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Fibromyalgia and chronic pain: Are there discriminating patterns by using the Minnesota Multiphasic Personality Inventory-2 (MMPI-2)?

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ABSTRACT. The aim of this *ex post fact* study was to explore how the wide variety of somatic and psychopathological symptoms presented by fibromyalgia patients can be reflected in the Minnesota Multiphasic Personality Inventory-2 (MMPI-2) questionnaire. In addition, it was intended to discriminate patterns of responding between fibromyalgia patients, chronic pain patients (nonfibromyalgia-based) and healthy controls. Three subsamples were considered using an *ex post facto* design: fibromyalgia patients (*n* = 36), chronic pain patients (*n* = 44) and healthy controls (*n* = 34). The Spanish adaptation of the MMPI-2 was individually administered to all participants. Differential analyses indicated that a) fibromyalgia group scored higher in all MMPI-2 validity and clinical scales, as compared to chronic pain and control groups; b) the fibromyalgia group MMPI-2 clinical profile is mainly oriented to the expression of a wide variety of somatic complaints, health problems, and physical malfunctioning; c) fibromyalgia group presented a pattern of overreporting responding which leads to hypothesize that some patients may reflect state of hypersensitivity and anxiety sensitivity, and others may reflect a pattern of seeking for psychological rewarding, maintaining a chronic sick role and chronic pain behaviours. Results indicate that MMPI-2 is a very useful psychometric tool to characterize a specific pattern of responding of fibromyalgia patients, and it is strongly recommended for bringing light to its clinical assessment.

KEYWORDS. Fibromyalgia. Chronic pain. MMPI-2. Clinical and health psychology. *Ex post* facto study.

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RESUMEN. El objetivo del estudio *ex post fact* es explorar la amplia variedad de síntomas somáticos y psicopatológicos de pacientes con fibromialgia mediante el Inventario Multifásico de Personalidad de Minnesota – 2 (MMPI-2), así como establecer patrones diferenciales de respuesta entre pacientes con fibromialgia, con dolor crónico no fibromiálgico y sujetos controles sanos. Se han considerado tres submuestras, utilizando un diseño *ex post facto*: pacientes con fibromialgia (*n* = 36), pacientes con dolor crónico (*n* = 44) y controles sanos (*n* = 34). La adaptación española del MMPI-2 fue administrada individualmente a todas las personas participantes. Los análisis diferenciales indicaron que a) el grupo de fibromialgia puntuó más alto en todas las escalas de validez y clínicas del MMPI-2, en comparación con los otros dos grupos; b) el perfil clínico MMPI-2 del grupo de fibromialgia se caracteriza por la expresión de una amplia variedad de quejas somáticas, problemas de salud y disfunciones físicas; c) el grupo de fibromialgia presentó un patrón de respuestas sobredimensionadas que lleva a hipotetizar que algunos pacientes pueden presentar estados de hipersensibilidad y sensibilidad ante la ansiedad, y que otros reflejen un patrón de búsqueda de recompensas psicológicas, manteniendo un rol de enfermedad crónica y de comportamientos de dolor crónico. Los resultados indican que el MMPI-2 es una herramienta psicométrica útil para caracterizar un patrón de respuesta específico de pacientes con fibromialgia, y se recomienda especialmente para aportar luz en su evaluación clínica.

PALABRAS CLAVE. Fibromialgia. Dolor crónico. MMPI-2. Psicología clínica y de la salud. Estudio *ex post facto*.

Fibromyalgia is a clinical state of widespread musculoskeletal pain for more than 3 months and the presence of more than ten out of 18 tender points with of unknown or uncertain aetiology (Wolfe *et al.,* 1990). Primarily symptoms of fibromyalgia are fatigue, morning stiffness, dizziness numbness, generalized hyperalgesia and/or allodynia (Katz, Greene, Ali, and Faridi, 2007). Fibromyalgia patients manifest hypersensitivity to heat, cold, electric, ischemic, pressure or noise stimulation (Yunus, 2007); poor sleep quality including sleep latency, sleep disturbances and daytime dysfunction, dysfunctional beliefs and attitudes about sleep, and high levels of perceived stress (Osorio, Gallinaro, Lorenzi-Filho, and Lage, 2006; Theadom and Cropley, 2008; Theadom, Cropley, and Humphrey, 2007); dysfunctional beliefs about health and quality of life (Besteiro *et al.,* 2008), tension headache, dysmenorrhea, and irritable bowel syndrome are common comorbid diseases presented by fibromialgia patients; finally, they also present high levels of negative emotionality, especially anxiety and depression (Pérez-Pareja *et al.,* 2004).

According to McBeth and Jones (2007), the prevalence of musculoskeletal pain is high and appears to be increasing both in adolescents and in adults. Indeed, fibromyalgia prevalence in the community increases from 2% at the age of 20 to 8% at the age of 70 (Wolfe, Ross, Anderson, Russell, and Hebert, 1995), with peak onset of disease between 45 and 60 years of age (Balasubramaniam, Laudenbach, and Stopler, 2007). Fibromyalgia affects largely to women, being the ratio women/men of 9:1 in the general population (Staud, 2007).

Comorbid anxiety and affective disorders are also well documented (Asmundson, Abrams, and Collimore, 2008; Raphael, Janal, Nayak, Schwartz, and Gallagher, 2006). Lifetime prevalence of mayor depression for fibromyalgia ranged from 50% and 70%, and current depression oscillates from 18% to 36% (Wolfe *et al.,* 1990). Lifetime prevalence of panic disorder is around 17%, and current prevalence reaches the 9% (Epstein, Kay, and Clauw, 1999). Finally, the presence of high rates of negative life evens (traumatic) during childhood and adolescence play an important role in the development of fibromyalgia (Anderberg, Marteinsdottir, Theorell, and von Knorring, 2000), and posttraumatic stress disorder appears to be highly associated with fibromyalgia (Amital *et al.,* 2006).

The aim of this study is to explore how the wide variety of somatic and psychopathological symptoms presented by fibromyalgia patients can be reflected in the MMPI-2 questionnaire. In addition, it is intended to discriminate patterns of responding between fibromyalgia patients, chronic pain patients (nonfibromyalgia-based) and healthy controls. This study was developed following the review process guidelines of the International Journal of Clinical and Health Psychology (Ramos-Álvarez, Moreno-Fernández, Valdés-Conroy, and Catena, 2008).

Method

Participants

For the purpose of this research, using an *ex post facto* design (Montero and León, 2007), three groups/categories were considered: fibromyalgia, chronic pain (non-fibromyalgia based) and healthy control. The participants of either the fibromyalgia group or the non-fibromyalgic chronic pain group (a group of patients with chronic pain due to objectified noninflammatory locomotion apparatus pathology) received the diagnosis by their corresponding physicians of the Mallorca Primary Health Care Centers (PHCC). Once this first diagnosis was made, two physicians from the Incapacities Assessment Evaluating Medical Unit (IAEMU) of the National Institute of Social Security (NISS) of the Balearic Islands used a double blind procedure to carry out a new evaluation. It was based on the criteria given in the international rheumatology protocols. Using the same protocol, this diagnosis was confirmed or not confirmed by an external rheumatologist. Classification of fibromyalgia was carried out according to the criteria established by the American College of Rheumatology (Wolfe *et al.,* 1990).

A final sample of patients with fibromyalgia was obtained after all those individuals with previous diagnoses of mental disease and patients involved in litigation or seeking disability compensation were eliminated. It consisted of 36 subjects, women (86.10 %) and 5 men (13.90 %), with a mean age of 49.30 (95 % *CI*: 46.53-52.07) (see Table 1).

Once this sample was obtained, the subjects of the non-fibromyalgic chronic pain group and control group were selected according to a matching procedure. This was based on the sociodemographic characteristics of each one of the group components.

The non-fibromyalgic chronic pain group was made up of a total of 44 subjects, 38 women (86.40 %) and 6 men (13.60 %), with a mean age of 45.81 (95 % *CI:* 42.97-52.43) (see Table 1).

Finally, the control group consisted of healthy persons with a total of 34 subjects, 31 women (91.20 %) and 3 men (8.80 %), mean age of 48.38 (95 % *CI*: 44.33-52.43) (see Table 1). They were randomly chosen among those who came to the Primary Health Care (PHC) Services of Santa Ponsa (Calviá) due to mild health problems (cold, pharyngitis, etc.), who fulfilled the matching criteria with the fibromyalgic pain group.

TABLE 1. Sample distribution by diagnosis groups and sex.

		n (%)		
		Females	*Males*	*Total*
Groups	Control (No pain)	31 (91.20)	3 (8.80)	34
	Chronic pain	38 (86.40)	6 (13.60)	44
	Fibromyalgia	31 (86.10)	5 (13.60)	36
	Total	100 (87.70)	14 (12.30)	114

It is important to remark that there were no statistically significant differences among the three groups regarding to age, which was normally distributed, a fact verified after applying the corresponding normality tests.

Once the medical examination was performed, pain perception was assessed. It is possible to state that this assessment, performed in the Psychology Department of the Balearic Islands University (BIU) and in the PHCC of Santa Ponsa, was made for all the subjects belonging to each one of the three groups mentioned by evaluators who, at the time of the evaluation, were blind to the diagnosis and thus to which group the person evaluated belonged.

Instrument and procedure

The current edition of the Minnesota Multiphasic Personality Inventory: the MMPI-2 (Butcher, Dahlstrom, Graham, Tellegen, and Kaemmer, 1989) is one of the most commonly used personality test for patients with chronic pain (Deardorf, 2001; Porter-Moffitt *et al.,* 2006).

The Spanish adaptation of the Minnesota Multiphasic Personality Inventory 2, MMPI-2 (Ávila and Jiménez, 1999) was individually administered to all participants as a part of a wider battery of psychological instruments. This paper specifically deals with MMPI-2 scores. The Spanish adaptation of the MMPI-2 provides up to 78 scores of different scales and subscales, including seven validity scales, ten standard clinical scales, fifteen content scales, 15 supplementary scales, the 28 «Harris & Lingoes» and the 3 «Si» subscales. In this paper, scores differences on the MMPI-2 validity and standard clinical scales, and Harris-Lingoes subscales will be addressed only.

Results

The means of the three groups established in relationship to the clinical subscales of the MMPI-2 were compared with the application of the unifactorial variance analysis. To do so, the hypothesis of homogeneity of variances has been verified by the Levene

test, and then the size of effect (measured by partial eta squared statistic), and observed power for the F-test between the means were estimated. Given that the data comply with the hypothesis of homogeneity of the variances (homoscedasticity), *a posteriori* contrasts (Bonferroni in case of homoscedasticity and T2 Dunnett for heterocedasticity) were used to make the comparison between the groups. The statistical analyses were performed with the SPSS 15.0 computer package program.

*MMPI-2 validity scale*s

Table 2 shows mean, standard deviation, and 95% confidence intervals for the three groups regarding validity scales. Among the MMPI-2 validity scales considered in this study, only the Infrequent scales (F and Fb), and the Infrequent-Psychopathology scale - F(p) - present significant statistical differences between groups.

TABLE 2. MMPI-2 Validity scales. Descriptive raw scores (mean, *SD*) by groups and *F*-Test, significance (*p*), observed power and effect size (partial eta squared).

| Validity scales	Control	Chronic pain	Fibromyalgia	F-Test	p	Observed power	Partial eta squared
	Mean (SD)	Mean (SD)	Mean (SD)				
L	6.97 (2.11)	6.84 (2.18)	7.04 (3.07)	.06	.941	.06	.00
F*	6.94 (3.06)	9.54 (6.65)	21.66 (15.19)	22.75	<.0001	1	.31
Fb*	4.08 (2.83)	6.09 (5.10)	15.77 (10.58)	27.47	<.0001	1	.35
F(p)*	2.15 (1.28)	3.16 (2.32)	8.37 (8.77)	14.72	<.0001	1	.22
K	15.03(4.12)	13.14 (.58)	13.29 (4.19)	2.32	.104	.46	.04

* *p* < .05, Degrees of freedom: 2; 105
Note. L = *Lie;* F = *Infrequency,* Fb = *Back F*, F(p) = *Infrequency-Psychopathology*, K = *Correction.*

F and Fb scales are composed of items that were endorsed less than 10% of the time by normative sample (Greene, 1997). Elevations on infrequent scales can represent either an inconsistent pattern of item endorsement (Clark, Gironda, and Young, 2003; Sewell and Rogers, 1994), the person´s acknowledgment of the presence of severe psychopathology or excessive symptom claiming (Butcher, 2005; Graham, 1993), or an overresponding (unfavourable self-description) pattern or malingering of psychopathology pattern of response (Baer, Rinaldo, and Berry, 2003; González-Ordi and Iruarrizaga-Díez, 2005; Strong, Greene, and Schinka, 2000). The fibromyalgia group presents the highest mean scores both in F (21.66, 95% Confidence Interval - *CI* =18.24-25.08), and Fb (15.77, 95% *CI* = 13.30-18.25) scales. F-scale mean differences (Dm) are statistical significant both with chronic pain group (Dm = 12.12, *p* < .0001) and control group (Dm = 14.72, *p* < .0001). No statistical differences were found between chronic pain and control groups. Similarly, Fb-scale mean differences are statistical significant both with chronic pain group (Dm = 9.68, *p* < .0001) and control group (Dm = 11.68, *p* < .0001), and there were no statistical differences between chronic pain and control groups, as well.

The Infrequent-Psychopathology scale, F(p), was designed by Arbisi and Ben-Porath (1995) for the MMPI-2 as an additional validity measure to understand elevations

on the F-scale. Arbisi and Ben-Porath (1995) suggested that high scores on F and F(p) may lead to consider overreporting psychopathology. In fact, research show that F(p) is more effective than F-scale alone in distinguishing groups with genuine psychopathology (likely honest subjects) than malingering (likely faking-bad subjects) (Arbisi and Ben-Porath, 1998; Bury and Bagby, 2002; Rogers, Sewell, Martin, and Vitacco, 2003; Rothke *et al.,* 2000; Storm and Graham, 2000; Strong *et al.,* 2000). Since F(p) scale is not included in the Spanish adaptation of the MMPI-2 (Butcher *et al.,* 1989), there are no Spanish normative data available for this scale up to now. This leads us to consider raw scores only and explains why it is not plotted into T-scores in Figure 1. The fibromyalgia group scored highest in F(p) scale, being the differences statistical significant both with chronic group (Δm = 5.21, *p* < .0001) and control group (Δm = 6.22, *p* < .0001). No significant differences were found between chronic group and control group (Δm = 1.01, *p* = 1).

FIGURE 1. Validity and standard clinical scales plotted into T-scores by using Spanish normative data (Ávila and Jiménez, 1999) (significant differences in grey).
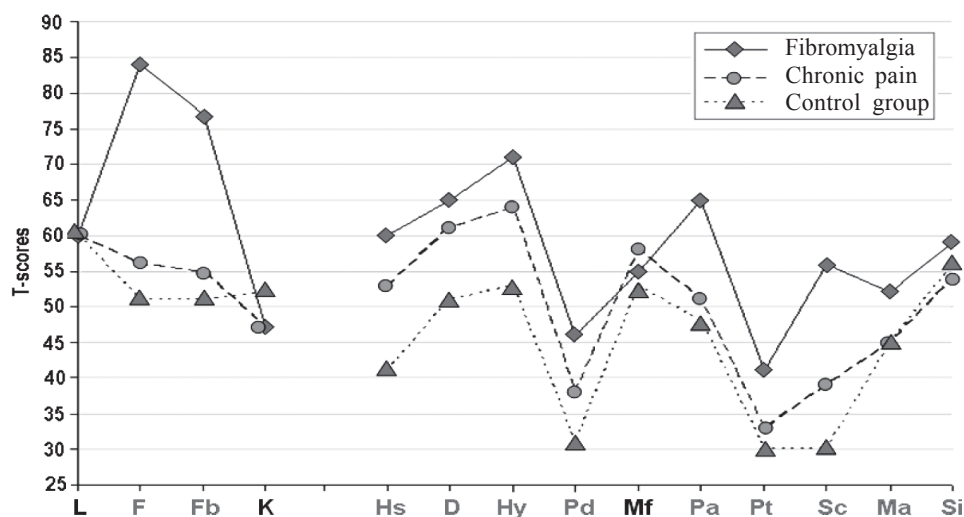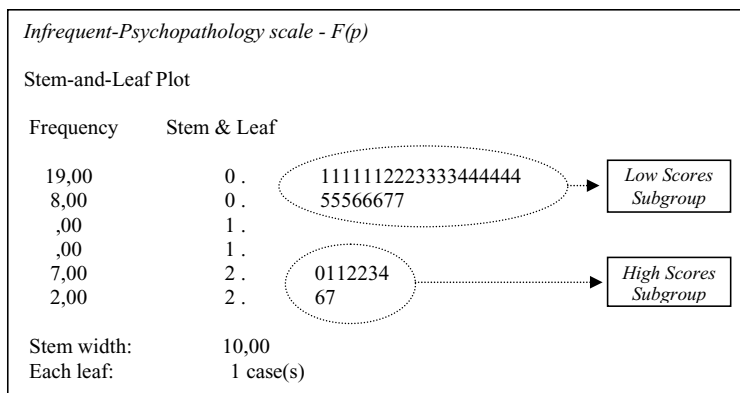

Note. L = *Lie,* F = *Infrequency,* Fb = *Back F,* F(p) = *Infrequency-Psychopathology,* K = *Correction,* Hs = *Hypochondriasis,* D = *Depression,* Hy = *Hysteria,* Pd = *Psychopathic Deviate,* Mf = *Masculinity/ Feminity,* Pa = *Paranoia,* Pt = *Psychasthenia,* Sc = *Schizophrenia,* Ma = *Hypomania,* Si = *Social Introversion.*

There is another remarkable aspect regarding the extent of the *SD* value for the fibromyalgia group (*M* = 8.37, *SD* = 8.77). A more precise analysis of the distribution of the raw scores of the fibromyalgia participants along this scale shows that there is a bimodal distribution profile. A low range scores (1-7 points), including up to 27 participants, and a high range scores (20-27 points), including the rest of the nine subjects (see figure 2). The fact that the fibromyalgia group shows the highest scores on F, Fb, and F(p),

and the bimodal patterning found on F(p) for this group will be discussed in detail below.

FIGURE 2. Stem and leaf plot for Infrequent-Psychopathology scale
- F(p) - by the fibromyalgia group.

Infrequent-Psychopathology scale - F(p)

Stem-and-Leaf Plot

Frequency	Stem & Leaf		
19,00	0 .	11111122223333444444	Low Scores Subgroup
8,00	0 .	55566677	
,00	1 .		
,00	1 .		
7,00	2 .	0112234	High Scores Subgroup
2,00	2 .	67	

Stem width: 10,00
Each leaf: 1 case(s)

MMPI-2 standard clinical scales

Table 3 shows mean, standard deviation, and 95% confidence intervals for the three groups regarding the 10 standard clinical scales. Except for the scale 5 (*Masculinity-Femininity*), significant statistical differences were found in all scales. Main core contents explanations for every MMPI-2 standard clinical scales are taken from Nichols (2001) or Graham (2005) or both interpretative guidelines.

Scale 1, *Hypochondriasis* (Hs), is referred to a series of self-reported head and somatic complaints, poor general health or physical competence, weakness, tiredness and easy fatigability. The most significant mean differences are regarding normal individual versus pain-based patients. In this sense, significant statistical mean differences were found between the control group and the fibromyalgia group (Δm =8.56, $p < .0001$) and, in a lesser extent, between the control group and the chronic pain group (Δm =5.17, $p < .001$). No statistical differences were found between pain-related groups, fibromyalgia and chronic pain, (Δm = 3.39, $p < .113$).

Scale 2, *Depression* (D) contents are deal with unhappiness, discomfort and dissatisfaction with the individual life situation, worry, apathy and lethargy, lack of interests, and low self-esteem. Similarly to scale 1, statistical differences were found regarding controls versus pain groups. Indeed, significant statistical mean differences were found between the control group and the fibromyalgia group (Δm = 6.66, $p < .001$) and, in a lesser extent, between the control group and the chronic pain group (Δm = 4.16, $p < .001$). No statistical differences were found between the clinical groups, fibromyalgia and chronic pain, (Δm = 2.49, $p < .261$).

Scale 3, *Hysteria* (Hy), is regarded to self-reported somatic complaints, denial of psychological or emotional problems and of discomfort in social situations. In a similar

way than scales 1 and 2, statistical differences are regarding to controls versus patients groups but no between pain-related groups. Specifically, significant statistical mean differences were found between the control group and the fibromyalgia group (Δm = 8.08, p < .001) and, in a lesser extent, between the control group and the chronic pain group (Δm = 4.75, p < .003). No statistical differences were found between the clinical groups, fibromyalgia and chronic pain, (Δm = 3.33, p < .165).

As can be seen, the first three scales (Hs, D, and Hy) present a similar comparison pattern among the groups, especially regarding differences found between normal individuals versus pain-based diseases patients and not found between the latter (chronic pain and fibromyalgia). Scales 1, 2, and 3, the neurotic triad, are usually elevated (significant) in patients with chronic pain, who underwent too many surgeries, many hospitalizations and longest period of disability (Costello, Hulsley, Schoenfeld, and Ramamurthy, 1987; Deardof, 2001; Nichols, 2001; Porter-Moffitt *et al.,* 2006). In addition, elevations in scales 1 and 3 (13/31 code-type) are usually indicative of tension, emotional constraint, and general «somatic distress» typically found in cases of chronic pain (Arbisi and Butcher, 2004; Vendrig, 2000).

Scale 4, *Psychopathic Deviate* (Pd) core contents are referred to alienation, social disinhibition, and the tendency to come into conflict with family, authorities, and others through rebellion, exploitation, misconduct, poorly developed conscience, and the lack of internalized moral standards. The fibromyalgia group scored highest in this scale, being the differences statistical significant both with the chronic pain group (Δm = 3.98, p < .01) and the control group (Δm = 6.59, p < .0001). No differences were found between the chronic pain and the control groups (Δm = 2.61, p < .06).

Scale 6, *Paranoia* (Pa), measures personal and moral rigidity, interpersonal sensitivity, resentment, and ideas of being misunderstood, mistreated, persecuted, or controlled by others, and the tendency to construe the actions, intentions, and motives of others as unfair, degrading, or hostile. Similarly to scale 4, the fibromyalgia group scored significantly higher than the chronic pain group (Δm = 4.84, p < .0001) and the control group (Δm = 5.97, p < .0001), and there were no differences between the latter groups (Δm =1.13, p < .605).

Scale 7, *Psychasthenia* (Pt) reflects the tendency to express stresses through tension, anxiety, worry, obsessions, rumination, compulsions, and fears of losing control. The fibromyalgia group scored significantly higher than the chronic pain group (Dm = 5.28, p < .04) and the control group (Δm = 10.51, p < .0001). The chronic pain group also scored significantly higher than the control group (Δm = 5.23, p < .01).

Scale 8, *Schizophrenia* (Sc), measures severe alienation, apathy, cognitive disruption, inertia, feelings of unreality, alien impulses, and motor and sensory impairment. The fibromyalgia group scored significantly higher than the chronic pain group (Δm = 13.23, p < .0001) and the control group (Δm = 20.11, p < .0001). The chronic group also scored higher than the control group (Δm = 6.87, p < .01).

Scale 9, *Hypomania* (Ma), measures hyperarousal, hyperactivity, stimulation-seeking, and states of euphoria. The fibromyalgia group only scored significantly higher than the

control group (Dm = 3.42, $p <$ .04). There were no statistical differences between the fibromyalgia and the chronic pain group (Dm = 2.73, $p <$ .08), and the chronic pain and the control group (Dm = .68, $p <$ .887).

Scale 0, *Social Introversion* (Si), reflects introversion, social withdrawal, shyness, social anxiety and avoidance. The fibromyalgia group scored significantly higher than the chronic pain group (Dm = 4.49, $p <$ .04). No differences were found between the fibromyalgia and the control group (Dm = 3.32, $p <$ .186), and the chronic pain and the control group (Dm = 1.17, $p <$ .878).

TABLE 3. MMPI-2 standard clinical scales. Descriptive raw scores (Mean, *SD*)
by groups and F-Test, significance (*p*), Observed power and effect size
(partial eta squared).

Standar clinical scales	Control	Chronic pain	Fibromyalgia	F-Test	p	Observed power	Partial eta squared
	Mean (SD)	Mean (SD)	Mean (SD)				
1. Hs*	11.65 (6.14)	16.81 (5.90)	20.21 (8.32)	13.16	<.0001	1	.20
2. D*	25.55 (3.79)	29.73 (6.09)	32.22 (7.58)	10.12	<.0001	.98	.17
3. Hy*	25.41 (5.28)	30.16 (6.76)	33.50 (9.01)	10.31	<.0001	.99	.17
4. Pd*	15.79 (4.07)	18.41 (5.70)	22.39 (6.60)	11	<.0001	.99	.18
5. Mf-Females	31.50 (4.58)	29.75 (3.86)	30.11 (4.93)	1.61	.205	.33	.03
5. Mf-Males	29.35 (4.40)	28.20 (4.00)	29.21 (4.25)	0.87	.420	.20	.02
6. Pa*	11.32 (3.80)	12.45 (5.20)	17.29 (6.08)	11.76	<.0001	.99	.19
7. Pt*	16.15 (6.75)	21.37 (9.81)	26.66 (9.37)	10.89	<.0001	.99	.18
8. Sc*	16.15 (7.51)	23.02 (12.78)	36.26 (10.96)	26.66	<.0001	1	.34
9. Ma*	17.29 (4.13)	17.98 (5.25)	20.71 (6.20)	3.76	.026	.68	.07
0. Si*	33.38 (7.54)	32.20 (7.87)	36.70 (6.31)	3.12	.048	.59	.06

* $p <$ .05 Degrees of freedom: 2; 105

Note. Hs = *Hypochondriasis,* D = *Depression,* Hy = *Hysteria,* Pd = *Psychopathic Deviate,* Mf = *Masculinity/Feminity,* Pa = *Paranoia,* Pt = *Psychasthenia,* Sc = *Schizophrenia,* Ma = *Hypomania,* Si = *Social Introversion.*

The MMPI-2 fibromyalgia group clinical profile

Let us now consider a more clinical dimension of the scores obtained by the groups in our study. For this reason, MMPI-2 validity and standard clinical mean raw scores were plotted to mean T-scores (standardized scores for each dimension) using the Spanish normative data (Butcher *et al.,* 1999), as it can be seen in Figure 1. In addition, some Harris-Lingoes subscales mean raw scores were also plotted to mean T-scores and also taken into account for the significant (elevated) scales. Indeed, as pointed out by Graham (1993) «the subscales generally should not be interpreted unless their parent scales are significantly elevated and interpretation should be limited to trying to understand why test subjects have obtained high scores on the parent scales» (Graham, 1993, p.109).

Comments will mainly focus on fibromyalgia patients, due to chronic pain patients and control participants scored below the optimal cut-off score to safety delineated clinical interpretations (T-score > 65). Guidelines for clinical interpretation will be taken from authoritative manuals and papers of Butcher (2005), Butcher and Williams (1992),

Duckworth and Anderson (1995), Graham (1993, 2005), and Nichols (2001). Fibromyalgia patients present themselves, as a group, with an exaggerated response set, which probably reflects an attempt to claim excessive symptoms or problems, and likely a «plea for help» attitude (F = 84 T-score, and Fb = 77 T-score).

Scale 3, *Hysteria* (Hy), is the most elevated clinical scale in the profile (Hy = 71 T-score), suggesting a tendency to develop numerous physical symptoms under stress, to experience pain, and to deny social friction or discord with others. Elevations on scale 3 are consistently found in the clinical literature of pain and disability (Gatchel, Polatin, and Mayer, 1995; Nichols, 2001; Porter-Moffitt *et al.,* 2006; Vendrig, 2000).

Harris-Lingoes significant subscales provided some more information on the direction of the elevation in scale 3. Hy3, *Lassitude-Malaise*, (T = 68) indicates that fibromyalgia patients feel weak, fatigued, or tired, that they have difficulties in concentrating, poor appetite, and sleep disturbances, and that they generally feel uncomfortable and they are not in good health. Hy4, *Somatic Complaints*, (T = 73) indicates that they have many somatic complaints such as pain, dizziness, nausea and vomiting, poor vision, shakiness, or feeling too hot or too cold, and they usually express little or no hostility toward other people.

Scale 2 and Scale 6 are the other elevated clinical scales in the profile but less than scale 3, both with a 65 T-score. Scale 2, *Depression* (D), would reflect the presence of symptomatic depression, dysphoria, distress, physical discomfort and vegetative symptoms. Harris-Lingoes significant subscales provided some more information on the direction of the elevation in scale 2. D3, *Physical Malfunctioning,* (T = 67) indicates that they are preoccupied with their own physical functioning, they feel that do not have good health and experience a wide variety of symptoms similarly to those mentioned in subscale Hy3 and Hy4. D4, *Mental Dullness*, (T = 67) remarks that they lack energy to cope with daily life problems, feel tense, experience difficulties in concentrating, have problems with memory, present lack of self-confidence and lack of self-esteem.

Scale 6, *Paranoia* (Pa) would indicate that fibromyalgia patients tend to be excessively sensitive and overly responsive to the opinions of others, tend to rationalize and blame others for difficulties, they are also feel emotionally labile and moody, and manifest sadness, withdrawal, and anxiety. Harris-Lingoes significant subscales provided some more information on the direction of the elevation in scale 6. Pa1, *Persecutory Ideas*, (T = 65) indicates that they view the world as a threatening place, feel misunderstood, and are suspicious and untrusting of other people.

Individuals with the 36/63 code type may report tension and anxiety and may have physical complaints, including pain and gastrointestinal discomfort. They also have feelings of hostility toward others, being defiant, uncooperative, and hard to get along with (Graham, 1993). Individuals with the 32/23 code type present themselves as overcontrolled persons. They are unable to start things or to complete them once they are started. They lack interest and involvement in life, and feel constantly fatigued, exhausted, nervous, and inadequate. This code type indicates a lowered standard of efficiency for prolonged periods of time. They also had feelings of helplessness and multiple somatic complaints (Duckworth and Anderson, 1995). In this sense, Applegate and her colleagues (Applegate *et al.,* 2005) found that for female participants, elevations

in MMPI-2 scales 1, 3 and 6 predicted increases in number of chronic pain conditions at follow-up.

Indeed, Pérez-Pareja, Borrás, Sesé, and Palmer (2005) found that the discriminating factor between chronic pain and fibromyalgia patients rely not on the pain perception but on its impact on daily life activities. Fibromyalgics usually display avoidance strategies because they believe that pain incapacitates them and, therefore, physical activity must be avoided. In a recent review of the literature on chronic pain, Gatchel, Peng, Peters, Fuch, and Turk (2007) highlighted that «fear of movement and fear of re-injury are better predictors of functional limitations than biological parameters or even pain severity and duration» (p. 599). In addition, «anxiety sensitivity», the tendency to interpret unpleasant physical sensations more often as a sign of danger, exacerbates fear-avoidance beliefs and the negative interpretations of bodily sensations that may increase pain experience and pain avoidance in patients with chronic musculoskeletal pain (Asmundson *et al.,* 2008; Asmundson, Wright, and Hadjistavropoulos, 2000; Giesecke *et al.,* 2004). Finally, fibromyalgia would be regarded as Central Sensitivity Syndromes – CSS (Yunus, 2000, 2005, 2007). «CSS comprise an overlapping and similar group of syndromes without structural pathology and are bound by common mechanisms of central sensitization (CS) that involves hyperexcitement of the central neurons through various synaptic and neurotransmitter/neurochemical activities. CS is manifested as hypersensitivity to various noxious as well as nonoxious stimuli.» (Yunus, 2007, p. 339). Hypersensitivity may contribute to overrate the own somatic, emotional and psychological symptoms in fibromylagia patients rather than other pain-based syndromes such as chronic pain due to objectified noninflammatory locomotion apparatus pathology, as it is the case in our study.

Discussion

This study compared MMPI-2 validity and standard clinical scales' mean raw scores in three groups labelled fibromyalgia, chronic pain and control. The most remarkable result is that the fibromyalgia group shows the highest mean scores in all validity and standard clinical significant MMPI-2 scales. This result is in accordance with data found in the recent studies conducted by Blasco-Claros *et al.* (2006) and Porter-Moffitt *et al.* (2006) especially regarding standard clinical scales. One possible hypothesis is that this results may reflect an overreporting responding style to self-report measures (such a MMPI-2) that may also reflect, at the same time, a state of hypersensitivity characterized by fibromyalgia patients (Yunus, 2007).

This hypothesis seems to be more suitable if we look carefully at the MMPI-2 validity scales. Fibromyalgia group also scored highest in F, Fb, and F(p), and the mean differences with chronic and control groups are the largest of all the measured scales. The fibromyalgia group mean scores for F, Fb, and F(p) are up to 21.66, 15.77, and 8.37, respectively. The F scale is the traditional MMPI-2 index of excessive symptom claiming, exaggerated responding or even, malingering. Indeed, as exposed before, high scores on F scale would be attributable to inconsistent patterns of item endorsement, the presence of actual psychopathology or malingering. Optimal cut-off scores for considering

malingering regarding F raw scores ranged from 17 to 28 (see Berry, 1995; Greene, 1997; and Strong *et al.,* 2000 for a review), although there is no consensus about the best cut score (Rogers *et al.,* 2003; Rothke *et al.,* 2000). Fb scale must be interpreted in the same direction than F scale, and exaggeration of psychopathology or malingering can be interpreted only when both F and Fb are elevated (Nichols, 2001). Fibromyalgia participants' F raw scores are in the range to suggest that they are likely responding to the questionnaire with an overreporting or symptoms exaggeration profile, although there is no additional data (patients involved in litigation, seeking disability compensation, *etc.*) that lead us to consider probable malingering.

As mentioned before, F(p) is designed as an additional validity index for the accurately detection of overreporting responding or malingering. Arbisi and Ben-Porath (1998), and Strong *et al.* (2000) recommended that F(p) raw scores of greater than 6 should be classified as overreported, and Rogers *et al.* (2003) proposed that F(p) raw score of greater than 9 is recommended for likely feigning. Although in our case, the overall fibromyalgia profile´ sample must be considered in the realm of overrreporting responding style, the fact that we found a bimodal distribution in F(p), with two extreme ranges (a low range scores between 1-7 points, including up to 27 participants, and a high range scores, 20-27 points, including 9 participants), might lead us to consider that some individuals were feigning their answers to the questionnaire. Thus, it is likely to think that among fibromyalgia participants there were two different styles of responding: a) an overreporting (exaggerated) responding style, and b) a probable feigning or malingering responding style.

Since patients involved in litigation or seeking disability compensation were skipped out of the sample for this research, fibromyalgia sample must be mainly considered as clinical group, and no malingering hypothesis may be raised. However, Fp high range responding probably accounts for individuals who are specially seeking for a kind of social (family) support for reinforcing and maintaining the «sick role», avoiding family/ housework charges and duties, *etc.* Rather than an economical rewarding, these «extreme score» patients are seeking for a psychological rewarding to maintain chronic sick role, chronic pain behaviors, and avoid daily activities and duties.

The hypothetical «fibromyalgia group» profile is of clinical relevance as compared to chronic pain and control groups, who manifest normal profiles. However, pathological indices are less severe than other profiles reported in the literature. This is the case of data from Porter-Moffitt *et al.* (2006) who reported that the fibromyalgia group, as compared to other six pain groups, had a higher percentage of individuals with a «Neurotic triad» profile (scales 1, 2 and 3 above 65), and the largest percentage of patients with a «Floating» profile (all or most of the clinical scales at or above 65).

However, except for Scale 1 (Hs), our data indicate that fibromyalgia group matched almost perfectly to one of the factorial dimensions proposed by Vendrig, de Mey, Derksen, and van Akkerveeken (1998) regarding chronic pain population: the «Somatic Complaints» factor (including the scales and subscales (Hs, Hy4, D3, and Hy3), that «indicates the expression of distress in terms of mainly somatic symptoms/complaints and/or being distressed about physical functioning» (Vendrig *et al.,* 1998, p. 183).

But more than a specific profile pattern in the clinical scales and subscales, our study remarks that the key feature in discriminating fibromyalgia patients from other pain patients might be regarded to validity scales, especially to F, Fb, and F(p) scales. Validity scales have received relatively little attention in the literature. Porter-Moffitt *et al.* (2006) did not report data regarding validity scales, and Vendrig (2000) did not mention them in detail in his outstanding review of the literature on MMPI-2 and chronic pain.

Taking our data as a whole, some concluding remarks can be delineated: a) the fibromyalgia group scored higher in all MMPI-2 validity and clinical scales, as compared to the chronic pain and the control group; b) the fibromyalgia group MMPI-2 clinical profile is mainly oriented to the expression of a wide variety of somatic complaints, health problems, and physical malfunctioning, c) the fibromyalgia group presented a pattern of overreporting responding. This pattern of responding may reflect a state of hypersensitivity and anxiety sensitivity that contributes to overrate the perception of their somatic, emotional and psychological symptoms. In addition, some individuals, with high scores in the Fp-scale, would reflect a pattern of seeking for psychological rewarding characterized by the maintenance of chronic sick role, chronic pain behaviors, and avoidance of daily physical activities and duties; and d) since the fibromyalgia group presented no prior mental disorders and no external incentives motivation (litigant status), it might be hypothesized that social networks may potentiate selective attention biases on pain and disability as a way to obtain social reinforcement and support.

Although this study presents some limitations such as the number of the participants involved in each group, the need to include more pain groups, and the inclusion of the MMPI-2 content and supplementary scales, our data suggest that future research efforts might be devoted to clarify the ranges of overrreporting styles, and how can be best discriminated by generating optimal cut-off scores that facilitate decisions to the clinicians to cope with fibromyalgia syndrome.

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