Personality and fibromyalgia: relationships with clinical, emotional, and functional variables

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Abstract

This study evaluates H.J. Eysenck´s three personality dimensions (neuroticism, extraversion, and psychoticism) in patients with fibromyalgia (FMS) compared with healthy controls (HC), and analyzes their association with clinical, emotional and functional variables and pain coping strategies. Ninety-two FMS patients and 65 HC completed the abbreviated EPQR, in addition to instruments measuring clinical pain, fatigue, sleep, anxiety, depression, health related quality of live (HRQL) and pain coping strategies. Results showed: (1) FMS patients exhibited greater levels of neuroticism and psychoticism but not extroversion, in comparison with HC; (2) group differences in all measured variables remained when the three personality dimensions were entered as covariates; (3) while in HC neuroticism was positively associated with pain, anxiety, depression, catastrophizing strategy scores, and lower HRQL, in FMS patients associations were sparse and lower in magnitude; (4) in FMS patients extroversion was associated with lower pain, anxiety, and depression, and higher mental HRQL; and (5) psychoticism was associated with lower anxiety in the FMS group and greater catastrophizing in HC. Data suggest that neuroticism only plays a minor role in clinical manifestations of FMS. However, extraversion appears to exert a protective influence in FMS, as it is associated with better health outcomes in several domains.

Keywords: Fibromyalgia; neuroticism; extroversion; psychoticism; clinical pain; quality of life; anxiety; depression.

1. Introduction

Fibromyalgia syndrome (FMS), a chronic disorder characterized by persistent and widespread musculoskeletal pain, affects 2 to 4% of the general population (Wolfe et al., 1990; Wolfe et al., 1995). FMS occurs predominately in females, affecting approximately 3.4% of women and 0.5% of men (Wolfe et al., 1990). In addition to pain, FMS is characterized by a heterogeneous range of symptoms such as fatigue, insomnia, morning stiffness, mild cognitive impairment, migraine and irritable bowel syndrome, among others (Wolfe et al., 2010; Yunus 2007). FMS is also associated with a high prevalence of anxiety and mood disorders (e.g. Fietta, Fietta y Manganelli, 2007; Reyes del Paso, Pulgar, Duschek & Garrido, 2012; Van Middendorp et al., 2008). The etiology and pathophysiology of FMS are currently unknown and there are no specific somatic signs of disease, which appears to involve abnormal central pain processing and inhibition of central anti-nociceptive inhibitory mechanisms (i.e. central pain sensitization), resulting in diffuse hyperalgesia and allodynia (Loggia et al., 2014).

Pain is a multidimensional phenomenon affected by attentional, emotional and cognitive factors, in addition to prior experience (McMahon, & Wall, 2006). Psychological factors (depression, anxiety, coping, self-efficacy, social support, etc.) can play a significant role in the development and maintenance of chronic pain, as well as in the severity of reported symptoms and complaints (McMahon & Wall, 2006; Martínez, Sanchez, Miró, Medina, & Lami, 2011). Affective measures are associated with clinical pain reports (Petzke, Gracely, Park, Ambrose & Clauw, 2003). Pain increases negative emotional states and psychological distress, which in turn may engender subsequent increases in pain (Loggia, Mogil & Bushnell, 2008; Martínez et al, 2011). Cognitive variables, such as catastrophizing, are relevant to the development and maintenance of this vicious circle of chronic pain (Keefe et al., 2004). For example, greater catastrophizing is associated with increased pain and pain-related disability in

FMS (Geisser & Roth, 1998; Geisser et al., 2003) as well with increased activation of brain areas associated with pain processing (Gracely et al., 2004). Lower self-esteem levels in FMS patients also appear to modulate the use of non-adaptive pain and stress copying strategies (Dysvik, Natvig, Eikeland & Lindstrom, 2005).

One variable that may modulate psychosocial factors affecting pain experience is personality. Through several mediating mechanisms (propensity of specific emotional states, sensitivity-reactivity, coping strategies, life style, interpersonal and social relationships, etc.), personality can significantly influence how pain is experienced and evaluated, how we react to and experience it, the adjustment process to a chronic illness, the use of medication and medical services, adherence and compliance with professional prescriptions, etc. (Affleck, Tennen, Urrows & Higgins, 1992; Asghari & Nicholas, 2006; Ramírez, Esteve & Lopez, 2001). FMS has been associated with extreme personality traits (Anderberg, Forsgren, Ekselius, Marteinsdottir & Hallman, 1999; Kendall, Elert, Ekselius & Gerdle, 2002; Pérez-Pareja, Sesé, González-Ordi & Palmer, 2010), with patients described as perfectionists (Ayats, Martín & Soler, 2006; Herken, Gursoy, Yetkin, Virit & Esgi, 2001), exhibiting emotional dependence (Cerón, Centelles, Abellana & García 2010), unrealistically high expectations of themselves and people around them (Gursoy, Erdal, Herken, Madenci & Alasehirli, 2001; Herken et al., 2001), tendencies towards somatization (Gursoy et al., 2001), introspection, pessimism regarding the future (Kendall et al., 2002), high levels of demanding behavior (Amir et al., 2000), exasperating (Asbring & Narvanen, 2003), harm avoidance (Glazer, Buskila, Cohen, Ebstein & Neumann, 2010), etc. Overall, it appears that the FMS-type personality is associated with greater psychological vulnerability (Hallberg & Carlsson, 1998; Hassett, Cone, Patella & Sigal, 2000).

One of the most well-known and empirically supported personality theories is that of H. J. Eysenck (Eysenck & Eysenck, 1985), which includes three broad dimensions of

personality, namely neuroticism (N), extraversion (E) and psychoticism (P), measured with the Eysenck Personality Questionnaire (EPQ). N (a stable tendency towards the experience of negative emotions, physiological hyperreactivity, greater physical and mental fatigability, higher distress in response to environmental stressors, etc.) represents a personality trait of great public health significance, because it is associated with numerous comorbid mental and physical disorders, in addition to increased use of mental and general health services, and impaired life quality and longevity among other outcomes (Lahey, 2009). Chronic pain patients who score high on N tend to experience more intensely and catastrophically their symptoms and negative emotions (Affleck et al, 1992; Montoya, Pauli, Batra & Wiedermann, 2005), and showed a reduced ability to tolerate discomfort (Costa, 1987; Harkins, Price & Braith, 1989). High levels of N may also be associated with pain catastrophizing and a more passive-oriented stress and pain coping strategies (Asghari & Nicholas, 2006; Martínez et al., 2011; Ramírez et al, 2001). In turn, passive coping strategies predict higher perceived pain intensity (Affleck et al, 1992; Bolger, 1990; Brown & Nicassio, 1987). High N is also associated with lower scores for health-related quality of life (HRQL) (McCain, 1996). Furthermore, N, along with E, is associated with autonomic nervous system responses to pain (Paine, Kishor, Worthen, Gregory, & Aziz, 2009).

High N has been widely implicated as a potential mechanism underlying chronic pain diseases, including FMS. High N scores in FMS patients, in comparison to healthy controls, have been reported previously (Asghari & Nicolas, 1999; Besteiro et al., 2008; Netter & Hennig, 1998; Malt, Olafsson, Lund & Urson, 2002; Ortet, Ibanez, Ilerena & Torrubia, 2002). However, the relationship between N and FMS symptoms is not clear. Some studies have found associations between N and pain anxiety and severity, depression, stress, anxiety, sleep disturbance, fatigue and confusion in FMS patients (Malin & Littlejohn, 2012a; Martínez et al., 2011), although other studies reported no such associations (e.g. Albertsen, Olafsson, Lund & Ursin, 2002; Zautra et al., 2005).

Regarding E (higher activity, dynamism, positive emotionality, interest in the outside world, sociability, etc.), chronic pain patients scoring highly on this dimension have higher pain thresholds and tolerance compared with introverts (Eysenck, 1967). Therefore, E might represent a protective factor against pain (Ballina, Martín, Iglesias, Hernández & Cueto, 1995; Ramírez & Valdivia, 2003) and may also affect selective attention towards it (Eysenck, 1967). Reduced levels of E have been reported in FMS patients (Ayats et al., 2006; Besteiro et al., 2008; Glazer et al., 2010; Kersh, Bradley & Alarcon, 2001; Malin & Little John, 2012b; Zautra et al. 2005). N and E are considered as the two most salient factors differentiating FMS and healthy control patient personality types (see Malin and Little John, 2012b for a review).

Finally, regarding P (tough mindedness, impulsivity, aggressiveness, egocentrism, irresponsibility, emotional detachment or low empathy, anti-sociability, impersonality, and creativity; Eysenck & Eysenck, 1985), to the best of our knowledge, no studies have specifically assessed this dimension in the context of FMS, although some reports suggests higher levels of P in FMS patients relative to healthy controls (e. g. Banic et al., 2004).

The study of personality traits in FMS may currently be of heightened relevance due to newly proposed criteria for FMS diagnosis, based on the use of two self-report scales measuring widespread pain (Widespread Pain Index Scale) and symptom severity (Symptom Severity Scale) (Wolfe et al., 2010). Self-reported scales can be affected by a negative affectivity component that may artificially inflate the reportage of somatic symptoms (Watson & Pennebaker, 1989), such that individuals with high negative affectivity or N usually report greater levels of somatic symptoms (Lahey, 2009; Watson & Pennebaker, 1989).

In this study we evaluate differences in H. J. Eysenck´s three personality dimensions between FMS patients and a healthy control group, and assess each dimension's association with (a) clinical (pain, fatigue, sleep), (b) emotional (anxiety and depression), (c) and functional (HRQL and impact of disease) variables, in addition to (d) pain-coping strategies. Finally, we also evaluate the association between personality, comorbid emotional disorders (depression and anxiety) and medication use. In accordance with the studies reviewed above we anticipate that: (1) FMS will exhibit higher levels of N and lower levels of E compared to healthy participants; (2) high N will be associated with more severe clinical symptoms, anxiety, and depression, a greater impact of illness on HRQL and the use of passive, non-adaptive coping strategies; and (3) high E will be associated with less clinical symptoms, lower anxiety and depression levels, higher scores on HRQL and a lower impact of illness, and the use of more active-adaptive coping strategies. We have no clear expectations regarding P, although given the observations of Banic et al. (2004), higher scores on this dimension may occur in FMS patients. Finally, the relative magnitude of associations between personality dimensions and measured outcomes in each group will be additionally compared. In analyzing the association between personality (especially N) and clinical outcomes in FMS, it is necessary to take into account the fact that the disability and clinical manifestations associated with a debilitating illness such as FMS may also negatively affect certain clinical outcomes, and probably surpass the modifying influence of personality characteristics. Given the relevance of the negative influence of the disability associated with FMS, we expected that associations (especially concerning N due to its expected negative influence) would be of lower magnitude in FMS patients than in healthy participants.

2. Method

2.1 Participants

Eighty-nine women and three men diagnosed with FMS, recruited via the Fibromyalgia Association of Jaén, participated in the study. All patients were examined by a rheumatologist and met the American College of Rheumatology criteria for FMS (Wolfe et al., 1990). Exclusionary criteria comprised cardiovascular diseases of any kind, metabolic abnormalities, inflammatory causes of pain, neurological disorders, and severe somatic (e.g., cancer) or psychiatric (e.g. psychotic or bipolar) diseases. The control group included 63 healthy women and 2 men, who were recruited via women's associations and family relatives. Controls were matched to patients according to age, body mass index and educational level. In addition to not having any kind of pain disorder, the control group was subject to the same exclusionary criteria as were the patients. Table 1 displays the demographic and clinical data of both groups.

Table 1. Demographic and clinical data (mean ± SD) and medications use (number of participants and percentage in brackets) in the FMS and control groups. Results of group comparisons were also reported (Student's *t*-test or χ^2).

Demographic and Clinical Data	**Fibromyalgia**	**Control group**	***t* or χ^2**	***p***
Age	51.55±8.12	49.92±8.61	1.46	.228
Body Mass Index	28.03±4.68	26.78±5.44	2.37	.126
Years of education	9.12±4.60	10.25±4.79	2.21	.139
Depression (%)	42 (47.2)	5 (7.9)	26.61	<.0001
Anxiety disorders (%)	37 (41.6)	9 (14.3)	13.02	<.0001
Antidepressant use (%)	49 (53.8)	2 (3.1)	44.41	<.0001
Anxiolytic use (%)	56 (61.5)	13 (20)	26.52	<.0001
Analgesic use (%)	66 (72.5)	6 (9.2)	61.13	<.0001
Opiate use (%)	36 (39.6)	0 (0)	33.43	<.0001

2.2 Psychological measures

In addition to a semi-structured interview assessing clinical history and demographic data, participants were evaluated with the Structured Clinical Interview for Axis I Disorders of the Diagnostic and Statistical Manual for Mental Disorders (SCID, First, Spitzer, Gibbon & Williams, 1999), in order to detect possible mental disorders. Self-reported questionnaires are delineated below.

-Spanish Adaptation of the Eysenck Personality Questionnaire Revised-Abbreviated (EPQR-A) Questionnaire. This scale was developed by Francis, Brown & Philipchalk (1992), and translated into Spanish by Valiente, Sandin, Chorot & Santed (1996). It consists of 24 items spread among four subscales (6 items each): N, E, P and social desirability (sincerity). Scores range between 0–6 on all subscales (answer format = YES/NO). Due to its relative brevity, this questionnaire is particularly suited for use in clinical settings and correlates adequately with its predecessor, the EPQ. Internal consistency (Cronbach's α) is 0.74 for N, 0.78 for E, 0.63 for P and 0.54 for the sincerity scale.

-State-Trait Anxiety Inventory (STAI). It consists of 40 items scored using Likert scales of four response alternatives (score range: 0-60, for both state and trait anxiety). The internal consistency of the Spanish version ranges between 0.90 and 0.93 for state anxiety and between 0.84 and 0.87 for trait anxiety (Spielberger, Gorsuch & Lushene, 1982).

-Beck Depression Inventory (BDI). Spanish adaptation by Sanz, Navarro & Vázquez (2003). The BDI consists of 21 items rated on 4-point Likert scales according to symptom severity (score range: 0-63). The internal consistency of the Spanish version ranges between 0.76-0.95.

-Fisk Fatigue Severity Score (FFSS). Developed by Krupp, LaRocca, Muir-Nash & Steinberg (1989) and adapted to Spanish samples by Bulbena, Berrios & Fernández de Larrinoa (2000). It consists of nine items, the summation of which provides an overall fatigue score (score range: 9-63). The internal consistency of the FFSS is 0.88.

-Short-From Health Survey *(SF-36)* (Ware & Sherbourne, 1992), Spanish adaptation by Alonso, Prieto & Anto (1995). The SF-36 is widely used to measure HRQL and consists of 36 items spread among eight domains of functioning (physical functioning, physical role, body pain, general health, vitality, social functioning, emotional role and mental health). Higher scores indicate higher well-being and less interference by the illness. The Cronbach's α values of the different scales range between 0.7 and 0.94. Using the above subscales, two general HRQL indices were obtained: a physical (score range: 25-99) and mental (score range: 10-46) component.

-Coping Strategies Questionnaire (Rosenstiel & Keefe, 1983), Spanish adaptation by Rodriguez, Cano & Blanco (2004). This is a 39-item, self-administered questionnaire that consists of eight scales that measure the frequency of use of both adaptive (auto-instructions, cognitive distraction, diversion of attention, reinterpreting pain sensations, ignoring pain sensations, and hope) and maladaptive pain coping strategies (catastrophizing and faith). Cronbach's *α* values range between 0.68 (ignoring pain) to 0.89 (catastrophizing). In order to simplify the presentation of results, only the scales in which significant results were observed will be reported: catastrophizing (score range: 0-36), cognitive distraction (score range: 0-36), and ignoring pain sensations (score range: 0-42).

-McGill Pain Questionnaire. Spanish adaptation by Lázaro, Bosch, Torrubia & Baños (1994). This instrument reliably measures sensory, affective and evaluative characteristics of pain. The following parameters were obtained: total pain index (TPI),

given by the sum of sensory, affective and evaluative pain descriptors (score range: 19-66); and the current pain intensity index (CPI), which represents an indicator of current pain intensity (score range: 0-5). Cronbach's α internal consistency values ranged between 0.56 (affective pain descriptor) and 0.74 (TPI).

-Fibromyalgia Impact Questionnaire (FIQ), Spanish adaptation by Esteve-Vives, Rivera, Salvat, de Gracia & Alegre (2007). The FIQ is a multidimensional, self-administered questionnaire that evaluates functional domains affected in FMS patients. It consists of 10 items (the first of which is further divided into several sub-items) with total scores ranging between 0-100; lower scores indicate greater functional capacity and quality of life. The internal consistency of the overall score is 0.82.

-Oviedo Quality of Sleep Questionnaire (OQSQ, Bobes et al., 2000). Completed during interview, the OQSQ possesses 15 items scored on a 5-point Likert scale (except for item 1, [subjective sleep satisfaction], which is rated according to a 7-point scale). The internal consistency of the questionnaire is 0.77. Sleep satisfaction (score range: 1-7), insomnia (score range: 9-45), and hypersomnia (score range: 3-15) indices were taken from the OQSQ.

2.3 Procedure

The study was conducted across two sessions. In the first session a clinical psychologist recorded patients' clinical histories, medication use, and socio-demographic data, and confirmed that there were no violations of the exclusionary criteria. The SCID, McGill Pain Questionnaire, BDI and OQSQ questionnaires were subsequently administered via individual interviews. During administration of the McGill Questionnaire to the control group, participants were asked to refer to possible sporadic pains, or the corporal area in which they usually felt some discomfort. In the

second session the remaining standardized self-report questionnaires (EPQR-A, CSQ, FFSS, STAI, SF-36, and FIQ -completed only by FMS patients) were administered during group sessions. All participants provided informed consent. The study protocol was approved by the Bioethics Committee of the University of Jaén. None of the participants were excluded on the basis of low sincerity values on the EPQR-A.

2.4 Statistical Analysis

The groups were compared on all measured variables by multivariate analysis of variance (MANOVA). In a second MANOVA model, the three personality dimensions were included as covariates. Comparisons within the FMS group, between patients taking or not taking each medication type, and patients suffering or not suffering from depression or anxiety disorders, were performed using ANOVAs. Adjusted squared theta (η^2) was used as effect size indicator. Analysis of the relationship between personality and the remaining variables was performed in the first instance using Pearson correlations, followed by multiple regression analysis. The three personality dimensions were entered simultaneously as predictors; clinical, emotional, functional, and coping features of FMS (in a separate analysis), were the dependent variables. Group differences in correlation coefficients were tested for significance using Fisher´s Z statistic. N was asymmetrically (negatively) distributed; in order to avoid possible ceiling effects in the associative analyses it was subjected to an x^2 transformation. To avoid spurious effect arising from large expected group differences in the measured variables, analyses were performed separately for each group. Significance was set at $p \leq .05$.

Results

3.1 *Group differences*

The results of MANOVA revealed a main effect of Group (F (23, 133) = 28.19, p < .0001, η^2 = .830). Table 2 displays means (± SD) and statistics for group comparisons of each variable. N and P scores were greater in FMS patients than in controls (with greater effect size for N than for P). No group difference was found in E. Regarding coping strategies, catastrophizing was greater in patients than in controls, while "ignoring pain sensations" scores were higher in controls. As expected, state-trait anxiety, fatigue, depression, insomnia, hypersomnia and pain scores were higher in FMS patients than in healthy controls. Finally, FMS patients exhibited lower levels of HRQL compared with healthy participants in the two SF-36 indexes. When N, E, and P were entered into the analysis as covariates, all of these group differences remained (at $p < .001$).

Table 2

Table 2. Means (± SD) of the measured variables as a function of group. The results of group comparisons are also displayed.

		Fibromyalgia	Healthy group	F	p	η^2
EPQR-A	N	4.72±1.33	2.65±1.71	72.96	<.001	.320
	E	3.52±1.66	3.82±1.40	1.49	.224	.010
	P	2.34±.99	1.94±1.18	5.26	.023	.033
McGill	TPI	52.92±23.98	16.11±12.30	129.03	<.001	.454
	CPI	3.44±.97	1.28±.97	187.24	<.001	.547
FFSS		51.26±12.15	25.21±12.99	165.51	<.001	.516
COS	S	2.69±1.44	4.37±1.45	51.51	<.001	.249
	I	30.51±7.54	17.02±7.23	126.25	<.001	.449
	H	8.67±4.82	4.27±1.87	49.03	<.001	.240
STAI	STAI-T	39.01±10.25	21.04±10.16	118.35	<.001	.433
	STAI-S	30.02±11.39	18.91±8.24	45.09	<.001	.225
BDI		22.37±10.56	6.94±6.29	110.92	<.001	.417
SF-36	MC	32.71±9.21	54.41±9.25	210.45	<.001	.576
	PC	35.96±8.18	63.41±7.47	460.42	<.001	.748
CSQ	CAT	17.89±5.20	7.41±4.38	175.45	<.001	.531
	CD	17.49±5.36	18.14±5.52	.54	.464	.003
	IPS	21.75±4.96	24.98±5.34	15.14	.000	.089

Note. Eysenck Personality Questionnaire Revised-Abbreviated (EPQR-A): N=Neuroticism, E=Extraversion, P=Psychoticism; *McGill Pain Questionnaire (McGill):* TPI= Total Pain Index, CPI= Current Pain intensity; *Fisk Fatigue Severity Score (FFSS):* Fatigue; *Oviedo Quality of Sleep Questionnaire (COS):* S=Satisfaction, I=Insomnia, H=Hypersomnia; *State-Trait Anxiety Inventory (STAI):* STAI-T= Trait, STAI-S= State; *Beck Depression Inventory (BDI):* Depression; *Short-From Health Survey (SF-36)*: MC= Mental Component, PC= Physical Component; *Coping Strategies Questionnaire (CSQ):* CAT=catastrophizing, CD=cognitive distraction, IPS=ignoring pain sensations.

3.2 *Associations between personality dimensions and clinical indicators.*

N was positively associated with TPI scores in the control group, but not in FMS patients (see Table 3); the difference between the two correlation coefficients was significant ($Z = -2.11$, $p < .05$). E was negatively associated with CPI scores in FMS patients but not in healthy participants, with significant differences between the two correlation coefficients ($Z = -2.86$, $p < .01$). The results of multiple regression analysis showed a significant effect of E on CPI in FMS patients (see Table 4). However the association between N and TPI in the control group remain marginal ($p = .065$) when tested simultaneously with the other personality dimensions in the regression analysis. No associations between personality and fatigue or sleep indices were found in any group.

3.3 *Associations between personality dimensions and anxiety-depression.*

N was positively associated with trait anxiety in both groups. Although this correlation was greater in healthy controls than in FMS patients, differences between the two correlation coefficients remained only marginally significant ($Z = -1.49$, $p = .065$). N was also positively associated with state anxiety, but only in the control group. E was negatively associated with trait anxiety in FMS patients; the association did not reach significance in the control group. The results of the regression analysis showed that N (positively) and E (negatively) were significant predictors of trait anxiety in both groups. P was negatively associated with trait anxiety in the FMS group. N positively predicted state anxiety but only in the control group.

N was positively associated with depression scores in both groups. Although the correlation was greater in control participants than in FMS patients, the difference between the two coefficients did not reach significance ($Z = -1.08$, $p > .1$). In the FMS

group only, E was negatively associated with depression scores. The results of the regression analysis showed that N (positively) and E (negatively) were significant predictors of depression scores in the FMS group, while in the control group only N negatively predicted depression levels.

Table 3. Correlations between personality dimensions and measured outcomes in fibromyalgia (FMS) patients and healthy participants.

Measured Outcomes		**Neuroticism**		**Extraversion**		**Psychoticism**	
		FMS	**Healthy**	**FMS**	**Healthy**	**FMS**	**Healthy**
McGill	TPI	-.062	.280*	-.144	.226	.061	.147
	CPI	-.153	.137	-.295**	.167	-.065	.069
FFSS		.130	.115	-.124	-.020	-.114	-.061
COS	S	.013	-.180	.103	-.081	.006	-.219
	I	.076	.232	-.010	-.062	.014	.226
	H	-.092	.124	-.040	.011	-.154	.196
STAI	STAI-T	.428**	.607**	-.350**	-.233	-.194	.111
	STAI-S	.084	.308*	-.156	-.127	.093	.214
BDI		.259*	.417**	-.268**	-.147	-.051	.192
SF-36	MC	-.208*	-.514**	.388**	-.137	.027	-.061
	PC	-.154	-.256*	.070	-.235	.014	.076
CSQ	CAT	.179	.396**	-.093	-.015	.032	.374**
	CD	-.248*	.041	.034	-.048	-.130	.185
	IPS	-.154	-.054	.081	-.038	-.020	-.021

Note. Identical abbreviations are used to those of Table 2. *p<.05, **p<.01

3.4 *Associations between personality, quality of life and impact of fibromyalgia.*

N was negatively associated with the mental HRQL component in both groups, but the relationship was stronger in the control vs. FMS group ($Z = 2.16$, $p < .05$). N also was negatively associated with the physical HRQL component, but only in the control group. E was positively associated with the mental HRQL component in the FMS group but not in healthy participants (see Table 3), with significant differences observed between the two correlation coefficients ($Z = 3.31$, $p < .01$). The results of the regression analysis (Table 4) showed that N negatively predicted, in the control group, both the physical and mental HRQL components. In the FMS group E positively predicted the mental HRQL component. No significant associations were found between personality and impact of fibromyalgia (FIQ).

3.5 *Associations between personality and pain coping strategies*

Correlation and regression analysis showed that both N and P were associated with greater use of the catastrophizing strategy, but only in the control group. The group difference between the two correlation coefficients for P was significant ($Z = -2.18$, $p < .05$). In FMS patients, N was associated with significantly less use of the “cognitive distraction” coping strategy compared with the healthy group ($Z = -1.78$, $p < .05$).

Table 4. Results of multiple regression analysis of the prediction of measured outcomes from personality dimensions in fibromyalgia (FMS) patients and healthy controls (HC). β = unstandardized beta.

	Dependent Variable	**Group**	***B***			r^2 adjusted
			N	***E***	***P***	
McGill	TPI	FMS	-.188	-.188	.100	.030
		HC	.235	.225	.112	.091*
	CPI	FMS	-.108	-.310**	-.012	.068*
		HC	.109	.168	.061	.000
FSS		FMS	.123	-.089	-.108	.007
		HC	.148	-.044	-.107	-.024
COS	S	FMS	.030	.110	-.012	-.022
		HC	-.118	-.099	-.200	.027
	I	FMS	.075	-.000	.010	-.028
		HC	.189	-.053	.167	.040
	H	FMS	-.088	-.032	-.144	-.002
		HC	.073	.029	.179	-.002
STAI	STAI-T	FMS	.399**	-.262**	-.182*	.274**
		HC	.655**	-.290**	-.107	.426**
	STAI-S	FMS	.051	-.166	.115	.008
		HC	.284*	-.131	.119	.087*
BDI		FMS	.226*	-.229*	-.031	.092**
		HC	.413**	-.167	.057	.169**
SF36	MC	FMS	-.151	.368**	-.019	.146**
		HC	-.528**	-.093	.072	.244**
	PC	FMS	-.148	.044	.017	-.007
		HC	-.277*	-.200	.126	.085*
FIQ		FMS	-.082	-.118	.110	-.029
		HC	-	-	-	-

CSQ	CAT	FMS	.166	-.073	.033	-.005
		HC	.317**	.001	.287*	.196**
	CD	FMS	-.238*	.015	-.118	.043
		HC	-.008	-.024	.184	-.013
	IPS	FMS	-.144	.062	-.020	-.006
		HC	-.048	-.037	-.013	-.045

Note. Identical abbreviations are used to those of Table 2. *p<.05, **p<.0

3.6 *Differences in personality as a function of medication use and emotional comorbidity in the FMS group.*

FMS patients taking antidepressants, relative to patients not taking this medication, exhibited lower scores on E (3.03 ± 1.81 vs. 4.07 ± 1.29; F (3, 88) = 9.77; p = .002; η^2 = .098). FMS patients taking anxiolytics, relative to those who were not, exhibited higher scores on N (4.97 ± 1.07 vs. 4.33 ± 1.59; F (3, 88) = 5.26; p = .024; η^2 = .055), and lower scores on E (3.22 ± 1.69 vs. 3.97 ± 1.54; F (3, 88) = 4.63; p = .034; η^2 = .049). Concerning opioids, FMS patients using this medication, relative to those who were not, exhibited lower scores on E (2.87 ± 1.86 vs. 3.93 ± 1.40; F (3, 88) = 9.60, p = .003; η^2 = .096). Finally, lower scores on E were observed in FMS patients with comorbid depression (3.11 ± 1.83 vs. 3.86 ± 1.44; F (3, 88) = 4.86; p = .030; η^2 = .051) as well as comorbid anxiety (2.96 ± 1.53 vs. 3.89 ± 1.66; F (3, 88) = 7.41; p = .008; η^2 = .076).

3. Discussion

As expected, FMS patients exhibited greater levels of N compared with healthy controls. This result corroborates previous reports (Asghari & Nicolas, 1999; Besteiro et a., 2008; Netter & Hennig, 1998; Malt et al., 2002; Ortet et al., 2002) and was expected in light of the high co-morbidity between FMS and affective and anxiety disorders (e.g. Fietta et al., 2007; Reyes del Paso et al., 2012; Van Middendorp et al., 2008; Wolfe et al., 1990). This high level of N is consistent with descriptions of FMS patients as individuals characterized by a highly negative emotional state, strong tendency towards excessive concern about future and past events, a high level of anticipatory anxiety and avoidance of both emotional and physical damage (Anderberg et al., 1999; Van Middendorp et al., 2008). FMS patients also exhibit higher levels of P compared with healthy controls, confirming the observation of Banic et al. (2004). Given the features included in the P trait, this difference may be difficult to understand at first glance. One

possible explanation concerns the suggested relationship between antisocial and somatization disorders, where it has been postulated that both disorders represent sex-differentiated manifestations of the same underlying predisposition (Lilienfeld, 1992). In support of this interpretation, H.J. Eysenck´s P trait includes antisocial characteristics (impulsivity, aggressiveness, egocentrism, irresponsibility, anti-sociability, etc.). Another explanation is that increased P may represent a secondary adaptation to adjustments made in response to the chronic disabilities that characterize FMS (see below). Contrary to our expectations, no group difference in E was found. This result does not supports previous studies that reported low E in FMS patients (Ayats et al., 2006; Besteiro et al., 2008; Glazer et al., 2010; Kersh, Bradley & Alarcon, 2001; Malin & Little John, 2012b; Zautra et al. 2005). However, it does accord with a recent study in which there were also no differences in E between FMS patients and healthy controls (Malin & Littlejohn, 2012a).

As expected, and in accordance with pre-existing knowledge (Malin & Littlejohn, 2012a; Wolfe et al., 2010), our FMS sample exhibited greater levels of anxiety, depression, fatigue, sleep problems, and clinical pain, in addition to lower levels of HRQL, and increased prevalence of both depression and anxiety disorders compared with our healthy participants. Regarding pain coping strategies, FMS patients scored more highly for “catastrophizing” and lower for “ignoring pain sensations” compared with healthy controls. Greater use of the “catastrophizing” strategy by FMS patients accords with studies showing greater use of poor coping strategies in response to stressors in FMS (Herken et al., 2001; Houdenhove & Luyten, 2006), and a higher degree of pain catastrophizing among FMS patients compared with patients suffering from other rheumatologic conditions (Börsbo, Gerdle & Peolsson, 2010; Hassett et al., 2000). Elevated pain catastrophization in FMS would lead to fear-avoidance behaviors that often result in physical inactivity (Hassett et al., 2000), which in turn frequently leads to further complications such as weakening of the musculoskeletal system, increased

pain, fatigue and functional disability (Kelley, Kelley, Hootman & Jones, 2010). The coping strategy of “ignoring pain sensations”, related to superior psychological functioning in the context of chronic pain (Jensen & Karoly, 1991), is used less by FMS patients. It should be noted that all of the above group differences remained when the three personality dimensions were entered into the analysis as covariates.

As expected, the associations found between N and the variables measured were in general of lesser magnitude in the FMS vs. healthy group. In FMS patients no relationship between N and clinical pain parameters was observed, contrary to several previous studies reporting, for example, that higher levels of N are associated with lower pain thresholds and greater pain sensitivity in FMS (Netter & Henning, 1998), and further that N predicts a substantial amount of the variance in FMS pain (Albertsen et al., 2002), etc. Eysenck (1994) also found that higher scores on N, in patients with chronic pain, were associated with more disability, somatization and pain intensity. However, our result accords with recent reports in which there were no associations between N and pain in FMS (Kersh et al., 2001; Malin & Littlejohn, 2012a; Wade et al., 1992). In healthy controls, however, N was associated with higher Total Pain Index values, thereby confirming the association between N and pain responses observed in the general population (Paine et al., 2009).

Moreover, N, in both FMS patients and healthy controls, was positively associated with trait anxiety. In healthy controls, N furthermore was associated with greater levels of state-anxiety. Also for both groups, higher scores on N were associated with higher depression levels. These associations have been repeatedly reported in the literature in patients with chronic pain disorders (e.g. Affleck et al., 1992; Kentle, 1989; Malin & Littlejohn, 2012a) and are compatible with the increased levels of negative affect that characterize both depression and anxiety (Clark & Watson, 1991). However, it is of relevance to specify that the influence of N, and in general the three personality

dimensions, on both anxiety and depression levels, is greater in healthy controls (in whom the three dimensions explained 42.6% of the variance in trait-anxiety and 16.9% in depression) than in FMS patients (27.4% and 9.2% of the variance in trait-anxiety and depression explained, respectively).

Concerning functional features, in the FMS group N negatively predicted the mental HRQL component, which accords with a previous study in which N was associated with lower satisfaction indices of HRQL in FMS (McCain, 1996). In healthy controls, N negatively predicted both the mental and physical HRQL components. Furthermore, the magnitude of the association between N and the mental HRQL component was greater in healthy controls than in FMS patients.

Higher N in FMS patients is associated with less use of the “cognitive distraction” coping strategy. This strategy is adaptive as it tends to confer reduced interference from pain, such that its disuse in FMS patients with higher N may lead to an impaired ability to adjust and adapt to the illness (Jensen, Turner & Romano, 1992). Contrary to our expectations, we detected no relationship between N and the use of non-effective strategies, such as “catastrophism”, in contrast to previous FMS studies (Affleck et al., 1992; Asghari & Nicolas, 2006; Jensen, Turner, Romano & Lawler, 1994; Martínez et al., 2011; Ramirez et al., 2001; Reid, McGrath & Gilbert, 1994). However, in healthy controls, N was associated with greater use of "catastrophizing", which accords with previous evidence of a relationship between high levels of N and the use of such maladaptive stress-coping strategies in general populations (Bolger, 1990; Gunthert, Cohen & Armeli, 1999).

The associations between N and total McGill score, SF-36 components and catastrophizing observed in healthy controls accord with the symptom perception hypothesis (Watson & Pennebaker, 1989). Individuals with high negative affectivity (i.e.

neuroticism) attend more to physical symptoms, complain more about, magnify, exaggerate and overreact to them, are more hypervigilant (i.e. scan the world for signs of trouble), ruminative and introspective (internally focused), exhibit higher somatic sensitivity, and are biased towards interpreting somatic symptoms as negative or threatening, etc. (Watson & Pennebaker, 1989). In principle, all of these dispositional features may be increased in our FMS patients, given that they exhibit higher N values. However, according to our analyses, the associations between N and health outcomes were few in the FMS group, and markedly scarcer than in the healthy controls. This group difference in the magnitude of associations was expected from the point of view that the interfering effect of disability from a debilitating illness such as FMS, and its clinical manifestations, would be more relevant than the negative effects of N.

Regarding E, our expectations were only confirmed in part. In the FMS group, E was associated with lower present pain intensity. This result is consistent with Eysenck (1967), where patients with chronic pain and high scores on E exhibited a higher pain tolerance than did introverted patients. The protective role of E on pain accords with its assumed biological basis, as lower activity in the ascending reticular activating system would lead to lower cortical representation of afferent stimuli (Eysenck, 1967).

In both FMS patients and healthy controls, E was negatively associated with trait anxiety. Specifically in the FMS group, extroversion was also negatively associated with depression levels. These associations were expected in light of affective-based models of emotional disorders, and the positive affect component included in the E trait (Clark & Watson, 1991; Watson & Penebaker, 1989). E was positively associated with the mental HRQL component in FMS patients. The higher scores on E in FMS patients were associated with fewer functional problems in daily life pertaining to social, emotional, energy-vitality and mental domains.

These results suggest a protective role of E in present pain perception, anxiety, depression, functional disabilities induced by the disorder, and certain pain coping strategies, but only in the FMS group. This protective effect may be related to several features associated with the E trait, including greater levels of positive affect, optimism, social support and interpersonal relationships, lower tendency towards internal focus, etc. (Eysenck, 1967; Clark & Watson, 1991). The negative association between E and depression in our FMS sample accords with the affective basis of depression (i.e. lower positive affectivity, Clark & Watson, 1991).

The relevance and protective role of E in FMS was also apparent when differences in personality were analyzed as a function of comorbid emotional disorders and medication use. FMS patients suffering from depression or anxiety disorders exhibited lower E levels. Similarly, FMS patients taking antidepressants, anxiolytics, and opiates also displayed lower E levels. The greater N levels observed in patients taking anxiolytics accords with the presence of an anxiety component in N.

Regarding P, in the regression analysis a negative association with trait anxiety in the FMS group was observed. Greater P in FMS patients might decrease trait anxiety through components such as tough-mindedness, egocentrism, emotional detachment, impersonality or low empathy (Eysenck & Eysenck, 1985). Furthermore, a moderate level of P appears to be associated with greater objectivity, realism and hardiness in daily life, including situation involving pain (Carrillo, Collado & Rojo, 2005). However, in the control group a higher P was associated with greater use of the catastrophism strategy. This result appears with the above interpretation and suggests differential roles of the P trait in both groups.

Fatigue and sleep complaints were unrelated to personality, in contrast to the study of Malin and Littlejohn (2012a) in which there was a positive association between N and

fatigue. Sleep disturbances appear to be related to the presence of somatic symptoms, but not to personality (Kolar, Hartz, Roumm, Ryan & Jones, 1989). The impact of the disease on daily life, as measured by the FIQ, was unrelated to personality in our study. This accords with a study by Zautra, Hamilton & Burke (1999), in which N did not affect FIQ scores in an FMS sample, but is contrary to a more-recent study in which extroversion predicted fibromyalgia´s impact on everyday life (Starowicz-Filip, Borcz & Prochwicz, 2014). In our study personality was associated with functional disability measured by the SF-36 but not the FQI. These results are particularly striking because the FQI is an instrument specifically adapted for use with FMS patients, whereas the SF-36 is more general in scope.

One important question concerns the origin of the personality differences observed. Are they present before the disease onsets, perhaps even conferring heightened vulnerability, or are they secondary to, or concomitant with, the development of FMS? The cross-sectional nature of our study does not allow us to address this question directly, such that possible interpretations are necessarily speculative. A chronic pain disorder characterized by the types of disabilities associated with FMS may be considered as a relevant negative stressful life event. During the adjustment to chronic suffering and disability personality may change towards greater expression of negative affect and N levels. Therefore, coping strategies are essential for managing adaptation and reducing discomfort, distress and helplessness (Goldenberg, Mossey & Schmid, 1995). In this context, one means of coping with chronic circumstances may be by developing more “tough-mindedness”, egocentrism, emotional detachment or impersonality (i.e. P), such that negative circumstances confer less burden. The negative association we found between P and trait anxiety in our FMS participants accords with this interpretation. These two explanations are not incompatible because certain previous personality predispositions may be present that develop further as a consequence of disease. Furthermore, the direction of associations between

personality and FMS manifestations can be bidirectional and interactive, such that the personality can modulate FMS symptoms, and these symptoms can in turn influence personality, all the while interacting with other relevant factors (Charles, Gatz, Kato & Pedersen, 2008; Herken et al., 2001).

One limitation of our study concerns the instrument used to measure personality, i.e. a short version (only 6 items per dimension) of the original Eysenck questionnaire. However, this abbreviated version exhibits good concurrent validity with the EPQ in addition to appropriate psychometric indices (Francis et al., 1992; Valiente et al., 1996). A strength of our study concerns the sample size, which is larger than that of many other studies in this area, in which samples comprising fewer than 40 participants per group are typical (see Malin & Littlejohn, 2012b for a review).

In conclusion, FMS patients displayed greater N and P levels, but not E scores, compared to healthy controls. It is possible that the high N that characterized the FMS group might serve to artificially inflate self-reported clinical and functional disabilities. However, in the FMS group N was weakly associated with health outcomes and the magnitudes of certain such associations were lower than they were in the control group. Furthermore, when the three personality dimensions were entered into the analysis as covariates, all previously observed group differences remained, and at similar magnitudes. Therefore, we conclude that N only plays a minor role in the clinical manifestations of FMS. These results are contrary to the widely held belief that FMS is a disorder rooted in, and dependent on, its accompanying affective-emotional alterations. N, which represents the common underlying trait of anxiety and depression (Clark & Watson, 1991), plays an even less important role in FMS patients than it does in healthy controls with respect to associations with the dependent variables measured herein. In contrast, E appears to play a protective role specifically in FMS patients, in whom it was associated with superior health outcomes across several domains.

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