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Cloninger's psychobiological model of personality and psychological distress in fibromyalgia

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Abstract

Aim: Personality can play an important role in the clinical symptoms of fibromyalgia (FM). The aim of this study is to identify personality profiles in FM patients and the possible presence of personality disorder (PD) from the Temperament and Character Inventory-Revised (TCI-R), and to assess whether personality dimensions are related to psychological distress in FM.

Method: The sample consisted of 42 patients with FM and 38 healthy controls. The TCI-R, Hospital Anxiety and Depression Scale, State-Trait Anxiety Inventory, Short-Form-36 Health Survey, Fibromyalgia Impact Questionnaire and McGill Pain Questionnaire were administered.

Results: The personality profile of the FM group based on the TCI-R is defined by high Harm Avoidance (HA), low Novelty Seeking (NS), and low Self-Directedness (SD). Only one-third of patients with FM present a possible psychometric PD, principally from Cluster C. In the FM group, HA and SD are associated positively and negatively, respectively, with indicators of emotional distress. Patients with higher HA present higher perceived pain intensity rated via a verbal-numerical scale while Determination (SD2) reduced the perceived level of pain induced by the stimulus. NS is negatively related to the number of work absences caused by FM.

Conclusions: The study suggests that HA and SD play an important role in psychological distress in FM. The fact that SD is prone to modification and has a regulatory effect on emotional impulses is a key aspect to consider from the psychotherapeutic point of view.

Key words: fibromyalgia, personality disorder, psychological distress, TCI-R.

INTRODUCTION

Fibromyalgia syndrome (FM), as a central sensitivity syndrome,[1] is characterized by chronic widespread musculoskeletal pain over a period of more than 3 months, and tenderness as a result of pressure on at least 11 of 18 tender points identified in the American College of Rheumatology (ACR) criteria.[2] Patients with FM have different associated symptoms, both pathological (sleep disorders) and non-pathological (morning numbness).[3] The estimated prevalence of FM in Spain is 2.4%, women accounting for 4.2% and men 0.2%.[4] The etiology of FM is still elusive, and numerous etiopathogenic factors have been considered (biological, psychological, social and environmental), their core factor being an alteration in pain modulation, in which emotional factors may regulate brain response.[5]

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Chronic pain conditions usually coexist with emotional symptoms, and there is mutual influence. In FM, a chronic functional pain disease, patients have been found to score high in depression and anxiety symptoms measured by different assessment instruments,[6–8] and particular personality traits have been associated with it. Recent publications have provided evidence that FM patients are not a homogeneous clinical group, and that personality traits may influence different clinical symptoms of the disease or indicate different subgroups.[9–11] FM personality dimensions have been studied from different theoretical models. Research using the Temperament and Character Inventory-Revised (TCI-R) test[12] showed that FM patients are typified by high Harm-Avoidance (HA) and low Self-directedness (SD), compared to a healthy control group.[10,13–15] Studies using the Revised NEO Personality Inventory (NEO PI-R) noted high scores in Neuroticism (N).[8]

Personality dimensions can play an important role in the exacerbation of pain, in illness adaptation level and in emotional state.[10] HA reflects a heritable neurobiological disposition to acquire conditioned responses of avoidance to adverse stimuli and reduced habituation in conditions of potential danger, while SD reflects a person's adaptability.[16] FM could be conceptualized as an aversive situation that generates stress. Personality dimensions, specifically HA, may be of great importance in the development and clinical course of FM.[10] In a similar line, Dersh notes pre-existing, semi-dormant characteristics of the individual before the onset of chronic pain, which are then activated and exacerbated by the stress from this chronic condition, eventually resulting in diagnosable psychopathology.[17] Thus, high HA and low SD may predispose the individual to maladaptive coping. A considerable number of studies related to the general population and chronic functional pain have shown that HA and low SD are associated with more psychological distress, suggesting that the combination of these two traits predisposes the person to emotional alteration.[18–21] These results have been confirmed in FM populations.[13,14] Furthermore, the character dimensions measured by the TCI-R may act as predictors of susceptibility to presenting an Axis I[19] or Axis II[22] psychopathological disturbance. As regards health status, some authors report that individuals with high Neuroticism (N), a dimension equivalent to HA, present a greater number of somatic complaints,[23] while SD is strongly associated with all aspects of well-being and health.[24]

HA can have a twofold effect, influencing coping strategies that people use to deal with pain and at the same time working as a personality trait that directly affects the pain itself.[25] Indeed, patients with chronic pain and high scores in Neuroticism (N) use passive coping strategies the inefficiency of which is reflected in greater intensity of perceived pain.[25] Nevertheless, Gencay-Can and Can[14] found no relationship between pain intensity and personality dimensions in patients with FM. Regarding the character dimensions, low self-efficacy plays an important role in pain control, in coping with the disability it causes in response to treatment.[26,27]

The aims of this study are: (i) to confirm and clarify the differences found in previous studies on the dimensions of temperament and character by means of the TCI-R, in a carefully selected sample of patients with clinical diagnosis of FM but without chronic fatigue syndrome (CFS), and compared to a healthy control group; (ii) to determine the presence of personality disorders (PD) in patients with FM using the TCI-R; and (iii) to assess whether a temperament dimension, HA, and a character dimension, SD, are associated with psychological distress, using measures of emotional state, perceived functionality and health, and pain in FM.

MATERIALS AND METHODS

Participants

The FM patients were selected by a senior rheumatologist and a senior psychologist from an initial sample of 150 at the Rheumatology Department, Hospital CIMA Sanitas. A notable aspect of this study was the rigorous process followed for the selection of the sample. It excluded all patients with FM who presented comorbid rheumatological diseases, patients with CFS, patients with a history of psychotic disorder or substance abuse, patients with a history or diagnosis of PD, and patients with a history of neuropathic pain. The final sample (Table 1) was made up of 42 women aged between 32 and 63 (mean 47.1 years, SD = 7.98). All FM patients met the diagnostic criteria of the American College of Rheumatology (ACR) (1990). The participants signed informed consent to accept the conditions of the study, which was approved by the Local Ethics Committee and was in compliance with the Helsinki Declaration.

The control group consisted of 38 healthy female volunteers aged 31 to 62 (mean 44.37 years, SD = 6.3). Inclusion criteria for control group selection were as follows: no history of rheumatic disorder, no history of functional pain or physical widespread pain, no known or reported history of Axis I or II psychiatric illness, and no known or reported history of neurological disease.

Table 1 Clinical characteristics of patients with FM (n = 42)

Clinical characteristics	Mean (SD)
Tender points (mean, SD)	15.90 (1.97)
Months from diagnostic (mean, SD)	85.98 (55.39)
Months with widespread pain (mean, SD)	60.57 (54.90)
Associated symptoms (0–14)	11.26 (2.49)
Morning tiredness *n* (%)	37 (88.1)
Unrefreshed sleep *n* (%)	36 (85.7)
Fragmented sleep *n* (%)	30 (71.4)
Fatigue *n* (%)	41 (97.6)
Morning stiffness	37 (88.1)
Stiffness after resting *n* (%)	29 (69)
Subjective swelling *n* (%)	36 (85.7)
Paresthesias *n* (%)	38 (90.5)
Headache *n* (%)	33 (78.6)
Symptoms of irritable bowel *n* (%)	21 (50)
Depression symptoms *n* (%)	30 (71.4)
Anxiety symptoms *n* (%)	34 (81)
Subjective difficulties of attention and concentration *n* (%)	35 (83.3)
Subjective memory complaints *n* (%)	37 (88.1)
Sick leave caused by FM (n°) (mean, SD)	4.06 (7.13)
Longest period of sick leave caused by FM (months) (mean, SD)	22.40 (44.04)
Current pharmacotherapy *n* (%)	36 (85.7)
Antidepressants *n* (%)	32 (76.2)
Anxiolytics *n* (%)	21 (50)
Hypnotics *n* (%)	6 (14.3)
Anticonvulsants *n* (%)	10 (23.8)
Anti-inflammatory *n* (%)	29 (69)
Analgesic *n* (%)	23 (54.8)
FIQ: Global score	66.50 (16.07)
MPQ: PRI-T	41.93 (10.01)
MPQ: NWC	15.62 (2.70)
MPQ: VAS	7.11 (1.48)
MPQ: PPI	2.98 (1.00)
Mild (%)	4.8
Moderate (%)	28.6
Strong (%)	38.1
Exhausting (%)	19.04
Unbearable (%)	9.52

FM, Fibromyalgia; SD, standard deviation; FIQ, Fibromyalgia Impact Questionnaire, MPQ, Mc Gill Pain Questionnaire; PRI-T, Pain Rating Index-total; NWC, Number of Words Chosen; VAS, Visual Analogue Scale; PPI, Present Pain Intensity.

There were no statistically significant differences by either age (t (78) = −1.69, P = 0.1) or educational level between the two groups (t (78) = 1.01, P = 0.3).

Measures

We administered the Spanish version of TCI-R.[28] The original TCI-R is a 240-item personality self-report questionnaire, based on Cloninger's multi-dimensional and psychobiological model that accounts for both normal and abnormal variations in seven personality dimensions (four temperament dimensions, three character dimensions) and 29 subscale categories. This questionnaire has proved to be reliable in its original version, with internal consistency alpha coefficients ranging from 0.65 for Persistence to 0.89 for Cooperativeness. The Spanish version has shown internal consistency alpha coefficients of over 0.77.

We administered the Spanish version of the Hospital Anxiety and Depression Scale (HADS)[29] self-report scale.[30] It has two scales (anxiety and depression) with seven items each. Scores for each scale range from 0 to 21 points. A score of 8–10 is considered a probable case of anxiety or depression, while a score of between 11 and 21 indicates a clear case of anxiety or depression.

We administered the Spanish version of the State-Trait Anxiety Inventory (STAI),[31] a self-report questionnaire with 40 items.[32] It has two scales that assess two independent anxiety concepts: state and trait. State Anxiety (S/A) is conceptualized as a transient emotional condition, characterized by subjective feelings of tension and apprehension; Trait Anxiety (T/A) concerns a stable personality dimension. It refers to individuals' propensity for anxiety and the tendency to perceive situations as threatening, which increases their State Anxiety.

We administered the Spanish version of the Short-Form-36 Health Survey (SF-36),[33] a generic self-report questionnaire with 36 items.[34] It covers nine dimensions of perceived health: vitality, physical functioning, bodily pain, general health perceptions, role functioning difficulties caused by physical problems, role functioning difficulties caused by emotional problems, social functioning, mental health, and change in health over time. The scoring range is 0 to 100, with higher score indicating better health status and less pain.

We administered the Spanish version of the Fibromyalgia Impact Questionnaire (FIQ),[35] a self-report questionnaire with 10 items.[36] This instrument measures the impact of FM on functional capacity and quality of life. FIQ score ranges from 0 to 100. Zero indicates the best functional capacity and quality of life and 100 the poorest.

We administered the Spanish version of the McGill Pain Questionnaire (MPQ),[37] an instrument for assessing quantitative and qualitative aspects of pain.[38] The

questionnaire consists of 64 pain descriptors organized in 19 subgroups. Different types of rating can be obtained: (i) Pain Rating Index (PRI), total and for each of the four areas (sensory, affective, evaluative and miscellaneous); (ii) number of words chosen (NWC), the sum of the number of descriptors selected by the patient; (3) Pain Intensity Index (PII), selecting the degree of pain on a categorical scale; and (4) Visual Analogue Scale (VAS), intensity of pain visually described.

Data analysis

For the statistical analysis we used the statistics package SPSS 17 (SPSS Inc., Chicago, IL, USA). We carried out a descriptive analysis and a comparison of means between the FM group and the control group using Stu-

Table 2 Comparison means between fibromyalgia patients and healthy controls in Temperament and Character Inventory-Revised (TCI-R) scales

TCI-R	FM Mean (SD) $n = 42$	Control Mean (SD) $n = 38$	CI	t	P
Novelty seeking	89.43 (10.96)	97.42 (12.38)	[2.80, 13.19]	3.063	**0.003**
NS1 Exploratory excitability	27.98 (4.84)	31.47 (5.87)	[1.11, 5.88]	2.919	**0.005**
NS2 Impulsiveness	21.86 (4.38)	23.50 (4.87)	[−0.42, 3.70]	1.589	0.116
NS3 Extravagance	25 (5.22)	25.97 (4.61)	[−1.23, 3.17]	0.881	0.381
NS4 Disorderliness	14.60 (3.51)	16.47 (4.29)	[0.14, 3.62]	2.150	**0.035**
Harm avoidance	120.81 (14.32)	94 (16.88)	[−33.76, −19.86]	−7.681	< **0.0005**
HA1 Anticipatory worry-Pessimism	35.90 (5.83)	28.05 (7.04)	[−10.72, −4.99]	−5.452	< **0.0005**
HA2 Fear of uncertainly	29.02 (3.90)	24.29 (4.72)	[−6.66, −2.81]	−4.907	< **0.0005**
HA3 Shyness	21.95 (5.67)	20.21 (5.53)	[−4.24, 0.76]	−1.389	0.169
HA4 Fatigability	33.93 (3.96)	21.45 (5.16)	[−14.52, −10.45]	−12.202	< **0.0005**
Reward dependence	111.31 (14.86)	109.34 (12.56)	[−8.12, 4.19]	−0.636	0.527
RD1 Sentimentality	31.12 (4.00)	28.39 (4.62)	[−4.64, −0.80]	−2.825	**0.006**
RD2 Openness to warm communication	37.29 (6.66)	37.05 (7.01)	[−3.28, 2.81]	−0.153	0.879
RD3 Attachment	21.21 (5.18)	22.34 (4.55)	[−1.05, 3.31]	1.031	0.306
RD4 Dependence	21.69 (4.36)	21.55 (4.18)	[−2.05, 1.77]	−0.144	0.886
Persistence	104.48 (18.77)	112.08 (15.58)	[−0.12, 15.33]	1.959	0.054
PS1 Eagerness of effort	28.79 (5.65)	31.55 (5.10)	[0.36, 5.17]	2.292	**0.025**
PS2 Work hardened	23.79 (5.88)	26.82 (4.59)	[0.66, 5.40]	2.550	**0.013**
PS3 Ambitious	25.26 (6.18)	27.50 (6.42)	[−0.57, 5.04]	1.588	0.116
PS4 Perfectionist	26.33 (6.15)	26.21 (4.73)	[−2.55, 2.31]	−0.101	0.920
Self-directedness	147.55 (18.80)	158.03 (15.10)	[2.67, 18.29]	2.671	**0.009**
SD1 Responsibility	30.45 (4.60)	33.39 (4.61)	[0.89, 4.99]	2.854	**0.006**
SD2 Purposefulness	21.33 (4.90)	24.24 (3.15)	[1.08, 4.72]	3.181	**0.002**
SD3 Resourcefulness	17.86 (3.96)	19.89 (3.20)	[0.43, 3.65]	2.516	**0.014**
SD4 Self-acceptance	37.90 (6.31)	37.76 (7.42)	[−3.20, 2.91]	−0.092	0.927
SD5 Enlightened second nature	40 (5.93)	42.74 (4.59)	[0.36, 5.12]	2.291	**0.025**
Cooperativeness	145.26 (13.82)	147.68 (9.39)	[−2.80, 7.65]	0.924	0.358
C1 Social acceptance	31.88 (4.17)	32.47 (4.22)	[−1.28, 2.46]	0.632	0.529
C2 Empathy	19.31 (3.47)	19.16 (2.35)	[−1.49, 1.18]	−0.226	0.821
C3 Helpfulness	31.71 (3.59)	33.47 (2.76)	[0.32, 3.20]	2.439	**0.017**
C4 Compassion	30.50 (3.42)	30.45 (2.86)	[−1.47, 1.36]	−0.074	0.941
C5 Pure hearted consciousness	31.86 (4.28)	32.16 (3.70)	[−1.49, 2.09]	0.335	0.739
Self-transcendence	64.74 (14.03)	65.29 (15.75)	[−6.01, 7.18]	0.166	0.869
ST1 Self-forgetful	26.45 (5.86)	27.13 (6.96)	[−2.18, 3.54]	0.473	0.637
ST2 Transpersonal identification	18.31 (5.18)	19.68 (5.89)	[−1.09, 3.84]	1.111	0.270
ST3 Spiritual acceptance	20 (5.96)	18.47 (5.76)	[−4.14, 1.09]	−1.162	0.249

$P < 0.05$. FM, Fibromyalgia; SD, standard deviation; CI, confidence interval.
Bold values are significant.

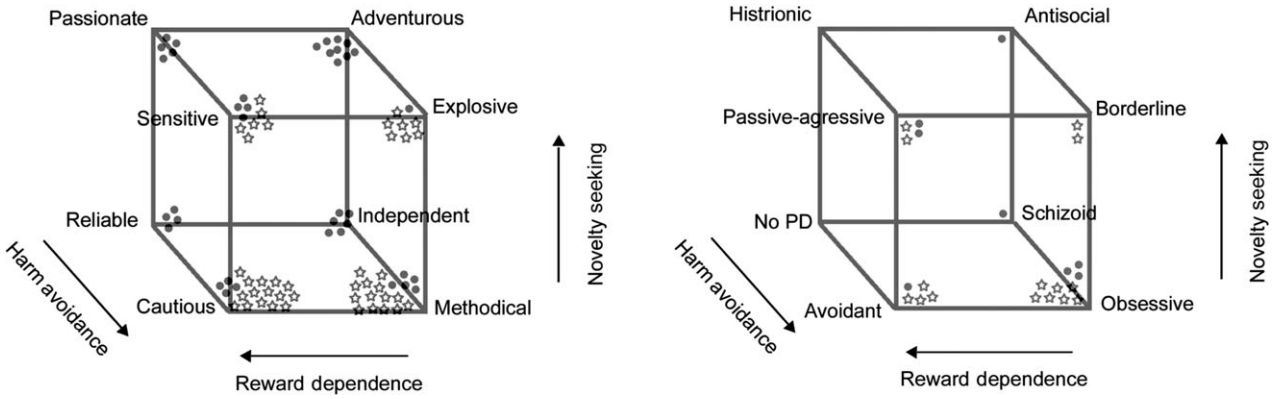

Figure 1 Temperamental profile and Personality Disorder between Fibromyalgia and Control group. *Fibromyalgia patients, circles: Control subjects.

dent's *t*-test for independent samples for the TCI-R scales and clinical and psychometric variables that define psychological distress in the sample. To compare means in psychological distress variables according to the presence or absence of PD we applied Student's *t*-test, and in those cases that did not meet the assumptions of parametric test application we applied the Mann–Whitney *U*-test. To establish the temperament profile and the presence of PD we followed Svrakic's guidelines.[22] A Pearson correlation was calculated, and a Spearman coefficient was obtained when conditions required it, with those dimensions of the TCI-R and its subscales that present significant differences with respect to the control group ($P < 0.05$), and measures indicative of psychological distress only in the FM group. To correct the accumulated error due to performing multiple correlations, all results were corrected using the Bonferroni method (the TCI-R consists of seven dimensions and 29 subscales). Correction was applied based on the seven dimensions of the TCI-R, and the 13 subscales showed significant differences with respect to the control group.

Table 3 Comparison means between Fibromyalgia and healthy controls in psychological tests

Psychological distress	FM (n = 42) Mean (SD)	Control (n = 38)† Mean (SD)	CI	t	P
Emotional symptoms					
HADS-D	9.02 (4.73)	2.03 (2.27)	[−8.63, −5.36]	−8.56	< 0.0005
HADS-A	11.71 (4.01)	5.74 (3.40)	[−7.64, −4.31]	−7.15	< 0.0005
STAI-S	29.74 (13.05)	15.32 (10.91)	[−19.81, −9.04]	−5.33	< 0.0005
STAI-T	34.29 (12.38)	14.03 (7.21)	[−24.73, −15.79]	−9.05	< 0.0005
Health status					
SF-36					
PF	40.60 (18.19)	92.97 (15.66)	[44.80, 59.96]	13.76	< 0.0005
SF	44.64 (24.87)	96.62 (8.15)	[43.82, 60.14]	12.79	< 0.0005
RP	11.31 (22.23)	97.30 (7.87)	[78.63, 93.34]	23.46	< 0.0005
RE	50.75 (44.33]	95.09 (13.90)	[29.85, 58.82]	6.15	< 0.0005
MH	47.71 (20.02)	77.51 (12.05)	[22.48, 37.12]	8.12	< 0.0005
VT	20.90 (17.00)	70.86 (16.62)	[42.41, 57.51]	13.17	< 0.0005
BP	26.85 (20.53)	86.42 (15.47)	[51.49, 67.67]	14.67	< 0.0005
GH	30.65 (17.70)	80.47 (11.96)	[43.11, 56.53]	14.80	< 0.0005
HC	33.33 (25.70)	54.05 (18.17)	[10.83, 30.62]	4.17	< 0.0005

$P < 0.05$. †37 cases in SF36. FM, Fibromyalgia; SD, standard deviation; CI, confidence interval; HADS, Hospital Anxiety and Depression scale; HADS-D, depression scale; HADS-A, anxiety scale; STAI, State-Trait Anxiety Inventory; STAI-E, state; STAI-T, trait; SF-36 Short form health survey (36 item); PF, Physical Functioning; SF, Social Functioning; RP, Role-Physical; RE, Role Emotional; MH, Mental Health; VT, Vitality; BP, Bodily Pain; GH, General Health; HC, Health change in time.

Table 4 Correlations between psychological distress and personality dimensions of TCI-R in Fibromyalgia

Psychological distress	Temperament				Character	
	HA		NS		SD	
	r	*P*	*r*	*P*	*r*	*P*
Emotional symptoms						
HADS-D	0.424	**0.005**	0.079	0.617	−0.377	0.014
HADS-A	0.337	0.029	0.231	0.140	−0.403	0.008
STAI-S	0.457	**0.002**	0.064	0.689	−0.313	0.043
STAI-T	0.554	< **0.0005**	0.093	0.558	−0.513	**0.001**
Health status						
SF-36						
PF	−0.208	0.186	0.209	0.185	−0.179	0.256
SF	−0.197	0.211	−0.019	0.903	0.077	0.628
RP	0.040	0.804	0.045	0.779	−0.050	0.752
RE	−0.193	0.220	−0.264	0.091	0.271	0.083
MH	−0.469	**0.002**	−0.028	0.859	0.459	**0.002**
VT	0.038	0.812	−0.091	0.567	0.120	0.450
BP	−0.168	0.287	0.074	0.639	−0.065	0.681
GH	−0.171	0.278	−0.287	0.066	0.416	**0.006**
HC	−0.130	0.413	0.071	0.653	−0.035	0.826
Impact of FM and quality of life						
FIQ: Global score	0.303	0.052	0.256	0.102	−0.267	0.088
Clinical symptoms†	0.373	0.015	0.222	0.158	−0.340	0.028
Sick leave‡	0.204	0.195	−0.469	**0.002**	0.048	0.764
Pain of FM						
MPQ						
PRI-T	0.253	0.106	0.156	0.324	−0.115	0.469
NWC	0.206	0.191	−0.031	0.847	0.112	0.480
PPI ^{rs}	0.114	0.471	0.115	0.468	−0.027	0.867
VAS	0.233	0.138	0.122	0.441	−0.070	0.661
Pain mechanical applied						
MPQ PMA						
PRI-T PMA	0.382	0.013	−0.010	0.952	−0.135	0.395
NWC PMA	0.129	0.417	−0.070	0.659	0.135	0.394
PPI PMA ^{rs}	0.472	**0.002**	0.007	0.963	−0.363	0.018
VAS PMA	0.359	0.020	0.129	0.416	−0.385	0.012

Significant at Bonferroni adjusted *P* value of ($P < 0.05/7 = 0.007$). †Clinical symptoms associated with FM; ‡Number of sick leave caused by FM. HA, Harm avoidance; NS, Novelty seeking; SD,Self-Directedness; HADS, Hospital Anxiety and Depression scale; HADS-D, depression scale; HADS-A, anxiety scale; STAI, State-Trait Anxiety Inventory; STAI-E, state; STAI-T, trait; SF-36, Short form health survey (36 item); PF, Physical Functioning; SF, Social Functioning; RP, Role-Physical; RE, Role Emotional; MH, Mental Health; VT, Vitality; BP, Bodily Pain; GH, General Health; HC, Health change in time; FIQ, Fibromyalgia Impact Questionnaire; MPQ, Mc Gill Pain Questionnaire; PRI-T, Pain Rating Index Total; NWC, Number of Words Chosen; PPI, Present Pain Intensity; VAS, Visual Analogue Scale; PMA, Pain Mechanical Applied; rs Spearman rank order correlation.
Bold values are significant.

RESULTS

Patients with FM present significantly high scores in HA and low scores in NS and SD, compared to the control group. In a *post hoc* analysis of the subscales, statistically significant differences from the control group were found, notably in the cases of HA1, HA2, HA4, SD2 and RD1 (Table 2).

Based on the dimensional approach to the study of personality, the TCI-R indicates that 69% ($n = 29$) of patients have an anxious-type temperamental profile, compared to 31% ($n = 13$) in the control group, the difference being statistically significant (χ^2 [1, $N = 80$] = 16.46, $P < 0.0005$). A total of 36% of patients with FM present a possible psychometric diagnosis of PD, mainly from Cluster C (26%, $n = 11$),

Table 5 Correlations between psychological distress and personality subscales of TCI-R in Fibromyalgia

Psychological distress	Temperament								Character							
	HA1		HA2		HA4		RD1		SD1		SD2		SD3		SD5	
	r	*P*	*r*	*P*	*r*	*P*	*r*	*P*	*r*	*P*	*r*	*P*	*r*	*P*	*r*	*P*
Emotional symptoms																
HADS-D	0.528	< **0.0005**	0.149	0.346	0.258	0.099	0.138	0.384	−0.216	0.170	−0.581	< **0.0005**	−0.221	0.159	−0.285	0.067
HADS-A	0.448	**0.003**	0.231	0.141	0.252	0.108	0.301	0.052	−0.285	0.067	−0.328	0.034	−0.273	0.081	−0.413	0.007
STAI-S	0.601	< **0.0005**	0.226	0.150	0.332	0.032	0.513	**0.001**	−0.300	0.054	−0.377	0.014	−0.221	0.160	−0.323	0.037
STAI-T	0.559	< **0.0005**	0.390	0.011	0.269	0.085	0.217	0.167	−0.279	0.073	−0.631	< **0.0005**	−0.430	0.005	−0.421	0.005
Health status																
SF–36																
PF	−0.210	0.182	0.098	0.538	−0.262	0.094	−0.055	0.731	−0.167	0.291	0.203	0.197	−0.102	0.520	−0.216	0.170
SF	−0.287	0.065	0.196	0.213	−0.311	0.045	−0.147	0.354	0.080	0.613	0.303	0.051	0.054	0.734	−0.064	0.687
RP	0.013	0.934	0.250	0.111	−0.039	0.806	0.122	0.443	−0.021	0.893	0.116	0.466	0.005	0.975	−0.153	0.334
RE	−0.371	0.016	0.110	0.486	−0.118	0.457	−0.067	0.672	0.331	0.032	0.231	0.141	0.292	0.060	0.123	0.436
MH	−0.524	< **0.0005**	−0.248	0.113	−0.483	**0.001**	−0.197	0.211	0.261	0.095	0.474	**0.002**	0.383	0.012	0.390	0.011
VT	0.126	0.425	0.175	0.269	−0.134	0.398	0.048	0.763	−0.057	0.721	0.265	0.090	−0.019	0.905	0.102	0.522
BP	−0.159	0.315	0.051	0.748	−0.303	0.051	−0.070	0.658	−0.094	0.555	0.128	0.418	0.036	0.819	−0.148	0.349
GH	−0.219	0.163	0.054	0.736	−0.290	0.063	−0.185	0.240	0.333	0.031	0.337	0.029	0.196	0.213	0.296	0.057
CH	−0.141	0.373	−0.069	0.665	−0.156	0.325	−0.200	0.205	−0.198	0.209	0.350	0.023	−0.090	0.571	−0.160	0.311
Impact of FM and quality of life																
FIQ	0.395	0.010	0.042	0.794	0.313	0.044	0.279	0.074	0.274	0.079	−0.270	0.084	−0.124	0.434	−0.227	0.148
Clinical symptoms†	0.427	0.005	0.160	0.312	0.306	0.049	0.379	0.013	−0.205	0.194	−0.301	0.053	−0.305	0.049	−0.382	0.013
Sick leave‡	−0.050	0.754	0.240	0.126	0.060	0.707	−0.066	0.678	0.203	0.198	−0.130	0.413	−0.111	0.483	−0.022	0.890
Pain of FM MPQ																
PRI-T	0.369	0.016	0.045	0.779	0.256	0.101	0.367	0.017	−0.172	0.277	−0.073	0.645	−0.083	0.599	−0.125	0.432
NWC	−0.024	0.880	−0.307	0.048	−0.140	0.377	−0.043	0.786	0.152	0.336	0.115	0.468	0.120	0.447	0.053	0.737
PPI ^{rs}	0.004	0.981	0.002	0.988	0.169	0.285	0.111	0.485	0.119	0.454	−0.141	0.373	−0.036	0.819	0.091	0.565
VAS	0.240	0.126	0.068	0.667	0.186	0.239	0.319	0.039	−0.164	0.299	−0.202	0.199	−0.107	0.501	0.064	0.685
Pain mechanical applied																
MPQ PMA																
PRI-T PMA	0.420	0.006	0.284	0.069	0.434	**0.004**	0.302	0.052	0.055	0.732	−0.265	0.090	−0.139	0.381	−0.079	0.618
NWC PMA	0.123	0.437	0.153	0.332	0.168	0.287	0.210	0.183	0.214	0.174	0.030	0.853	−0.042	0.793	0.124	0.436
PPI PMA ^{rs}	0.422	0.005	0.470	**0.002**	0.429	0.005	0.165	0.298	0.048	0.764	−0.460	**0.002**	−0.352	0.022	−0.232	0.140
VAS PMA	0.221	0.159	0.250	0.110	0.290	0.062	−0.079	0.620	−0.052	0.745	−0.507	**0.001**	−0.278	0.075	−0.313	0.044

Significant at Bonferroni adjusted *P* value of ($P < 0.05/13 = 0.004$). †Clinical symptoms associated with FM; ‡Number of sick leave caused by FM. HA1, Anticipatory worry-Pessimism; HA2, Fear of uncertainly; HA4, Fatigability; RD1, Sentimentality; SD1, Responsibility; SD2, Purposefulness; SD3, Resourcefulness; SD5, Enlightened second nature; HADS, Hospital Anxiety and Depression scale; HADS-D, depression scale; HADS-A, anxiety scale; STAI, State-Trait Anxiety Inventory; STAI-E, state; STAI-T, trait; SF-36, Short form health survey (36 item); PF, Physical Functioning; SF, Social Functioning; RP, Role-Physical; RE, Role Emotional, MH, Mental Health; VT, Vitality; BP, Bodily Pain; GH, General Health; HC, Health change in time; FIQ, Fibromyalgia Impact Questionnaire; MPQ, Mc Gill Pain Questionnaire; PRI-T, Pain Rating Index Total; NWC, Number of Words Chosen; PPI, Present Pain Intensity; VAS, Visual Analogue Scale; PMA, Pain Mechanical Applied; rs Spearman rank order correlation. Bold values are significant.

although there were no significant differences from the control group ($P = 0.371$) (Fig. 1). In the comparison between the PD and non-PD groups of patients, no significant differences were observed in the psychological distress variables.

As far as psychological distress is concerned, it can be observed that the FM group scores significantly higher on the HADS-D, HADS-A, STAI-S, and STAI-T and significantly lower on all the SF-36 scales, compared to the control group (Table 3).

As regards the relationship between psychological distress and the personality dimensions and subscale categories (Tables 4, 5), HA score is positively and significantly correlated with HADS-D, STAI-S and STAI-T. The HA1 subscale shows a positive and significant correlation with HADS-D, HADS-A, STAI-S and STAI-T. SD is negatively and significantly correlated with STAI-T. SD2 shows a negative and significant correlation with HADS-D and STAI-T, while RD1 correlates positively and significantly with STAI-S.

HA, HA1 and HA4 show a significant negative correlation with the MH scale of the SF-36, on which a higher score is indicative of better health. SD and SD2 are significantly and positively correlated with the SF-36 MH scale; SD correlates positively and significantly with the SF-36 GH scale, and NS correlates negatively and significantly with number of work absences (sick leave) caused by FM.

HA and HA2 correlate positively and significantly with Present Pain Intensity Pain Mechanical Applied (PPI PMA). HA4 correlates positively and significantly with Pain Rating Index – Total (PRI-T) PMA. SD2 correlates negatively with PPI PMA and VAS PMA. The SD1, SD3 and SD5 subscales do not show significant correlations, although their values are provided as some show a trend toward statistical significance. NS1, NS4 and PS1, PS2 and C3 present no significant correlations.

DISCUSSION

It has been argued in various studies that personality can play an important role in the development and clinical course of FM.[10,13] The present study, with a rigorously selected FM sample, and excluding CFS, sets out to define the personality profile according to the TCI-R and assess which temperament and character dimensions are associated with psychological distress in FM. In this work, the personality profile of FM is defined with high HA and low SD and NS, with respect to the control group. Moreover, analysis of the subscales, and in particular HA1 and SD2, reveals statistically significant differences in those subscales that best define an anxious and maladaptive profile. The majority of patients with FM present an anxious temperament profile, and only a third a possible psychometric diagnosis of PD, principally from Cluster C. The FM group presents scores indicative of greater psychological distress, compared to the control group. In the FM group, HA and SD are associated positively and negatively, respectively, with indicators of emotional alteration and health status measures linked to emotional alteration. HA and SD show a tendency to be related positively and negatively, respectively, to the presentation of a greater number of FM-related symptoms. NS is negatively related to number of work absences due to FM. It is important to highlight the role of HA and SD in psychological distress in FM, and specifically HA1 and SD2, being the subscales most frequently associated with indicators of psychological distress.

The majority of studies carried out with the TCI-R are in agreement in noting high scores in HA and low scores in SD in FM,[10,13–15] and the present work is no exception. Nevertheless, in the remaining five dimensions of the TCI-R, the results of the different studies show more discrepancies, with no clear defining profile for FM.[10,14] In the present study we observed a low NS, as in the study by Lundberg,[10] but in contrast to that work we found a near-significant low score in Persistence (PS). It should be stressed that these differences may be due to the sample selection process and to the absence of CFS mentioned above. As regards the subscales, we noted high scores in HA1 and low scores in SD2 with respect to the control group, and this finding is in accordance with those of Conrad[39] in a chronic pain population.

The personality profile observed in FM is defined as being prone to react to stressors with an increase in anxiety, having a tendency toward negative thoughts in response to everyday frustrations and anticipating future problems, presenting high fatigability (high HA), and showing poor ability to control and regulate one's behaviour for adapting to situations, according to one's own objectives and values (low SD). People with this profile would tend to react with indifference or rejection to novelty, to feel comfortable with monotony and to avoid situations involving risk (low NS). These characteristics could lead to their becoming disheartened when faced with potentially anxiety-inducing situations. They would also show problems for persisting with a behavior when difficulties arise, such as tiredness or frustration, which can be caused by pain,[40] and by the difficulty of adapting to situations that involve

maintaining a behaviour in the absence of gratification (low PS).

In contrast to other works, the present work sets out to study in depth the temperament profile obtained with the TCI-R,[22] finding that 69% of patients present a non-pathological anxious temperament profile characterized by low NS and high HA, being defined with a cautious or methodical profile. The TCI-R also suggests, psychometrically, the possible presence of a PD if extreme temperament profiles are associated with low scores in SD and/or Cooperativeness.[22] Some studies have found greater prevalence of PD in patients with FM.[41,42] In the present work one in three FM patients presented a possible psychometric diagnosis of PD, principally of an Avoidant or Obsessive Compulsive type, and this concurs – as regards the most prevalent form of PD – with the findings of previous research.[41] Furthermore, it is reaffirmed that FM patients constitute a heterogeneous group in terms of the clinical expression of their condition.[9,11] However, despite the evidence that PDs influence people's capacity for adaptation,[43] it is found here that the presence of a PD established psychometrically through the TCI-R does not influence the psychological distress measures analyzed. This may be due to the sample size and the assessment instrument employed, since although the TCI-R can serve as a screening instrument for establishing a PD, the most suitable and widely accepted form of obtaining a PD diagnosis is via a structured interview specifically designed for the assessment of PDs.

As far as the dimensions and subscales of the TCI-R are concerned, the data from the present study indicate that patients scoring high in HA and Anticipatory anxiety-Pessimism (HA1) also score high in anxiety and depressive symptomatology and trait anxiety, assessed by means of two specific assessment instruments. Moreover, the results suggest that patients scoring low in SD present greater trait anxiety. Also, those individuals who lack a clear sense of direction in their lives and tend to react to their immediate circumstances and needs (low SD2) show high trait anxiety and depressive symptoms. Likewise, various studies in general populations and pain populations have found high HA and low SD to be associated with greater emotional alteration.[13,14,18–21] In contrast to the findings of Gencay-Can and Can,[14] where Reward Dependence (RD) is negatively related to anxiety symptoms, the present study found Sentimentality (RD1) to be positively related to state anxiety. These results appear to be more in line with the underlying theory, since it would appear logical for people who are more easily moved, warmer and more understanding to present more anxiety symptoms.

The negative association of HA and HA1 with the SF-36 mental health scale corroborates the previous results, supporting the assertion that HA is related to the presentation of more emotional alteration symptoms; at the same time, the positive association of SD and SD2 with mental health would suggest that people with low SD present greater emotional alteration. Furthermore, SD is positively related to the SF-36 general health perceptions category, corroborating Cloninger's assertion that SD is associated with all health indicators.[24]

As regards the level of impact of FM on functioning and quality of life, it is found that people who are curious, enthusiastic and impulsive (high NS) are less likely to be absent from work due to FM. Gencay-Can and Can[14] observed a positive relation between HA and total score on the FIQ. In the present study we found a positive correlation, with a trend toward significance, between HA, Anticipatory anxiety-Pessimism (HA1) and the FIQ, indicating that individuals with high HA may be more affected by FM. Some authors also note that people with high Neuroticism (N) report more somatic complaints,[23] and this would explain why in the present study HA shows a tendency to be associated with more accompanying symptoms of FM.

In the area of chronic pain, personality dimensions are not related to the pain characteristic of FM, and this is in line with the findings of Gencay-Can and Can,[14] according to which neither HA nor SD are related to pain intensity. Nevertheless, we can observe a positive association, with a trend toward significance, between Anticipatory worry-Pessimism (HA1) and the PRI-T index, which concurs with the results of Malt,[44] who observed that Neuroticism (N) on its own would explain 16% of total pain on the MPQ, while N in combination with cortisol level and systolic blood pressure would explain 42% of the variance in MPQ total pain.

As regards perceived pain, patients with higher HA and Fear of uncertainty (HA2), and to a lesser extent Anticipatory worry-Pessimism (HA1) and Fatigability (HA4), present higher pain intensity rated via a verbal-numerical scale, suggesting that HA, and specifically Fear of uncertainty (HA2) (which refers to the tendency to be tense and worried in response to new situations), could have an influence by increasing the qualitative rating of intensity of a pain stimulus. Affleck,[23] in the field of chronic pain, observes that catastrophizing, as a relatively ineffective coping strategy, mediates the relation between Neuroticism (N) and the intensity of per-

ceived pain, although N is not directly related to pain intensity. HA may act as a vulnerability factor that lowers the threshold at which pain is perceived as threatening and catastrophizing thoughts about pain appear, which may in turn be related to greater anticipatory anxiety (HA1) and fear of uncertainty (HA2); on the other hand, SD, and specifically Determination (SD2), has the opposite effect, reducing the perceived level of pain induced by the stimulus. HA is indeed a stable temperament dimension that reflects one's disposition to respond intensely to aversive stimuli, while SD concerns the cognitive processes that regulate the expression of emotional impulses. The presence of higher hyperalgesia in response to a nociceptive stimulus in FM may be explained in part by high HA and low SD, which influence the subjective response to pain. This can have relevant therapeutic implications on our being able to modify, to some extent, people's capacity to control their pain via modification of the character dimension.

The present study has certain limitations: the sample size is relatively small – even though it is highly selective and participants were all hospital patients – and this may reduce its statistical power and restrict the potential for generalization of its results in the context of FM, considered an illness of great clinical heterogeneity;[9] there was no assessment of whether or not TCI temperament scores in FM changed after remission of depressive symptoms;[12,45] the instruments used, despite showing adequate psychometric properties, lack control scales for detecting false responses; some of the results are different from those found elsewhere in the literature, although this may be explained by the degree of rigour in the sample selection, which excluded FM comorbid with other rheumatological conditions and patients with CFS; and finally, we cannot be certain whether temperament scores might vary over the clinical course of the illness.

In summary, some authors consider personality profiles as factors involved in the development of FM and in its clinical expression.[10,13,14,46] According to Cloninger's theory, temperament dimensions are heritable and fairly immutable, so that in principle, they are present prior to the onset of the illness. Character dimensions are potentially modifiable, so that suffering an illness may have influenced a person's capacity for adaptation rated via SD. The present study yields a profile with high HA and low SD, and their association with various indicators of psychological distress, although only a longitudinal study could properly clarify the role of these dimensions in the development of FM. It is important to stress that, in contrast to previous studies, the present work analyzes the relation between adaptive capacity (SD) and the psychological distress associated with FM. The fact that SD is a character dimension, prone to modification through learning and which has a regulatory effect on the expression of emotional impulses, is a key aspect to consider from the psychotherapeutic perspective, as this could have substantial implications for the predictive capacity of the TCI-R as regards the course of FM. In future research it would be useful to explore the possible effect of the interaction of coping strategies and personality on the psychological distress indicators associated with FM. It would also be relevant to study the differential effects of some dimensions measured by the TCI-R subscales – specifically the HA and SD subscales – with larger samples.

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DISCLOSURES

All authors have no conflicts of interest.

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