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Influence of Cognitive and Affective Variables in Stress, Functional Limitation and Symptoms in Fibromyalgia

Lilian Velasco, Cecilia Peñacoba, Margarita Cigarán, Carmen Écija and Rafael Guerrero
Universidad Rey Juan Carlos, Madrid, Spain

1. Introduction

The clinical manifestations of Fibromyalgia (FM) have invited extensive inquiry into the potential role of psychological factors associated with this condition (Alegre et al., 2010; Wolfe, et al., 1990). Widespread pain and limitations in physical functioning characterize this condition, and a number of studies have shown that such symptoms are accompanied by considerable psychological distress (Affleck et al., 1996; Esteve-Vives et al., 2010). Some researchers have proposed, however, that deficits in positive affect and cognitions characterize the unique adaptation difficulties of FM patients better than measures of vulnerability (Davis, Zautra, & Smith, 2004; Zautra et al., 2005).

Chronic pain disorders are a source of stress for the patient and demand constant efforts of adaptation. In this context, numerous studies have identified patients´ perceptions of control as significant predictor of health outcomes in chronic pain samples in general and in FMS in particular (Arnstein et al., 1999; Besteiro et al., 2008; Buckelew et al., 1994; Oliver and Cronan, 2005; Wallston, 1989). This perception of control beliefs includes two different constructs: *self-efficacy beliefs* and *locus of control*. Both, previously defined as stress modulator variables, have in common to make up mechanisms that involve a sense of control.

Self-efficacy levels in people living with FM have been shown to predict psychological and physical well-being (e.g. Culos-Reed & Brawley, 2003), and individuals with lower self-efficacy show limitations in their ability to perform everyday tasks required or adaptation to FM. On the other hand, higher levels of pain self-efficacy has been related with better improvement on treatment (Buckelew et al., 1996; Martin et al., 1996; Schachter et al., 2003; Wells-Federman et al., 2003), higher satisfaction levels (Serber et al., 2003), lower pain intensity, less associated symptoms, less functional limitation and psychological distress (Buckelew et al., 1995; Martín-Aragón et al., 2001; Menzies et al., 2006; Miró, 1994; Oliver & Cronan, 2002). Also, self-efficacy is a predictor of physical activity in FM patients (Culos-Reed & Brawley, 2003; Culos-Reed, 2001) and has also been related to a better stress/recovery balance, increasing satisfactory experiences and the involvement in social activities (González-Gutiérrez et al., 2009).

Another perception of control variable that has been studied in FM is locus of control. It seems that FM patients present a more external locus of control (belief that the course of their illness

depends on external factors like other professionals, chance or fate) in comparisson with other chronic pain population or healthy controls (Gustafsson & Gaston-Johansson, 1996). This externality is linked with more pain intensity, worst coping and more psychological distress (Crisson & Keefe, 1988; Härkäpää et al., 1996; Martín-Aragón et al., 2001; Toomey et al., 1991). Oppositely, internal locus of control has been related with better functioning in these patients. This internality may benefit adaptation in FM by providing a cognitive structure that connects actions with expectations of controllable outcomes (Lledó et al., 2010).

It seems that self-efficacy and internal locus of control are two cognitive resources that has been associated to a better control of the symptoms in FM as well as with lower levels of disability, better mood (González-Gutiérrez et al., 2009; Jensen et al., 2001), more treatment adherence (Härkäpää et al., 1991) and use of active coping strategies (Härkäpää et al., 1996, Haythornthwaite et al., 1998; Martín-Aragón et al., 2001; Rudnicki, 2001).

Many researchers (e.g. Cohen et al, 2002; Davis, Zautra & Smith, 2004; Epstein et al, 1999; Malt et al., 2000; McBeth & Silman, 2001; Staud et al., 2003; Walker et al, 1997; Van Houdenhove & Luyten, 2006; Walter et al., 1998; Zautra et al., 2001) suggest that stress and negative affective states such as anxiety and depression may trigger FM symptoms. Some have gone further, proposing that FM is an affective disorder (e.g. Netter & Hennig, 1998). High levels of FM pain itself and the inability to control that pain are sources of stress in themselves that can reduce a person's capacity to cope effectively (Lundberg et al., 2009; Zautra et al., 1999) and lead to depression (Kurtze & Svebak, 2001). It has been found that FM patients show higher levels of negative affect in comparison with osteoarthritis patients (Zautra et al., 2005; Zautra et al., 2007) and this negative affect was related with more pain, fatigue and associated symptoms in FM (Zautra et al., 2001; Davis et al., 2004).

Patients with FM, in comparison with other chronic and painful illnesses, may not have the ability to mobilize sufficient positive cognitive-affective resources to neutralize the experience of pain and the associated negative affect. Recent studies of positive emotion in this population (e.g. Stuifbergen et al., 2010; Zautra et al., 2008, 2010) indicate that patients with FM experience a relative absence of positive emotional resources (Zautra et al., 2005) and researchers have taken an interest in how psychological strengths, such as positive emotion, self-efficacy, may affect the physical and psychological functioning of FM patients (Zautra et al., 2005). Furthermore, cognitive resources may also be in short supply and difficulty in sustaining positive states may present additional challenges to adaptation for FM patients.

In the current study, our first aim is to determine the predictive value that the perception of control variables (pain locus of control and pain self-efficacy) have on stress, affect, functional limitation and symptoms in FM. The second aim is to analyze the mediator effect of positive and negative affect on perception of control variables and functional limitation, anxiety and depression in FM. The third aim is to evaluate a model of cognitive-affective states of FM. In this model, it was defined two correlated but distinct factors: one set of positive features (resources) and another set of negative features (vulnerabilities). Measures of positive affect, self-efficacy over symptoms, self-efficacy over physical activities, self-efficacy over pain and internal pain locus of control were identified a priori as resources. Vulnerabilities included measures of stress responses, external pain locus of control (other professionals, chance and fate) and negative affect. Consistent with prior research, we related the resources factor to better physical functioning and the vulnerabilities factor was related to greater pain intensity, more associated symptoms, anxiety and depression.

2. Methods

2.1 Participants

Participants were recruited from among the patients of a physician in the Pain Clinic at the Foundation Hospital in Alcorcón (Madrid, Spain), and all were members of the Fibromyalgia Association of Madrid (*AFIBROM-Asociación de Fibromialgia de la Comunidad de Madrid*). All participants met the American College of Rheumatology (ACR) criteria for the classification of FM. A high proportion of Pain Clinic patients with Fibromyalgia were female, consistent with prevalence of the condition among both men and women pain patients. We chose to exclude men from the study in order to concentrate limited resources for obtaining a sufficient sample size to test hypotheses with adequate power. Demographic data for the sample are provided in Table 1.

2.2 Procedure

The study followed the ethical principles for research with human participants, and was approved by the University Committee on Ethics. Once participants had signed the forms giving informed consent to take part in the project, they were given a booklet of questionnaires, which took 60–120 minutes to complete. Of the 145 women who signed the consent form, 136 provided complete data: six participants did not complete the questionnaires correctly and three did not agree to participate in the study.

Demographic Characteristics	***N*= 136**
Age (years)	53.18 ± 8.86
Marital status	
Married	72,2 %
Single	9,8 %
Widowed	8,3 %
Divorced	9,8 %
Education	
None	12,2 %
Primary	43,5 %
High School	35,1 %
Higher Education	9,2 %
Employment Status	
Working	27,3 %
Never worked	3,1 %
Inactive for over a year	58,6 %
Inactive within a year	10,9 %
Income / month	
More than 1800 €	6,9 %
Between 1200 € and 1800 €	12,3 %
Between 600 € and 1200 €	21,5 %
Less than 600 €	30 %
None	29,2 %

Table 1. Sample Demographic characteristics.

2.3 Measures

2.3.1 Positive and negative affect

Positive and Negative Affect were measured using the Spanish language version of the 20-item Positive and Negative Affect Schedule (Sandín et al., 1999). Participants were asked to indicate on a five-point scale from 1 (very slightly or not at all) to 5 (extremely) the extent to which they had experienced each type of affect during the past week. The Positive Affect scale included items such as 'interested', 'excited' and 'proud', and the Negative Affect scale included items such as 'distressed', 'nervous' and 'irritable.' Internal consistency reliability for the current sample was α=.83 for the Positive Affect Scale and α=.85 for the Negative scale.

2.3.2 Pain self-efficacy

Pain Self-efficacy was assessed with the Spanish adaptation of the 'Arthritis Self-efficacy Scale' (Martín-Aragón et al., 1999). This scale comprises 19 items measuring three components of self-efficacy: over pain (α=.76 for the current sample), over physical activities (α=.84) and over symptoms (α=.85).

2.3.3 Pain locus of control

It was measured using the Multidimensional Health Locus of Control-Pain Scale (*MHLC-P*; Toomey et al., 1988), adapted from the Multidimensional Health Locus of Control-Form A (Wallston et al., 1976). This scale determines whether respondents believe they are able to achieve control over their pain by their own means ('Internal Locus'), or through other actions ('External Locus'): physicians or health care professionals ('Other Professionals'), or control of pain may also depend on luck, fate or haphazard factors ('Chance' and 'Fate'). These four measures ('Internal', 'Other Professionals', 'Chance' and 'Fate'), are independent factors. Each of one is checked through six different items and rated on a six-point scale (Likert-type format), from 1 ('strongly disagree') to 6 ('strongly agree'), with high scores indicating greater Pain Locus of Control. Internal consistency for this sample was α=.66 for the 'Internal Locus Scale', α=.74 for the 'Other Professionals', α=.59 for the 'Chance Scale' and α=.65 for the 'Fate Scale'.

2.3.4 Stress response

Stress Response (SR) was measured with 68 items developed by Peñacoba (1996) within four domains, each including 17 items: (a) emotional response ('I feel a need to cry, run or hide'), (b) cognitive response ('I am unable to concentrate'), (c) physiological response ('I feel a strong tightening sensation in my chest') and (d) motor response ('I find it impossible to stay still'). The participant read a series of 17 stress responses identified in each domain and was asked to rate them on a five-point scale from 0 (not experienced) to 4 (experienced very frequently). You can obtain specific subscales score and a total Stress Response score was given by the mean score for the four subscales. Cronbach's alpha for this instrument is .97 for all subscales, α=.92 for the emotional subscale, α.=95 for the cognitive subscale, α=.91 for the physiological subscale and α=.87 for the motor subscale.

2.3.5 Anxiety/depression

Self-reports of Anxiety and Depression were assessed from the Fibromyalgia Impact Questionnaire, (*FIQ;* Burckhardt et al., 1991), which has been used in previous work with FM population (e.g. Franks et al., 2004; Gelman et al., 2002). Respondents had to mark a point on a 100-mm Visual Analog Scale, 0-mm (no impact)–100-mm (very severe impact) to indicate how depressed they had felt over the past week, and separately, how anxious they had felt.

2.3.6 Functional limitation

Functional Limitation was assessed using the first 10 items from the Fibromyalgia Impact Questionnaire (*FIQ*, Burckhardt et al., 1991) with which one can obtain a Physical Functioning score from questions assessing the patient's ability to perform 10 different activities. The activities assessed were as follows: shopping, using a washing machine, cooking, washing dishes by hand, vacuuming a rug, making beds, walking 51 km, visiting friends/relatives, gardening and driving. The responses are structured, applying a four-point scale ranging from 0='always able to do' to 3='never able to do'. This first subscale measures how an individual's FM symptoms impact on their daily functions in a typical week. The FIQ is commonly used throughout FM research as an indicator of functional ability (e.g. Franks et al., 2004). Cronbach's alpha for this subscale was .83 for the current sample.

2.3.7 Pain intensity

For measuring Pain Intensity, participants were asked to rate the average amount of pain they experienced in the last week on a scale from 1 to 10, with 1 indicating 'no pain' and 10 indicating 'worst imaginable pain' (Item 5 from the Fibromyalgia Impact Questionnaire, *FIQ*, Burckhardt et al., 1991).

2.3.8 Associated symptoms

FM associated symptoms were assessed with a self-report instrument designed to identify the frequency of FM-related psychosomatic symptoms (González-Alonso, 1999). The patients were asked to indicate whether they presented 26 different symptoms, such as dizziness, apathy, fear, irritability, insomnia, headaches or intestinal disorders. If they did not have the symptom, their score was 0, and if they presented it they scored 1 point. Cronbach's alpha was .83.

3. Results

3.1 Descriptive statistics

Table 2 presents means and standard deviations for all of the continuous variables used in the models.

3.2 Predictive variables of stress, affect and FM variables

To examine the predictive value of the perception of control variables on stress, affect, functional limitation and symptoms in FM a series of hierarchical regressions were conducted. In each regression, sociodemographic variables (age, education, employment status and income) were entered in the first block. The second block consisted of the perception of control variables (pain locus of control and pain self-efficacy). The results of the regression analyses for the Stress Responses are shown in Table 3. It is observed that Self-efficacy Over Symptoms (SOS), Self-efficacy Over Pain (SOP) and Fate Pain Locus of Control (FPLC) were predictors of emotional SR (R^2=.45, F=7.65, P<.01); SOS and SOP were predictors of Cognitive SR (R^2=.42, F=6.66, P<.01) and SOS were predictor of Motor SR (R^2=.31, F=4.24, P<.01). Table 4 shows the results of the regression analyses for the Positive and Negative Affect. SOS were predictor of Negative Affect (R^2=.31, F=4.18, P<.01) and SOS and Self-efficacy Over Physical Activities (SOPA) were predictors of Positive Affect (R^2=.43, F=7.13, P<.01). Results for the regression analysis for functional limitation, associated symptoms, anxiety and depression are shown in Table 5. SOP and FPLC were predictors of

associated symptoms (R^2=.29, F=3.86, P<.01); SOPA was predictor of functional limitation (R^2=.24, F=2.87, P<.05); SOP was predictor of Anxiety (R^2=.26, F=3.33, P<.01); and FPLC was predictor of Depression (R^2=.29, F=3.88, P<.01).

Measures	Mean	SD	Skewness	Kurtosis
Positive Affect	28.49	8.43	-0.08	-.48
Negative Affect	27.42	8.09	-.01	-.48
Self-efficacy symptoms	27.25	12.47	-.23	-.007
Self-efficacy activities	30.28	14.40	.03	-.62
Self-efficacy pain	16.87	9.60	.34	.30
Internal Pain Locus of Control	16.79	4.16	-.39	.04
Other Professionals	17.01	5.65	.24	-.30
Chance	7.15	3.43	.78	.59
Fate	10.48	3.63	-.04	-.55
Emotional Stress Response	45.39	15.36	-.62	-.23
Cognitive Stress Response	45.14	16.03	-.80	.05
Physiological Stress Response	41.41	14.94	-.34	-.54
Motor Stress Response	32.97	13.64	-.02	-.47
Anxiety	7.82	2.27	-1.24	1.12
Depression	7.35	2.66	-.91	-.11
Functional limitation	14.08	5.85	.27	-.24
Pain Intensity	7.53	1.69	-.51	-.28
Associated Symptoms	16.30	4.95	-.42	-.53

Table 2. Descriptive statistics of variables measured in the sample.

	F	R^2	IncR^2	Beta	*t*
Emotional Stress Response					
Step 1: Age				-,21	-2,16*
Education				-,08	-,72
Income	3,42*	,13		-,22	-2,13*
Step 2: Other Professionals				-,07	-,85
Internal Pain Locus of Control				,00	,01
Chance				,02	,27
Fate				,17	2,15*
Self-efficacy Over Symptoms				-,37	-3,47**
Self-efficacy Over Physical Activities				,02	,23
Self-efficacy Over Pain	7,65*	,45	,32	-,21	-2,02*
Cognitive Stress Response					
Step 1: Age				-,23	-2,34*
Education				-,01	-,16
Income	2,24	,09		-,14	-1,35
Step 2: Other Professionals				-,06	-,71
Internal Pain Locus of Control				,08	,90
Chance				,10	1,17
Fate				-,03	-,34
Self-efficacy Over Symptoms				-,36	-3,22*

	Self-efficacy Over Physical Activities			-,06	-,61
	Self-efficacy Over Pain	6,66*	,42	-,25	-2,24*
Motor Stress Response					
Step 1:	Age			-,21	-2,11*
	Education			-,23	-2,08*
	Income	3,06*	,11	-,06	-,58
Step 2:	Other Professionals			,03	,41
	Internal Pain Locus of Control			-,04	-,46
	Chance			,11	1,17
	Fate			,02	,28
	Self-efficacy Over Symptoms			-,30	-2,51*
	Self-efficacy Over Physical Activities			-,08	-,70
	Self-efficacy Over Pain	4,24*	,31 ,20	-,04	-,36

*p < .05; **p < .01.

Table 3. Regression analysis: Stress Responses and Perception of Control.

		F	R^2	IncR^2	Beta	*t*
Positive Affect						
Step 1:	Age				,25	2,55*
	Education				-,02	-,20
	Income	1,89	,07		-,00	-,03
Step 2:	Other Professionals				-,03	-,42
	Internal Pain Locus of Control				,00	,03
	Chance				,00	,09
	Fate				-,04	-,55
	Self-efficacy Over Symptoms				,36	3,29**
	Self-efficacy Over Physical Activities				,27	2,47*
	Self-efficacy Over Pain	7,13**	,43	,36	,02	,18
Negative Affect						
Step 1:	Age				-,21	-2,09*
	Education				-,07	-,67
	Income	1,16	,05		-,09	-,82
Step 2:	Other Professionals				-,16	-1,71
	Internal Pain Locus of Control				,00	,02
	Chance				,13	1,41
	Fate				,13	1,45
	Self-efficacy Over Symptoms				-,39	-3,24*
	Self-efficacy Over Physical Activities				,12	1,00
	Self-efficacy Over Pain	4,18**	,31	,26	-,18	-1,51

*p < .05; **p < .01.

Table 4. Regression analysis: Affect and Perception of Control

	F	R^2	IncR^2	Beta	t
Functional limitation					
Step 1: Age				-,23	-2,30*
Employment Status				-,12	-1,28
Education	1,68	,07		-,10	-,94
Step 2: Other Professionals				-,08	-,83
Internal Pain Locus of Control				,11	1,14
Chance				-,02	-,22
Fate				,05	,60
Self-efficacy Over Symptoms				-,09	-,75
Self-efficacy Over Physical Activities				-,46	-3,66**
Self-efficacy Over Pain	2,87*	,24	,17	,17	1,39
Associated Symptoms					
Step 1: Age				-,17	-1,69
Employment Status				-,06	-,74
Education	2,82*	,11		-,32	-2,88*
Step 2: Other Professionals				-,07	-,80
Internal Pain Locus of Control				,03	,39
Chance				-,08	-,85
Fate				,22	2,40*
Self-efficacy Over Symptoms				-,08	-,67
Self-efficacy Over Physical Activities				-,06	-,54
Self-efficacy Over Pain	3,86**	,29	,18	-,27	-2,23*
Anxiety					
Step 1: Age				-,13	-1,34
Employment Status				-,07	-,78
Education	,86	,03		-,07	-,65
Step 2: Other Professionals				-,11	-1,18
Internal Pain Locus of Control				-,02	-,28
Chance				-,01	-,12
Fate				,16	1,72
Self-efficacy Over Symptoms				-,14	-1,15
Self-efficacy Over Physical Activities				,08	,63
Self-efficacy Over Pain	3,33**	,26	,23	-,37	-3,01*
Depression					
Step 1: Age				-,12	-1,22
Employment Status				,01	,18
Education	3,14*	,12		-,32	-2,94*
Step 2: Other Professionals				-,10	-1,09
Internal Pain Locus of Control				,04	,44
Chance				-,09	-,99
Fate				,23	2,45*
Self-efficacy Over Symptoms				-,10	-,87
Self-efficacy Over Physical Activities				-,06	-,54
Self-efficacy Over Pain	3,88**	,29	,17	-,24	-1,95

*p < .05; **p < .01.

Table 5. Regression analysis: Functional limitation, associated symptoms, anxiety and depression and Perception of Control.

3.3 Affect as a mediator of perception of control variables and functional limitation, anxiety and depression

To test for the presence of mediating effects, we conducted an ordinary least squares multiple regression analysis and a Sobel test (Baron & Kenny, 1986; Preacher et al., 2007). To assess whether a variable has a "true" mediating effect, the preconditions for a test of mediation are significant relationships between the predictor variable and the mediator, the predictor variable and the outcome variable, and the mediator variable and the outcome variable (Holmbeck, 1997). Partial mediation is demonstrated when the beta weight for the independent variable is reduced (but not to non-significance) as soon as the proposed mediator is added to the equation. Full mediation is demonstrated if the [beta] value for the predictor variable is reduced from significance to non-significance when the proposed mediator is added to the equation (Baron & Kenny, 1986). We conducted hierarchical regression analyses on the perception of control variables (Internal Pain Locus of Control (IPLC), FPLC, SOS, SOPA and SOP). Sociodemographic variables were entered in step 1, perception of control variables were regressed on Step 2 (only those that had shown a significant relationship with the mediator variable), and affect was entered in Step 3.

The analyses showed that positive and negative affect mediated the relationship between IPLC (IPLC) and anxiety and depression (see Table 6). Negative affect mediates the relationship between FPLC and Anxiety and Depression (see Table 7) and between SOS and Functional limitation, anxiety and depression (see Table 8). And negative affect also mediated the relationship between SOPA (see Table 9) and SOP (see Table 10) and Anxiety and Depression.

Outcome Variables	F	R^2	IncR^2	Beta	t
Anxiety					
Step 1: Age	,185	,001		-,038	-,430
Step 2: IPLC	4,602*	,066	,065	-,255(-,208*)[a]	-3,001**
Step 3: Positive Affect	4,993**	,104	,038	-,208	-2,337*
Depression					
Step 1: Age				-,006	-,204
Education				-,103	-1,052
Income	1.012	,026		-,122	-1,308
Step 2: IPLC	2,493*	,082	,056	-,236 (-,188*)[a]	-2,604*
Step 3: Positive Affect	3,007*	,119	,037	-,204	-2,175*
Anxiety					
Step 1: IPLC	9,042*	,063		-,251(-,116) [a]	-3,007*
Step 2: Negative Affect	35,811**	,350	,287	,552	7,661**
Depression					
Step 1: Education				-,085	-,935
Income	1,510	,026		-,121	-1,303
Step 2: IPLC	3,331*	,081	,055	-,236(-,120) [a]	-2,611*
Step 3: Negative Affect	10,356**	,270	,189	,457**	5,381**

NOTE: Standardized regression coefficients (betas) are reflected when variables are from the step in which they are added to the equation.

a. Beta value after introduction of mediator variable (positive or negative affect). Significant comparisons between standardized regression coefficients after Sobel test are shown in bold.

*p<0.05; **p<0.01

Table 6. Mediation model: Internal Pain Locus of Control.

Outcome Variables	F	R^2	IncR^2	Beta	t
Anxiety					
Step 1: Education	,458	,004		,062	,677
Step 2: FPLC	3,685*	,060	,056	,243(,148) [a]	2,625*
Step 3: Negative Affect	20,993**	,354	,294	,557	7,235**
Depression					
Step 1: Education				-,097	-1,042
Income	1,510	,026		-,121	-1,303
Step 2: FPLC	2,866*	,071	,045	,216(,136) [a]	2,337*
Step 3: Negative Affect	10,561**	,274	,203	,465	5,598**

NOTE: Standardized regression coefficients (betas) are reflected when variables are from the step in which they are added to the equation.
a. Beta value after introduction of mediator variable (positive or negative affect).
*p<0.05; **p<0.01

Table 7. Mediation model: Fate Pain Locus of Control.

Outcome Variables	F	R^2	IncR^2	Beta	t
Functional limitation					
Step 1: Age	1,68	,07		-,23	-2,30*
Step 2: SOS	10,763**	,074	,067	-,273(-,202*)[a]	-3,281*
Step 3: Negative Affect	7,314**	,099	,025	,172	1,911*
Anxiety					
Step 1: Age	,185	,001		,038	-,430
Step 2: SOS	7,865*	,108	,107	-,333(-,116) [a]	-3,940**
Step 3: Negative Affect	23,339**	,352	,244	,543	6,967**
Depression					
Step 1: Age				-,020	-,204
Education				-,103	-1,052
Income	1,012	,026		-,122	-1,308
Step 2: SOS	3,099*	,100	,074	-,276(-,093) [a]	-3,023*
Step 3: Negative Affect	8,208**	,270	,170	,467	5,088**

NOTE: Standardized regression coefficients (betas) are reflected when variables are from the step in which they are added to the equation.
a. Beta value after introduction of mediator variable (positive or negative affect). Significant comparisons between standardized regression coefficients after Sobel test are shown in bold.
*p<0.05; **p<0.01

Table 8. Mediation model: Self-efficacy Over Symptoms.

Outcome Variables	F	R^2	IncR^2	Beta	t
Anxiety					
Step 1: SOPA	11,443**	,079		-,280(-,125) [a]	-3,383**
Step 2: Negative Affect	36,083**	,352	,273	,545	7,485**
Depression					
Step 1: Education				-,097	-1,042
Income	1,510	,026		-,121	-1,303
Step 2: SOPA	4,314*	,103	,077	-,278(-,147) [a]	-3,113*
Step 3: Negative Affect	10,698**	,276	,173	,444	5,185**

NOTE: Standardized regression coefficients (betas) are reflected when variables are from the step in which they are added to the equation.
a. Beta value after introduction of mediator variable (positive or negative affect).
*p<0.05; **p<0.01

Table 9. Mediation model: Self-efficacy Over Physical Activities.

Outcome Variables	F	R^2	IncR^2	Beta	t
Anxiety					
Step 1: Marital status	,213	,002		-,040	-,461
Step 2: SOP	12,506**	,161	,159	-,402(-,231**)[a]	-4,976**
Step 3: Negative Affect	27,142**	,387	,226	,505	6,890**
Depression					
Step 1: Marital Status				-,132	-1,402
Education				-,099	-1,075
Income	1,671	,042		-,147	-1,557
Step 2: SOP	4,777*	,146	,104	-,325(-,171**)[a]	-3,680**
Step 3: Negative Affect	9,009**	,289	,143	,416	4,723**

NOTE: Standardized regression coefficients (betas) are reflected when variables are from the step in which they are added to the equation.
a. Beta value after introduction of mediator variable (positive or negative affect). Significant comparisons between standardized regression coefficients after Sobel test are shown in bold.
*p<0.05; **p<0.01

Table 10. Mediation model: Self-efficacy Over Pain

3.4 An integrated model

In our sample, multivariate normality was tested using the Mardia test for multivariate kurtosis. Skewness and kurtosis indexes were calculated for each variable (see Table 2) and the Mardia test suggested the presence of non-normality at a multivariate level (critical ratio = 7.83; p< 0.05). Given this, the decision was made to pursue parameter estimation under two scenarios, traditional maximum likelihood analysis and bootstrapping. For the

bootstrap analysis we performed 2000 bootstrap replications for purposes of estimating standard errors, p values and confidence intervals. We employed the bias-corrected approach to interval estimation as implemented in AMOS (Arbuckle & Wothke, 1999). Estimation for all 2000 individual bootstrap samples yielded convergence and meaningful solutions. To asses the overall fit of the tested models we used the Bollen Stine bootstrap p-value in addition to the usual maximum likelihood-based p-value (chi square), following Bollen and Stine's recommendations (Bollen & Stine, 1993). In general, conclusions were the same in the two estimation methods. Significance tests and confidence interval reported are from the bootstrap analyses.

3.4.1 Contrasting the two-factor structure: Resources and vulnerabilities

The initial model is evaluated in a structural model that specifies the relationship between two latent variables and a measurement sub-model which relates a series of observable indicators with the latent variables. The two latent variables are as follows: cognitive-affective resources and cognitive-affective vulnerabilities. It can be seen that there is a bidirectional path from the cognitive-affective resources to the cognitive-affective vulnerabilities. In the measurement sub-model, the three observed variables of self-efficacy (over symptoms, over physical activities and over pain) are defined along with the internal pain locus of control and the positive affect as a result of the latent variable "cognitive-affective resources" (plus the random measurement error) that in turn influences the observed endogenous variable "functional limitation". Moreover, the latent variable "cognitive-affective vulnerabilities" is the result of the observed variables relative to the average score of the different stress responses, the external locus of pain control (other professionals, chance and fate) and negative affect, this latent variable in turn influences the associated observed symptom variables; pain intensity, anxiety and depression (See Figure 1).

To test this model a structural equation model (SEM) was carried out which allowed us to make an empirical analysis of the theoretically constructed model and reject it in the case of it being inconsistent with the data. In order to examine the fit of the model the Bollen-Stine p value was taken into account and it turned out to be statistically significant (<.05) which suggested a poor fit for the model. Other commonly used adjustment indices were also taken account of: $\chi 2$, $\chi 2$/g.l., *CFI* (Comparative Fit Index), *IFI* (Incremental Fit Index), *TLI* (Tucker Lewis Index) and *RMSEA* (Root Mean Square Error of Approximation). The $\chi 2$ should have non-significant values (p>.05) but as it is very sensitive to sample size (Jöreskog & Sörbom, 1989), it is recommended to calculate $\chi 2$/g.l. which is considered to be acceptable when it is less than 5 (Bentler, 1989). The incremental models (CFI, IFI and TLI) are based on a comparison between the hypothesized model and the null model and are not affected by the size of the sample with values greater than .90 being considered acceptable (Hu & Bentler, 1995). Values of .08 or less are considered acceptable for RMSEA (Browne and Cudeck, 1993). These indices offer results which tend to show an insufficiently robust fit ($\chi 2$= 161,756; $\chi 2$/g.l.= 1,81; *CFI*=0,87; *IFI*=0,88; *TLI*= 0,85; *RMSEA*=0,08). For this reason it was decided to examine the coefficient paths in order to eliminate those not statistically significant. However, no path was eliminated by following this criterion. The test used next was that of Lagrange multipliers (LM) with the objective of identifying possible paths or covariances among the measurement errors, which could improve the fit of the model (Aitchinson & Silvey, 1958). In this way two covariances were added from among the measurement errors, the first from between the measurement error of the FPLC and Chance

Pain Locus of Control (CHPLC) (modification index=25.,03) and the second between the measurement errors of anxiety and depression (modification index=16.25). All of this gave rise to the model presented in Figure 2, with a Bollen-Stine p value of 0.25 while the rest of the indices of global fit were: $\chi 2$= 113,198; $\chi 2$/g.l.= 1,30; *CFI*=0,95; *IFI*=0,95; *TLI*= 0,94 and *RMSEA*=0,05 all of which points to an appropriate degree of fit for the model. All of the coefficient paths were statistically significant ($p < 0.05$). Figure 2 provides a graphic representation of the final model.

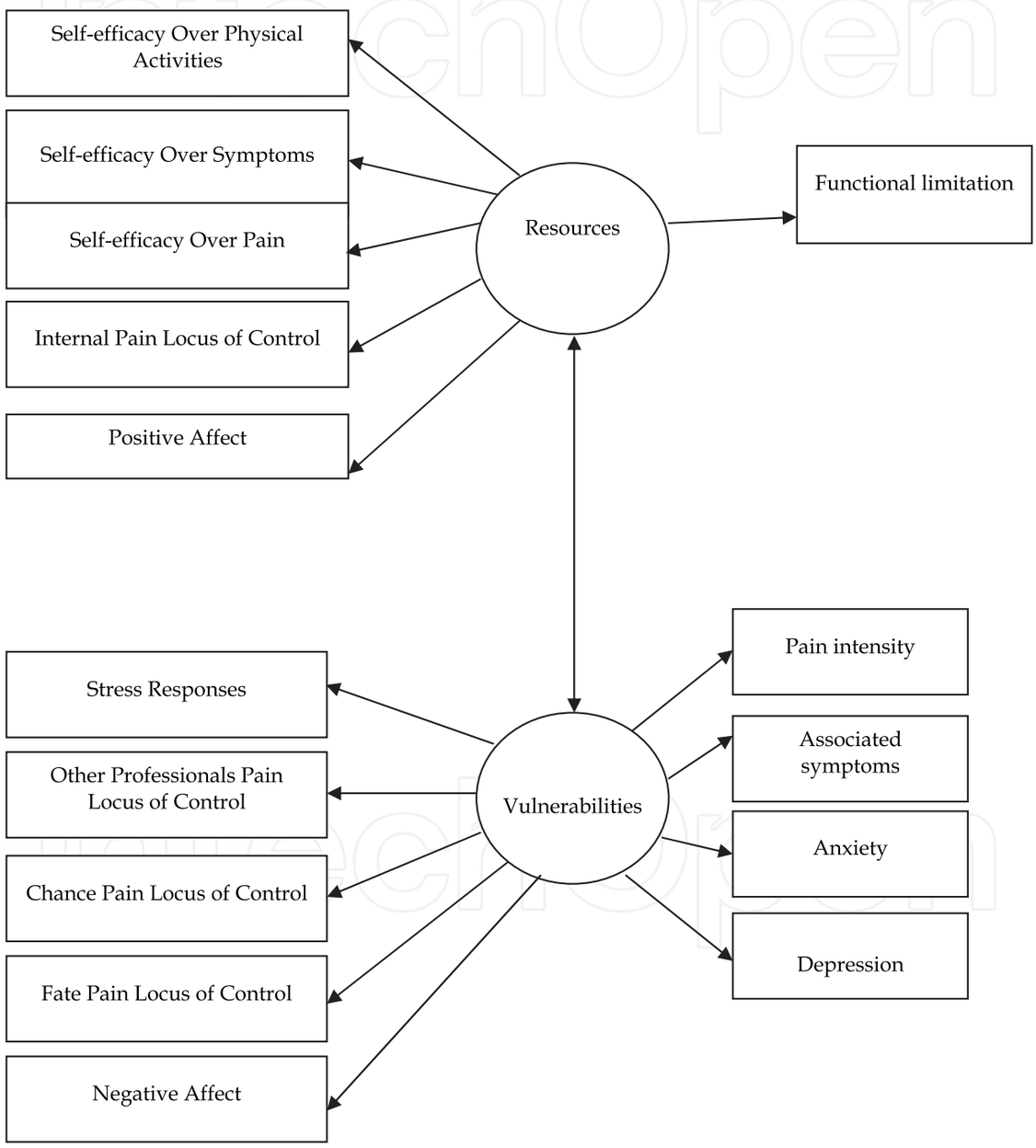

Fig. 1. Initial trajectories model hypothesized. The rectangles represent observed variables (measured), circles represent latent variables (unobserved). For the sake of clarity the error variances of the endogenous variables are not shown.

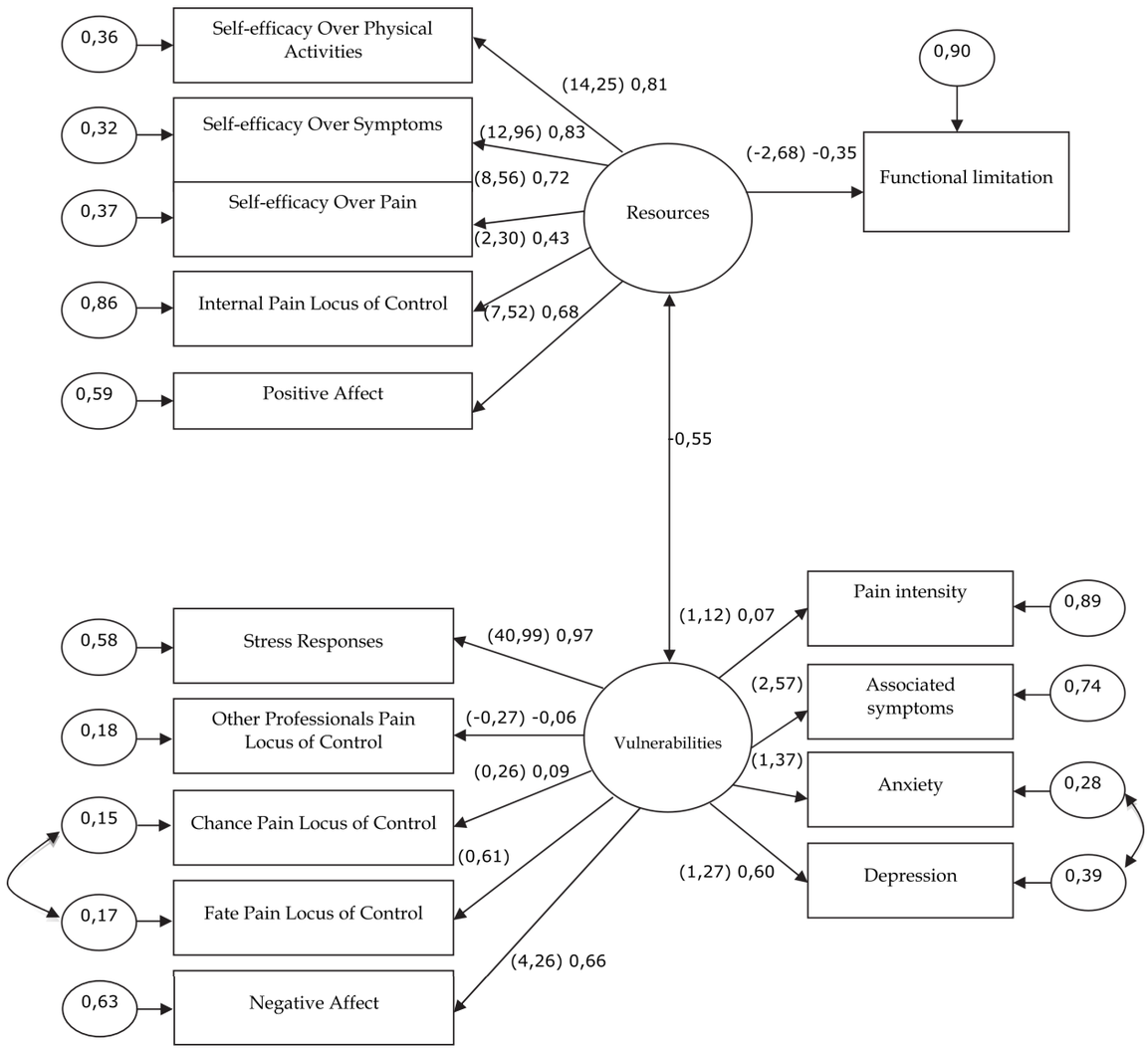

Fig. 2. Final Model. The circles represent latent variables (unobserved), the ellipses are the standardized variances of error and the rectangles are the observed endogenous variables. Values in parentheses are unstandardized path coefficients, while the values outside parentheses are standardized path coefficients. The values attached to the bidirectional lines are the coefficients of correlation between the error variances.

4. Discussion

4.1 Predictive variables of stress, affect and FM variables

The results show that the variables of perceived pain control play an important role in stress responses in women with FM. In particular, self-efficacy over pain and over symptoms play a key role since they are predictors in the cognitive-emotional patterns of response. In the case of the motor response, predictive capability is only seen for SOS. Moreover, in the case of emotional response, FPLC is included as a predictor variable.

Our results show that external locus of control (Fate) are predictors of stress responses consistent with previous studies (Crisson & Keefe, 1988; Härkäpää et al., 1996). Thus, the

belief that one's illness or behavior is determined by external agents, in this case by others or by one's own fate or destiny, increases the stress response in their emotional and physiological modalities. Different studies have shown the positive role of self-efficacy for over pain and over symptoms associated with FM (Buckelew et al., 1995, Martin-Aragon et al., 2001, Menzies et al., 2006 ; Miró, 1994), among them stress. It seems that our data support the idea that low pain self-efficacy predicts the evaluated stress responses.

As for the explanatory models of Affect, it appears that perception of control variables, particularly pain self-efficacy play an important role. These results show the important connection between emotional and cognitive aspects as has been demonstrated in previous studies (v.g. Palomino et al., 2007). High self-efficacy is related to positive affect, whereas low self-efficacy goes with negative affect. In addition, the results point to the independence of both types of affectivity, so that the predictors differ in both cases. According to this data, women with FM can regulate their negative affect by increasing their self-efficacy regarding associated symptoms. However, to achieve positive emotions associated with affect they also need to increase their self-efficacy related to the carrying out of activities. Although previous studies have shown the relationship between negative affect, perceived pain, stressful experiences, low self-efficacy and symptoms associated with FM (Davis et al., 2001, Davis et al. 2004; Kersh et al. 2001; Kurtz & Svebak, 2005, Potter et al., 2000, Zautra et al., 1999), there is little literature on the variables with influence on positive affect, as has been pointing out by positive psychology. This differentiation has important practical implications, since according to the objectives of the intervention programs, the activity carried out should be differential on the basis of the variables that are really involved. In this context it is particularly important to work both with the illness and health variables, with the strengths and weaknesses, with positive and negative affect, with all health problems in general and particular with FM. With regard to affect, studies such as Zautra et al. (2005) have shown that FM patients have emotional equilibrium problems; they have lower levels of positive affect though they do not have high levels of negative affect, unlike what has been claimed by the majority of studies (Zautra et al., 2005). The problem of emotional regulation in these patients is not explained by negative affect but by a certain vulnerability in the system of positive affect: these patients show little responsiveness to positive emotions or events, focusing instead on the negatives. These results highlight the importance of targeting interventions toward increasing positive resources in these patients.

In this vein, and in order to differentiate between positive affect and negative effect, the research team (Velasco et al., 2009) evaluated a causal model using structural equations defining the presence of two dimensions: cognitive-affective resources and cognitive-affective vulnerabilities. The resources are made up of positive affect, self-efficacy over symptoms, self-efficacy over physical activities, self-efficacy over pain and internal pain locus of control. The vulnerabilities were stress responses (emotional, physiological, cognitive and motor), anxiety, depression and negative affect. The resources showed a direct influence on physical functioning, which in turn affected the thermal tolerance to pain. This highlights the capacity of the patients to retain wellness in spite of pain; the presence of positive emotions helps them to not feel dysfunctional, on the contrary, it helps them adapt to the pain. Positive resources are the key for better tolerance of pain. Vulnerabilities, on the other hand, predicted pain intensity and associated symptoms. These results allow us to reflect on the close relationship between cognitive and emotional variables, in their

classification as positive and negative variables. The participation of the patient in stress processes, as an active and transforming agent in his or her surroundings, is fundamental for the resolution of conflicts and dealing with situations of disruption. This participation functions to cushion the impact of stressful situations and in turn could act as an enhancer of the health and welfare of the individual (Söderfeldt et al., 2000). Thus, within this role of agent, perception of control variables would have an important role in alleviating stressful experience and the negative affect as well as promoting positive emotional resources. From the perspective of a process model of positive personality, this capacity of the active subject is related to emotional coping skills that seek to regulate the emotional response and enhance emotional resistance. Perceived self-efficacy in stressful or threatening situations generates expectations about the results based on the individual's conviction that he or she not only possesses the necessary coping resources but is also able to maintain an adaptive flexibility that allows him or her to control the demands of the situation (Idel et al., 2003). If there are expectations of self-efficacy this will facilitate the choice of healthy behaviors and appropriate coping strategies to deal with a difficult situation like a disabling illness. At the same time the emotional effect of self-efficacy will shape a sense of control which will see health as being an important good for the subject and as something capable of being positively modified by his or her behavior (see Reich & Zautra, 1981). All of this in such a way that by being able to carry out tasks and achieve goals, the subjective state of well being will be reflected in a positive mood as well. By the same token, the internal locus of control, seen as a tendency to attribute results more to oneself that to external factors, has been related to subjective well being (Cooper et al., 1995) which would explain its predictive role with regard to affect.

With regard to the specific variables of FM, namely the associated symptoms and emotional aspects, we found that both self-efficacy over pain in the case of anxiety and the fate pain locus of control in the case of depressive symptoms are relevant variables and both for the associated symptoms. Taking as a reference point the risk personality category defined by Folkman (1984), certain similarities can be found with patients with FM; individuals inclined to the perception of threat and danger and the perception of a lack of resources and lack of personal control, with a greater probability of emotional coping and the feeling of more negative emotions and anxiety (Lundberg et al., 2009). These factors would place the person in a continuous situation of stress, anxiety and depression. This lack of resources would be reflected in low levels of self-efficacy and an external locus of control (Buckelew et al., 1990; Crisson & Keefe, 1988; Skevington, 1990).

Finally, with respect to functional limitation, it has been shown to be a predictor variable for self-Efficacy over physical Activities. Previous studies have shown that self-efficacy is related to greater physical activity in FM (Culos-Reed & Brawley; 2003). Confidence in the carrying out of certain activities may lead to participation in them and also participation in activities which require less effort such as those valued by this present study (going shopping, going for a walk etc.) Furthermore, the specific self-efficacy necessary for the activities predicts the physical activity and functioning of these patients (Culos-Reed, 2001). Different treatment programs of an inter-disciplinary or cognitive-behavioral nature have demonstrated the necessity of working with self-efficacy expectations to diminish the symptoms and pain associated with FM (Aspegren et al., 2000; Bailey et al., 1999; Buckelew et al., 1995; 1996; Lera et al., 2009; Schachter et al., 2003; White & Nielson, 1995).

4.2 Affect as a mediator between perception of control and functional limitation, anxiety and depression

From the results obtained from mediation analysis a major mediating role can be seen for negative affect between perception of control and the outcome measures of FM. Furthermore, in the majority of cases, negative affect has a total mediator role and so its predictive capacity for the perception of control variables considered here can only be explained by its influence. The outcomes explained by models of mediation were primarily anxiety and depression, and to a lesser degree functional limitation. Thus negative affect acts as a mediator among IPLC, FPLC, SOS, SOPS, SOP as predictor variables and Anxiety and Depression as outcome variables. In all cases the mediation is total except that of self-Efficacy over pain where it was partial. At the same time negative affect acted as a mediator, in this case partial between self-Efficacy over symptoms and Depression. These results are consistent with previous literature (González-Gutiérrez et al. 2009; Kurtze & Svebak, 2005, Potter et al., 2000), which shows how, in relation to the explanation of anxiety, depression and functional limitation on the basis of perception of control and affective variables, negative affect would be the best predictor of these outcomes. The mediating role of positive affect is clearly lower and when associated with an internal perception of control helps to reduce levels of anxiety and depression.

FM has often been associated with negative affect (Kurtz & Svebak, 2005, Potter et al., 2000) and even authors such as Davis et al. (2001), Potter et al. (2000), Staud et al. (2003), Zautra et al. (1999; 2005; 2007), consider it as an important variable in the consolidation and development of the disease. Furthermore, as part of a vicious circle, these negative emotions in turn influence the symptoms associated with FM (Ramírez-Maestre et al., 2001).

One of the limitations in interpreting the results found is the assessment of anxiety and depression through individual FIQ items and its possible contamination with positive and negative affect, precisely because of the measurement procedure used. However, while recognizing these limitations, it is necessary to clarify that in this case the measures of anxiety and depression related to emotional symptoms rather than to psychiatric diagnosis. In this context, Pérez-Pareja et al. (2004) differentiate the concept of psychiatric disorder from that of mood and indicate the importance of this difference not only in the context of the diagnosis of the illness but also in relation to the possible treatments for it. In the authors view the depressed mood of these patients is a consequence of the symptoms of the disease itself as well as of pain interferences, although other authors (O'Brien et al., 2010) does not agree. Thus, not being able to carry out previously habitual activities or not being able to control one's own pain or its interference provokes more negative symptoms, in line with the mediating effects of negative affect found in the present study.

The partial mediation role played by negative affect between SOS and functional limitation must also be highlighted. As has previously been mentioned, self-efficacy beliefs play an important role in the physical functioning of patients with FM. In this sense, lower self-efficacy regarding symptoms lead to greater negative affect which in turn affect functional limitation. Previous studies have established a relationship between self-efficacy for pain and functional limitation (Buckelew et al. 1995; Jegede, 2006; Martin-Aragon et al., 2001M Mueller et al. 2003; Oliver & Cronan, 2002; Theadom et al., 2007; Velasco et al., 2008), although they did not include affect as a mediating variable.

Functional capacity is a major source of concern in patients with FM as they face limitations in carrying out different activities, especially in activities of daily life which they regard as fundamental. The inability to carry out, or the difficulties encountered in carrying out, such

tasks results in a series of negative emotions, which is reflected in the high levels of negative affect and low positive affect of these patients, as well as poor self-efficacy of pain both for carrying out activities as well as for symptom control and pain control. This functional impairment is also often compounded by a lack of comprehension on the part of those around the sufferer due to the nature of the disease (absence of demonstrable organic changes) (Esteve-Vives et al., 2010).

Various studies (Alonso et al., 2004, Davis et al., 2001, Hassett et al., 2008, Zautra et al., 1999) have assessed the relationship of positive and negative affect with the symptoms of FM, using the same instrument used in our study (PANAS). The results show that negative affect has more to do with the symptoms of the disease and functional limitation than positive affect. Although the results for positive affect are more limited, we should remember also the tendency to use negative indicators of disease and outcome variables while ignoring positive outcomes such as satisfaction, well being or quality of life. In the same vein, authors such as Lyubomirsky et al. (2005) consider that positive emotions are more than the absence of negative emotionality, so it is important to consider the potential utility of positive emotions to achieve high levels of psychological well-being, even in times of illness.

This "lack of prominence" as a mediator of positive affect with regard to the effect of perception of control variables could be understood on the basis, mentioned above, of the inability of FM patients to mobilize positive resources to neutralize the experience of pain and negative affect associated with it (Zautra et al., 2005). That is why their difficulty in maintaining a positive mood is an additional challenge for patients with FM. In addition, there may be a vicious circle connecting lower positive affect and fewer satisfactory social relationships, which could also explain the results in relation to interpersonal stress responses. As already noted, these patients have low responsiveness to positive emotions or events, they focus more on the negative, and have a relative absence of positive emotional and cognitive resources (Potter et al., 2000; Zautra et al., 2001).

Other studies (Arnold et al., 2006; Hassett et al. 2008; Porter-Moffitt et al. 2006; Suhr, 2003) have confirmed this affective pattern (low positive affect and high negative affect) in FM patients and its impact on lower physical functioning and increased clinical symptoms. Some authors (Clauw & Chrousos, 1997, Martinez-Lavin, 2004; Sarzi-Puttini et al., 2006) have brought up the study of the role of affective variables via physiological correlates in this regard.

In any case, it seems clear that interventions aimed at decreasing negative affect may contribute to improving the quality of life of these patients by optimizing their own perception of control variables. Similarly, one of the fundamental aspects of disease treatment would aim to design interventions that enhance positive resources. Positive experiences would be a key to increase the quality of life and physical functioning of these patients. One of the practical implications involved would be the inclusion, in psychotherapy, of programs for emotional regulation, currently almost nonexistent in the approach to FM, as a vehicle for improving these patients and their ability to cope with the disease.

4.3 An integral explanatory model for fibromyalgia

In the final phase of our study it was evaluated a causal model of the relationship between cognitive-affective resources and cognitive-affective vulnerabilities in patients with fibromyalgia, with the researchers interest focused on the relationship between these

variables and a number of disease outcomes, such as functional limitation, pain intensity, associated symptoms and anxiety and depression. Techniques derived from structural equation modeling (SEM) were used and indices obtained suggested an adequate fit of the model evaluated.

The model evaluated in this study of the relationship between resources and cognitive-affective vulnerabilities supports the hypothesis of the existence of a number of variables that function as resources including cognitive processes of control perception as well as other emotional resources like positive affect (Thompson, 2006). Thus, self-efficacy over pain and control expectancies are two constructs whose positive effects have been demonstrated in areas such as coping with stress and adherence to therapy. Both variables have shown a positive role in health (Dwyer, 1997; Pastor et al., 1999). Regarding the study of these control beliefs in FM, studies that focus on self-efficacy are more numerous, being fewer focused on locus of control, although the internal locus of control has been associated with fewer FM symptoms and greater physical functioning improving the quality of life of the patients (Zaharoff, 2005). Several studies have shown the positive role of self-efficacy in managing pain and symptoms in people with FM (Menzies et al., 2006). In addition to these cognitive variables, we found that positive affect is also included in this set of "resources" that acting together, have a major influence on the physical functioning of patients with FM. Thus, the use of these resources would reduce functional limitation. In this regard, previous studies have demonstrated the influence of these variables on physical functioning in FM (Buckelew et al. 1995; Culos-Reed & Brawley, 2003; Fontaine et al., 2010), and various treatment programs have mentioned that self-efficacy is fundamental to predict physical functioning (Buckelew et al., 1995; Oliver & Cronan, 2002; Rivera et al. 2004; Schachter et al., 2003). The presence of positive emotions and cognitive resources reflect better physical functioning and reduced clinical symptoms in fibromyalgia (Arnold et al., 2006; Hassett et al., 2000; 2008; Porter-Moffitt et al. 2006; Suhr, 2003).

In this present model we found a series of cognitive-affective vulnerabilities that directly affect the symptoms presented in FM. These vulnerabilities are the different responses to stress, the external pain locus of control and negative affect. Stress has been associated with high levels of psychological distress, including symptoms related to anxiety, depression or negative affect. These types of affective symptoms appear on most occasions together with stress processes in different contexts and populations (Fresco, 2000; Stillerman, 2007). As already mentioned, there are numerous studies that have found relationships between stress (studied as a stimulus, response or consequence) and fibromyalgia as well as between emotional distress and symptoms of the disease. These cognitive-affective vulnerabilities impact on the intensity of pain and symptoms associated with FM. It seems that people with fibromyalgia have a more external pain locus of control than people with other types of chronic pain and healthy people (Gustafsson & Gaston-Johansson, 1996), although this has not been confirmed in our work. This externality of the locus of pain is in turn associated with greater intensity of pain, worse coping and psychological distress in fibromyalgia (Crisson & Keefe, 1988; Härkäpää et al., 1996; Martin-Aragon et al., 2001; Toomey et al., 1991). It seems that negative affect is associated with increased symptoms and pain in FM (Alexander et al., 1998; Potter et al., 2000; Velasco et al., 2006). In subjects with high negative affect an increased perception of threat has been suggested in relation to which the subjects experience an increase in the perception of pain intensity (sensory and affective) when presented with an ambiguous stimulus, if their pain expectation is manipulated (Alexander

et al., 1998). Staud et al. (2004) found an association between negative affect, the number of tender points and pain intensity in fibromyalgia. There are numerous studies that relate affective unease and intensity of pain in fibromyalgia (Alexander et al. 1998; Kurtze & Svebak, 2005, Potter et al., 2000) and there are several hypotheses about the temporal relationship between the two elements (the emotional distress as a precedent and as a consequence of chronic pain) and empirical evidence can be found in favor of both approaches (e.g. Gaskin et al., 1992, Sullivan et al., 2001), which seems to suggest the presence of a bidirectional relationship. However, as a piece of isolated data, a relationship between negative affect and pain intensity has not been found in our work. In our model, we took anxiety and depression to be direct consequences of this set of "vulnerabilities" that could be considered within the same construct. This allows us to understand the correlation between the measurement errors of these variables in the model analysis. Future studies should establish control mechanisms in order to check and eliminate this type of response bias. It would also be interesting to check the fit of this model to other samples of patients with chronic pain (with either a known or unknown etiology), in order to test its generalizability to other disorders and to examine the differential characteristics with respect to FM.

In previous studies the research team evaluated two models in samples of women with FM, on similar lines. Firstly, as has already been pointed out when talking about the independence between positive and negative affect, one of the models (Velasco et al., 2009), based itself on the presence of two dimensions: cognitive-affective resources and cognitive-affective vulnerabilities. The resources include positive affect, self-efficacy over symptoms, self-efficacy over physical activities and over pain and internal pain locus of control, while the vulnerabilities include stress responses, anxiety, depression and negative affect. The resources have a direct influence on physical functioning and the vulnerabilities predict pain intensity and associated symptoms. Unlike the model set out in this present study, pain and anxiety were considered as variables within this set of vulnerabilities, given the bidirectional relationship between emotional variables and the results indicated throughout this present study. The second of the proposals (González-Gutiérrez et al., 2010) evaluated a pattern of relationships between a number of cognitive resources (self-efficacy expectancies and internal pain locus of control), the stress-recovery process and emotional distress in 130 women with fibromyalgia. The results showed that the stress-recovery balance mediates the relationship between cognitive resources and emotional distress. The presence of a direct effect of cognitive resources on functional limitation was also noted, while the intensity of pain and other symptoms of illness were directly predictive of emotional distress.

Other recent study (Lledó et al., 2010) has highlighted the relationship between control beliefs, coping focused on the disease (most used by these patients) and emotions to explain the health outcomes of FM patients. It shows cognitive and emotional resources to be important variables in explaining the impact on health of FM. In this regard, perceived competence in health (the perception that one is able to interact effectively in situations of health) and self-efficacy of pain were the most important variables in explaining the health status of FM. The perceived competence predicted the intensity of pain while self-efficacy and depressed mood accounted for physical activity, with the cognitive component being more important than the emotional one, the perception of competence and anxiety and depression predicted the psychosocial impact of disease, self-efficacy and perceived competence in health predicted depression, with the first having a greater effect than the

first, and the use of behavioral or passive coping strategies (or strategies centered on the disease), such as the protection of areas or movements, asking for help or and rest, only had an effect on the degree of physical activity.

We would like to point out some limitations of this study which need to be considered. First, its correlational cross-sectional nature made it unable to establish cause-effect relationships. To establish these, longitudinal studies are necessary. Moreover, the biases associated with the application procedure of the questionnaires, especially the self-report questionnaires that were used in this study and their own nature, may have interfered with the results found. Another limitation is the excessive focus on disease variables to the exclusion of positive health variables. The focus of the study on personality as a state and not as a process was also a limitation. We believed this latter approach would provide key findings for understanding how certain variables operate and to design appropriate intervention programs. This limitation is especially relevant for the assessment of stress and emotion.

5. Conclusions and implications

This study shows a predictive capacity of pain perception of control on stress responses and affect in people with FM. As for the associated disease variables (associated symptoms, functional limitation, anxiety and depression), the study shows self-efficacy over physical activities, over pain and external pain locus of control (other professionals and fate) to be predictors for them. Likewise, negative affect (compared to positive) is a powerful mediator between the variables of perceived pain control and the outcomes of fibromyalgia variables (anxiety and depression and to a lesser extent, functional limitation). Positive affect partially mediates between internal pain locus of control and anxiety and depression. The study also demonstrated an integrative model of FM which confirms the existence of a series of variables that function as resources (cognitive processes of perception of control and positive affect) that affect functional limitation, and a series of cognitive-affective vulnerabilities (stress responses, external pain locus of control and negative affect) that directly affect pain and associated symptoms presented by these patients.

The conclusions drawn from this study may yield important practical implications. Although protocols have been designed for more complete care of FM, there are few interventions that address the main areas affected by the disease. Thus, the objectives that should be set out would focus on the integral development of four areas: emotional (anxiety and depression in particular), cognitive (perception of self-efficacy, beliefs and expectancies), behavioral (daily activities that are reduced or eliminated as result of FM) and social (impact of the disease in the patient's social and family sphere).

Thus, in accordance with the above and consistent with the results obtained in this work, we propose that these intervention programs should offer at least three fundamental objectives: 1) promote beliefs related to perceived control, 2) promote strategies of emotional regulation aimed mainly at promoting positive emotions and 3) provide active coping strategies aimed at proper management of stress responses. Changing beliefs about control of the disease are key elements to ensure the positive development of the patients. Lledó et al. (2010) suggest that promoting successful experiences in managing the problem is a therapeutic resource to enhance the perception of control. Therefore, it is important to consider small achievable goals that involve successful experiences in confronting the problem. Perhaps the key would be to carry out treatment programs aimed at changing attitudes regarding pain

management. To the extent that patients own self-control of the disease increases, their beliefs associated with control will be modified and they will have greater involvement in the management of the disease (Biurrun-Unzué et al., 2002).

Another line of action should focus on the relationship between health professional and patient. Bearing in mind the importance of the influence of the health professional and the healthy role of "other professionals pain locus of control" (in combination with "internal locus of control") any strategy to facilitate the patient's confidence in their health professional is specially needed in the case of this disorder. Effective and educational communication could also have a very positive effect in reinforcing control beliefs. In the same way, by working on control, negative emotions can be reduced, another therapeutic objective to consider, not only because they themselves are the health area most affected, but also because they are a resource to increase physical and social activity, and thus prevent further deterioration. It has been shown that positive emotions play an important role in the recovery from painful episodes of FM. In addition, these emotions might modulate negative affect present in the moments of greatest pain. The positive experiences and positive affect on the FM are a key point in preserving the quality of life and physical functioning of these patients. That is why the regulation of the activity should be adjusted to promote activities suitable for abilities of the person, their needs and their particular circumstances. The activity should be managed in such a way as to motivate the person to continue participating, maintaining the improvement and adapting the task to the relapse (Turner, Foster y Johnson, 2003).

Another area to intervene on these patients is their social and ocupational adaptation as their impact is such that it is reflected in the negative affect experienced. Behavioral strategies, organization, time planning, delegation and enjoyment of pleasurable activities, are key to better adaptation. Furthermore, family support is also important so programs of family education about the disease should be carried out, promoting commitment, understanding and family collaboration with the patient. Finally, as has been shown throughout the present study, stress plays a fundamental role in FM and is seen as a possible etiological hypothesis, although it also the case that the very experience of FM, from the beginning of symptoms until treatment is also a clear stress factor. That is why there should be a complete and comprehensive assessment of the stress process and its influence on the symptoms of the disease (Salaffi et al., 2009). It would be highly appropriate to set up standardized programs of stress management which would have among their objectives the provision of information about and psychoeducation regarding the stress process and the teaching of techniques, strategies and tools to promote problem solving and coping strategies as well as the learning of relaxation and self-control techniques. The implementation of these techniques would help in the management of pain, increasing physical and social functioning and reducing the associated symptoms in Fibromyalgia.

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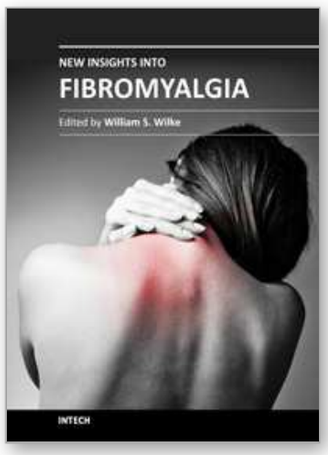

New Insights into Fibromyalgia
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Given the potential problems that can obscure any scientific enterprise, inconsistent results across studies are bound to occur. How are we to decide what is true? Let's turn to philosophy for a reasonable answer. The mathematician-philosopher Bertrand Russell approached a similar problem in his monograph The Problems of Philosophy (Russell B, 1912). He addressed the following question: How do we know that anything is "real"? Is the only reality subjective and simply in our minds, as Bishop Berkley challenged, or can we mostly believe the objective reality? His pragmatic answer: All possibilities may be true, but when the preponderance of evidence indicates that objective reality and knowledge are the most probable case, go with it. If the preponderance of all evidence about the clinical description of fibromyalgia and it's pathogenic mechanisms and treatment strategies indicate a highly probable interrelated hypothesis, go with it. The direction of the literature on the whole trumps the less likely tangents. At the same time, remember Bertrand Russell and his pragmatic answer, and keep an open mind.

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InTech Europe
University Campus STeP Ri
Slavka Krautzeka 83/A
51000 Rijeka, Croatia
Phone: +385 (51) 770 447
Fax: +385 (51) 686 166
www.intechopen.com

InTech China
Unit 405, Office Block, Hotel Equatorial Shanghai
No.65, Yan An Road (West), Shanghai, 200040, China
中国上海市延安西路65号上海国际贵都大饭店办公楼405单元
Phone: +86-21-62489820
Fax: +86-21-62489821

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