue depended upon the level of emotional avoidance and processing. High affect intensity was related to elevated pain and fatigue only

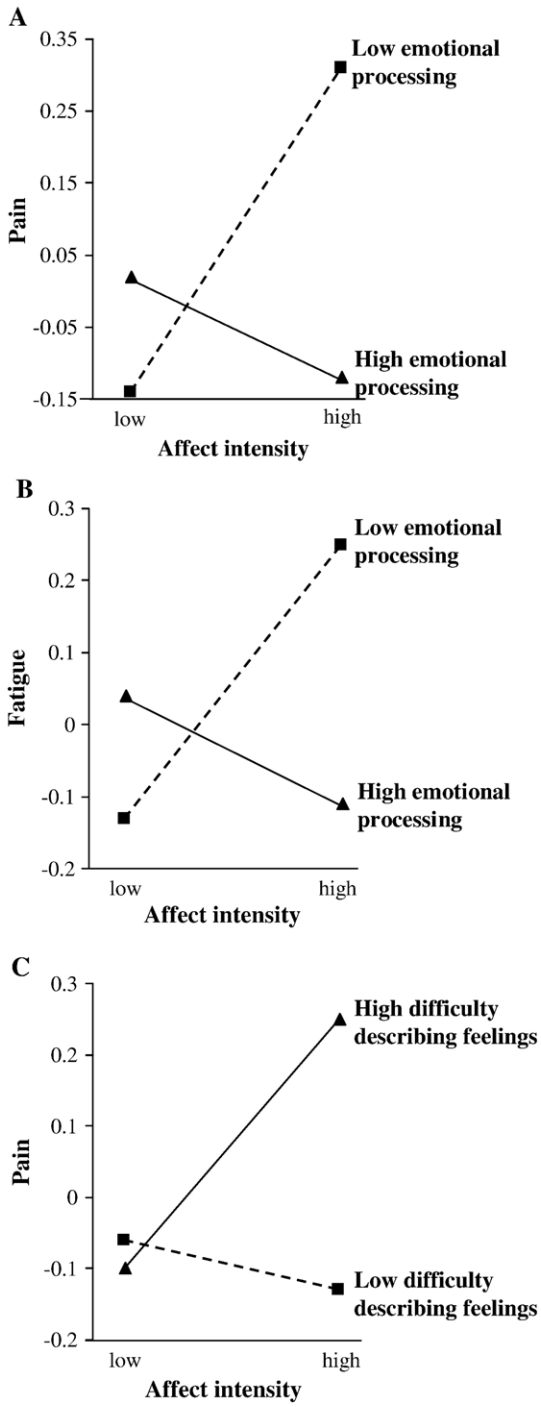

Fig. 2. Associations between affect intensity and pain (A) and fatigue (B) for different levels of emotional processing and associations between affect intensity and pain (C) for different levels of difficulty describing feelings.

among patients scoring low on emotional processing (Fig. 2A, pain: interaction term: $t=-3.51$, $P=.001$; $\beta=-.09$, $P=.22$ and $\beta=.27$, $P=.001$; Fig. 2B, fatigue: interaction term: $t=-2.96$, $P=.003$; $\beta=-.09$, $P=.23$ and $\beta=.21$, $P<.01$ for high and low emotional processing, respectively) or high on difficulty describing feelings (Fig. 2C, pain: interaction term: $t=2.51$, $P=.01$; $\beta=.20$, $P<.01$ and $\beta=-.04$, $P=.54$ for high and low difficulty describing feelings, respectively).

Discussion

In fibromyalgia and other chronic pain conditions, affective disturbances are prevalent [3]. Our study confirms the observation of heightened negative and lowered positive affect in female patients with fibromyalgia. Patients differed most from controls with regard to internalizing negative emotions (such as sadness) and joviality. That the experiencing of positive affect was found to be even somewhat more disturbed in fibromyalgia than the experiencing of negative affect after selecting only those participants with no other chronic psychological or physical conditions provides support for the assumption of a positive affect deficit in fibromyalgia [12].

A predominance of negative over positive affect may result from the use of specific "unhealthy" strategies to regulate emotions [16,30,31]. Although avoidance or minimization of negative emotional experiences may be desirable for some patients at some point in time, finally, these emotions will need to be processed to resolve them [32]. When negative emotions are approached by acknowledging, expressing, and reappraising them, resolution may occur by habituation, development of insight, strengthening of social support, and improved self-regulation. On the other hand, when individuals lack emotional awareness or suppress or otherwise avoid their emotions, repeated emotional intrusions and elevated physiological arousal occur, which may eventuate in heightened susceptibility to somatic disturbances and the experience of physical symptoms.

As hypothesized, women with fibromyalgia were shown to make more use of emotionally avoidant strategies to process and regulate emotions than control women. Emotional-approach strategies were not deviant from normal. The emotionally avoidant strategies were associated with higher levels of negative affect, which may indicate that avoiding emotional processing and expression leads to negative affect, that increased levels of negative affect lead to avoidant emotion regulation, or that a third variable, such as the painful, debilitating, chronic, and often medically invalidated nature of fibromyalgia, affects both. Since both sets of variables were assessed at the same time, the present study is unable to disentangle the direction of the dependency of negative affect and emotion regulation, which would require multiple measurements over time or non-self-report data. We did show that by partialing out negative affect, group differences in the use of emotionally avoidant strategy and in affect intensity largely disappeared. The only exception was difficulty identifying feelings, the strategy most strongly related to negative affect, which remained to be a differentiating characteristic of fibromyalgia. That alexithymia levels are increased in chronic pain populations may not be surprising, since neuropsychological studies have shown that physical and emotional pains are related neurologically and are difficult to differentiate [33,34]. Irrespective of the specific direction of relationships, however, both emotional experiencing and use of emotionally avoidant strategy may provide a worthwhile entrance to improve functioning in fibromyalgia.

The adaptive or maladaptive nature of the intense experiencing of emotions has been unclear up to now, with conflicting results from different studies [15,35,36]. Our study supported the hypothesis that affect intensity was related to more severe pain only in combination with the inability to process or verbalize emotions, suggesting that the intense experiencing of emotions is not necessarily maladaptive as long as these emotions are adequately processed. These observations buttress a recent within-person study in which pain was shown to influence negative affect only in people who were high on emotional intensity and low on emotion regulation [13]. These findings may hold in other populations, but this needs to be tested in future research. However, since affect intensity and emotional avoidance were found to be more prevalent in fibromyalgia than in our control group, the cautionary remarks regarding the interaction of affect intensity and emotional-avoidance strategies may be especially relevant in this patient group.

As hypothesized, negative emotions were related to higher symptom levels in fibromyalgia, especially mental distress, while positive emotions were related to lower symptom levels. The dynamic model of affect proposes that the presence of positive affect protects against the experiencing of negative affect in times of stress and pain [7]. This buffering hypothesis is supported by within-subject analyses [9,11], but not by our between-persons study. Actually, even though we found a high frequency of disturbance in emotional experiencing in fibromyalgia, only weak relationships with pain and fatigue were found. Although this relative independence may mitigate the goal of improving fibromyalgia symptoms by improving affective functioning, the large disturbance in the emotional domain warrants attention in its own right.

Although it is hard to derive clinical implications from a cross-sectional study, the demonstration of deficits in emotional experiencing and strategy use could lead to a search for improvement of emotional functioning in this patient group. Research should test the hypothesis that interventions should be tailored to patients' emotional style. For patients with elevated and strongly experienced negative emotions, it may be important to start by validating their suffering, by being empathic, and by trying to reduce emotional distress by stimulating emotional processing and expression [37]. For individuals with deficient emotional

awareness, insight-oriented or emotion-focused therapy may prove futile. For example, a recent study found that when psychosocial issues are raised during consultation with a general practitioner, alexithymic patients with fibromyalgia show a prolonged increase in negative affect and cortisol [38]. In these patients, it may be wise to engage first in psychophysiological education or biofeedback to demonstrate the link between mind and body before trying to help patients recognize, label, and adequately regulate emotions [37,39–41]. Although alexithymia tends to be relatively stable [42], interventions that target alexithymia can decrease it, resulting in clinical benefits [39–41]. If patients with chronic pain will learn how to better differentiate negative emotions from bodily symptoms such as pain and fatigue, they may benefit from better disease control and less generalizability of negative affect.

The strengths of the current study include the large and heterogeneous samples of women with fibromyalgia and control women; we purposely recruited a comparison sample that was not overly healthy, which would have increased the differences between the groups. When only those participants without any condition besides fibromyalgia were selected, most differences in experienced emotions and emotional-approach and emotional-avoidance strategies remained, even though of smaller magnitude. This suggests that deficits in emotional experiencing and alexithymia are unique to fibromyalgia. However, our research design also shows some weaknesses, which may limit the generalizability of our findings. Although fibromyalgia participants were compared with nonparticipants on a number of demographic and health variables, that information was only available for a small part of the nonparticipants due to the specifics of our recruitment procedure. In addition, the control group was not a random selection of the population, which is very hard to achieve, nor can we be sure how well our controls represent the population. The groups were also shown to differ in a number of respects that are inherent to fibromyalgia status (e.g., work status and medication use), but matching them on all these characteristics would have provided a very selected and ungeneralizable control sample. As an alternative comparison sample, future research could recruit control patients who are seeking health care for another (pain) condition, as care seeking has been found to be predicted by a number of psychosocial variables that may differentiate our current patient and control samples. The findings cannot be generalized to other ethnicities, male subjects, or patients with fibromyalgia not diagnosed according to the American College of Rheumatology criteria, which are variables related to emotional experiencing and regulation [43,44]. Finally, this study is limited by the use of self-report questionnaires to measure constructs and by its cross-sectional nature, which prevents causal inferences.

The importance of emotional functioning in fibromyalgia, other medically unexplained syndromes, and chronic pain disorders in general, is being increasingly recognized. This study provides evidence not only of heightened negative and lowered positive emotions but also of increased emotional avoidance in women with fibromyalgia. Although there has been a long-standing focus on changing cognitions and behaviors to help these patients [45], research should test interventions that change emotional processing and expression. It may be worthwhile to focus fibromyalgia interventions on trying to reduce emotional avoidance by raising emotional awareness and adaptive expression while guarding against oversensitivity to emotions.

Acknowledgments

This study was financially supported by the Dutch Arthritis Association. We thank Leslie Beks and the rheumatologists of the University Medical Center Utrecht, the rheumatologists and secretaries of the Diakonessenhuis Utrecht, and the rheumatologists of the Flevo Ziekenhuis Almere for their help in the recruitment of patients; Jetske van Gorsel, Marianne Kool, Saskia Mulder, Nienke Braam, Marijn van Oers, Madelon Cremers, and Jessie Smulders for the recruitment of the control group; and Rianne Burger, Juliette Libier, Eveline Rijken, and Bob Scheerder for their help in data collection and data entrance.

References

[1] Wolfe F, Smythe HA, Yunus MB, Bennett RM, Bombardier C, Goldenberg DL, Tugwell P, Campbell SM, Abeles M, Clark P, Fam AG, Farber SJ, Fiechtner JJ, Franklin CM, Gatter RA, Hamaty D, Lessard J, Lichtbroun AS, Masi AT, McCain GA, Reynolds WJ, Romano TJ, Russell IJ, Sheon RP. The American College of Rheumatology 1990 criteria for the classification of fibromyalgia. Report of the Multicenter Criteria Committee. Arthritis Rheum 1990; 33:160–72.

[2] De Gucht V, Fischler B, Heiser W. Neuroticism, alexithymia, negative affect, and positive affect as determinants of medically unexplained symptoms. Pers Individ Differ 2004;36:1655–67.

[3] Raphael KG, Janal MN, Nayak S, Schwartz JE, Gallagher RM. Psychiatric comorbidities in a community sample of women with fibromyalgia. Pain 2006;124:117–25.

[4] Brosschot JF, Aarsse HR. Restricted emotional processing and somatic attribution in fibromyalgia. Int J Psychiatry Med 2001;31:127–46.

[5] Burns JW, Johnson BJ, Devine J, Mahoney N, Pawl R. Anger management style and the prediction of treatment outcome among male and female chronic pain patients. Behav Res Ther 1998;36:1051–62.

[6] Sayar K, Gulec H, Topbas M. Alexithymia and anger in patients with fibromyalgia. Clin Rheumatol 2004;23:441–8.

[7] Davis MC, Zautra AJ, Smith BW. Chronic pain, stress, and the dynamics of affective differentiation. J Pers 2004;72:1133–60.

[8] Thomas E, Moss-Morris R, Faquhar C. Coping with emotions and abuse history in women with chronic pelvic pain. J Psychosom Res 2006;60:109–12.

[9] Zautra AJ, Johnson LM, Davis MC. Positive affect as a source of resilience for women in chronic pain. J Consult Clin Psychol 2005;73:212–20.

[10] Broderick JE, Junghaenel DU, Schwartz JE. Written emotional expression produces health benefits in fibromyalgia patients. Psychosom Med 2005;67:326–34.

[11] Strand EB, Zautra AJ, Thoresen M, Odegard S, Uhlig T, Finset A. Positive affect as a factor of resilience in the pain–negative affect relationship in patients with rheumatoid arthritis. J Psychosom Res 2006;60:477–84.

[12] Zautra AJ, Fasman R, Reich JW, Harakas P, Johnson LM, Olmsted ME, Davis MC. Fibromyalgia: evidence for deficits in positive affect regulation. Psychosom Med 2005;67:147–55.
[13] Hamilton NA, Zautra AJ, Reich J. Individual differences in emotional processing and reactivity to pain among older women with rheumatoid arthritis. Clin J Pain 2007;23:165–72.
[14] Van Middendorp H, Geenen R, Sorbi MJ, Hox JJ, Vingerhoets AJJM, Van Doornen LJP, Bijlsma JWJ. Styles of emotion regulation and their associations with perceived health in patients with rheumatoid arthritis. Ann Behav Med 2005;30:44–53.
[15] Berenbaum H, Raghavan C, Le H-N, Vernon LL, Gomez JJ. A taxonomy of emotional disturbances. Clin Psychol Sci Pr 2003;10:206–26.
[16] Stanton AL, Danoff-Burg S, Cameron CL, Bishop M, Collins CA, Kirk SB, Sworowski LA, Twillman R. Emotionally expressive coping predicts psychological and physical adjustment to breast cancer. J Consult Clin Psychol 2000;68:875–82.
[17] Watson D, Clark LA. The PANAS-X. Manual for the Positive and Negative Affect Schedule—Expanded Form. Iowa: University of Iowa, 1999.
[18] Stanton AL, Kirk SB, Cameron CL, Danoff-Burg S. Coping through emotional approach: scale construction and validation. J Pers Soc Psychol 2000;78:1150–69.
[19] Gross JJ, John OP. Individual differences in two emotion regulation processes: implications for affect, relationships, and well-being. J Pers Soc Psychol 2003;85:348–62.
[20] Spielberger CD, Reheiser EC, Sydeman SJ. Measuring the experience, expression, and control of anger. In: Kassinove H, editor. Anger disorders: definition, diagnosis, and treatment. Philadelphia (Pa): Taylor and Francis, 1995. pp. 49–67.
[21] Van Elderen T, Maes S, Van der Kamp L, Van der Ploeg H, Spielberger C. Zelfexpressie en Controle Vragenlijst [kit] (Self expression and control questionnaire, manual). Leiden: Sectie Klinische en Gezondheidspsychologie, Faculteit der Sociale Wetenschappen, Universiteit Leiden, 1999.
[22] Bagby RM, Parker JD, Taylor GJ. The twenty-item Toronto Alexithymia Scale: I. Item selection and cross-validation of the factor structure. J Psychosom Res 1994;38:23–32.
[23] Evren B, Evren C, Guler MH. Clinical correlates of alexithymia in patients with fibromyalgia. Pain Clin 2006;18:1–9.
[24] Haviland MG, Reise SP. Structure of the twenty-item Toronto Alexithymia Scale. J Pers Assess 1996;66:116–25.
[25] Gross JJ. The Berkeley Expressivity Questionnaire. In: Maltby J, Lewis CA, Hill A, editors. Commissioned reviews on 300 psychological tests. Lampeter (Wales): Edwin Mellen Press, 2000. pp. 465–7.
[26] Zijlstra TR, Taal E, Van de Laar MA, Rasker JJ. Validation of a Dutch translation of the Fibromyalgia Impact Questionnaire. Rheumatology (Oxford) 2007;46:131–4.
[27] Lousberg R, Groenman NH. Multidimensionele Pijnvragenlijst—Dutch language version. MPI-DLV Handleiding (Multidimensional Pain Questionnaire—Dutch language version. MPI-DLV manual). Maastricht: Rijksuniversiteit Limburg, 1994.
[28] Cohen J. Statistical power analysis for the behavioral sciences. 2nd ed. Hillsdale (NJ): Lawrence Erlbaum Associates, 1988.
[29] Aiken LS, West SG. Multiple regression: testing and interpreting interactions. Newbury Park (Calif): Sage, 1991.
[30] Solano L, Costa M, Temoshok L, Salvati S, Coda R, Aiuti F, Di Sora F, D'Offizi G, Figa Talamanca L, Mezzaroma I, Montella F, Bertini M. An emotionally inexpressive (Type C) coping style influences HIV disease progression at six and twelve month follow-ups. Psychol health 2002;17:641–55.
[31] Van Middendorp H, Geenen R, Sorbi MJ, Van Doornen LJP, Bijlsma JWJ. Emotion regulation predicts change of perceived health in patients with rheumatoid arthritis. Ann Rheum Dis 2005;64:1071–4.
[32] Wiebe DJ, Korbel C. Defensive denial, affect, and the self-regulation of health threats. In: Cameron LD, Leventhal H, editors. The self-regulation of health and illness behaviour. New York: Routledge, 2003. pp. 184–203.
[33] Eisenberger NI, Lieberman MD. Why rejection hurts: a common neural alarm system for physical and social pain. Trends Cogn Sci 2004;8:294–300.
[34] Panksepp J. Neuroscience: feeling the pain of social loss. Science 2003;302:237–9.
[35] Cicchetti D, Ackerman BP, Izard CE. Emotions and emotion regulation in developmental psychopathology. Dev Psychopathol 1995;7:1–10.
[36] Mennin DS, Heimberg RG, Turk CL, Fresco DM. Preliminary evidence for an emotion dysregulation model of generalized anxiety disorder. Behav Res Ther 2005;43:1281–310.
[37] Cipher DJ, Clifford A, Schumacker RE. The heterogeneous pain personality: diverse coping styles among sufferers of chronic pain. Altern Ther Health Med 2002;8:60–9.
[38] Finset A, Graugaard PK, Holgersen K. Salivary cortisol response after a medical interview: the impact of physician communication behaviour, depressed affect and alexithymia. Patient Educ Couns 2006;60:115–24.
[39] Beresnevaite M. Exploring the benefits of group psychotherapy in reducing alexithymia in coronary heart disease patients: a preliminary study. Psychother Psychosom 2000;69:117–22.
[40] Graugaard PK, Holgerson K, Finset A. Communicating with alexithymic and non-alexithymic patients: an experimental study of the effect of psychosocial communication and empathy on patient satisfaction. Psychother Psychosom 2004;73:92–100.
[41] Lumley MA. Alexithymia, emotional disclosure, and health: a program of research. J Pers 2004;72:1271–300.
[42] Luminet O, Rokbani L, Ogez D, Jadoulle V. An evaluation of the absolute and relative stability of alexithymia in women with breast cancer. J Psychosom Res 2007;62:641–8.
[43] Aaron LA, Bradley LA, Alarcon GS, Alexander RW, Triana-Alexander M, Martin MY, Alberts KR. Psychiatric diagnoses in patients with fibromyalgia are related to health care-seeking behavior rather than to illness. Arthritis Rheum 1996;39:436–45.
[44] Van Middendorp H, Geenen R, Sorbi MJ, Hox JJ, Vingerhoets AJJM, Van Doornen LJP, Bijlsma JWJ. Gender differences in emotion regulation and relationships with perceived health in patients with rheumatoid arthritis. Women Health 2005;42:75–97.
[45] Turk DC. Cognitive–behavioral approach to the treatment of chronic pain patients. Reg Anesth Pain Med 2003;28:573–9.