

Fibromyalgia, perfectionism, and interpersonal style. Further evidence for a person-centered approach

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Received date: June 15, 2024

Accepted date: July 13, 2024

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Abstract

Objectives. We carried out a controlled, cross-sectional investigation in patients with Fibromyalgia (FM) to determine the presence of perfectionism and three interpersonal styles, namely 'subjugation', 'approval-seeking', and 'self-sacrifice'.

Method. Several validated self-report questionnaires were filled-in by 100 female FM patients and 36 women with rheumatoid arthritis as a control group.

Results. We found significantly higher scores in the FM group for all perfectionism subscales, except for the subscale 'organization'. Moreover, FM patients scored higher for the three interpersonal styles.

Conclusions. Our results support our clinical observations suggesting that maladaptive perfectionism as well as excessive other-directed interpersonal styles may be highly prevalent in patients with FM. These results add to growing evidence that a personalized, biopsychosocially oriented approach taking these factors into account may be a useful addition to standard therapy. However, the effectiveness of additional psychotherapy for FM should be further investigated.

Keywords: Fibromyalgia, Perfectionism, Subjugation, Approval seeking, Self-sacrifice

Introduction

Fibromyalgia (FM) is usually considered a 'medically unexplained' chronic pain disorder with no known causal treatment. The disorder is also referred to as a 'functional somatic syndrome' in which psychological factors are believed to play an important role [1-3]. According to recent criteria of the American College of Rheumatology (ACR), the main symptom is unexplained widespread pain for at least 3 months; associated symptoms include fatigue, impaired concentration, non-restorative sleep, stimulus intolerance, post-exertional malaise, and various complaints related to neuro-vegetative dysfunction [4,5]. In clinical practice, a symptomatic overlap with chronic fatigue syndrome (CFS) and frequent comorbidity with affective disorders and other functional somatic syndromes is apparent [6]. The prevalence of FM in Western Europe is estimated to be between 3 and 6 percent with a male/female ratio of 1/4 to 1/7 [7,8].

The etiology of FM is not well understood but probably multifactorial, implying a complex interplay between vulnerability, triggering factors and illness-aggravating and/or sustaining factors, both on the physical and the psychological level. Previous psychological and psychiatric research has shown that depression, anxiety, stress (including post-traumatic stress disorder) [9,10], a history of early childhood trauma [11] and certain personality characteristics, such as neuroticism [3,12], alexithymia [13,14], type D personality [15], low self-esteem [16], a tendency to hyperactivity ('ergomania', 'high action-proneness') [17] and, particularly, perfectionism [18,19,20] may lead to greater illness severity,

more flare-ups, and more functional limitations. However, there is no scientific consensus about the prevalence and role of maladaptive personality traits [21].

The pathophysiology of FM is also largely unclear. Presumably, the neurobiological stress system, i.e. the hypothalamic-pituitary-adrenal axis and the sympathetic nervous system may be involved, since they both strongly influence pain perception and energy regulation [2,22]. Thus, it seems plausible that maladaptive personality factors, such as perfectionism, may also play a role in the pathophysiology of the disorder by giving rise to chronic stress that negatively interferes with the stress system.

To the best of our knowledge, no studies have been carried out targeting 'interpersonal styles' [23] in FM, a concept referring to ways of relating to others that develop in childhood, persist over time and often become maladaptive.

This is remarkable, since in our own clinical practice we are struck by the fact that these patients' interpersonal style is often excessively 'other-directed'. Therefore, in the present study we aimed to corroborate our own observations about perfectionism and the interpersonal styles 'subjugation' 'approval-seeking', and 'self-sacrifice', using two well-validated self-report questionnaires in a controlled, cross-sectional design. Additionally, we also assessed levels of anxiety and depression.

Materials and Methods

Participants

Patients with a diagnosis of FM according to ACR criteria were recruited from the outpatient clinic of a general hospital (St.Maarten, Mechelen) by a specialist in physical medicine and rehabilitation with 30 years of clinical experience with FM (G.E.). The hospital also offers a multidisciplinary semi-residential therapy exclusively aimed at this patient group. We explicitly chose not to select patients during registration for or participation in this therapy to avoid selection bias.

Patients in the control group all had a diagnosis of rheumatoid arthritis (RA). We chose this condition because of its similar symptoms of pain and fatigue. These patients were recruited by rheumatologists at the outpatient clinic of a university hospital, two general hospitals and four private practices in the provinces of Antwerp, East Flanders and Limburg.

For both groups, the inclusion criteria were voluntary participation, female gender and age between 25 and 55 years. Serious psychiatric problems that were prominent at the time of screening and required active treatment, as well as abuse of psychoactive substances (diagnosed according to DSM-5 criteria) and intellectual impairment were considered exclusion criteria. Treatment with pain medication was allowed.

All patients were assessed for inclusion in order of presentation. They were provided with an informed consent form, explaining the purpose and design of the study. All assessment measures were self-report questionnaires. Patients were also asked to fill-in a form with personal data: age, gender, type of education, marital status, profession and order in the peer group of the parental family. For the FM group we also registered the duration of the complaints. All forms were handed to the participants with the request to return them in a closed envelope or to bring them along to the next consultation.

The recruiting physicians were informed in advance by the researcher about the design and purpose of the study and the procedure to be followed. The study was conducted according to ICH-GCP E6R2 guidelines and approved by two ethics committees of the participating hospitals (Emmaus and UZA). It was registered at <https://be.edge-clinical.org> with trial number EDGE 001796.

Assessment

First, as to perfectionism, an important distinction must be made. Adaptive perfectionists strive for high but realistic goals and derive self-satisfaction and a better sense of self-worth from them. On the contrary, in maladaptive perfectionism extremely high standards are applied, often driven by fear of failure. This form of perfectionism not only creates repeated dissatisfaction and chronic stress but has been shown to be related to various forms of psychopathology (anxiety disorder, depression, burnout, eating disorders...) [24]. Of note, a high degree of maladaptive perfectionism has also been found in CFS research [25].

The Frost Multidimensional Perfectionism Scale (FMPS) [24] has been well validated in different groups of patients as well as in healthy controls [26]. The Dutch version is also well validated, and the scale has been repeatedly used in populations with CFS [27]. The self-report questionnaire, scored on a 5-point Likert scale, covers 6 dimensions: 'concern over mistakes', 'high personal standards', 'parental expectations', 'parental criticism', 'doubts about actions' and 'organization and precision'. Because the latter subscale reflects an adaptive aspect of perfectionism and shows only a weak correlation with the other subscales, the author recommends not to include it when calculating the sum score.

Second, maladaptive interpersonal styles refer to early beliefs and ways of relating to others that develop in childhood and become rigid and persist over time, even though the context has often changed radically. According to Young [28] this particularly holds true for styles in the domain of 'other-directedness' i.e. 'subjugation' 'approval-seeking', and 'self-sacrifice', which make it difficult to guard and set boundaries in relationships. Importantly, these patterns are frequently associated with a lack of self-care and neglect of one's own bodily needs.

The Young Schema Questionnaire (YSQ-L3) [29] is a self-report questionnaire containing 16 early maladaptive schemes. Based on our clinical experience with FM patients, we used the 3 schemes in the domain of 'other-directedness', namely 'subjugation' (10 items), 'approval-seeking' (14 items), and 'self-sacrifice' (17 items), scored on a 6-point Likert scale. The psychometric properties of this questionnaire have been found to be good in various studies, as have those of the Dutch translation [30,31].

The Hospital Anxiety and Depression Scale (HADS) [31] is a self-report questionnaire containing 14 items, scored on a 4-point Likert scale (0-3) and divided in 2 subscales: anxiety and depression. Scores between 8 and 11 indicate a possible, and scores between 11 and 21 a probable depression and/or anxiety disorder. The scale has been repeatedly used with physically ill patients including those with FM [33]. Both the original and the Dutch versions have been properly validated [34,35]. As an example, mean scores for anxiety and depression of 6.5 and 5.0 respectively were found for a physically ill population, and 11.1 and 9.3 for a psychiatric outpatient group [35].

Statistical procedure

Preliminary sample size calculation was performed with JAMOVI. We opted for an alpha of .05 and a statistical power of .95.

According to these calculations 88 subjects were needed for the FMPS, and 38 for the YSQ-L3. However, since recruitment of the RA patients was severely delayed, we decided to perform the statistical analysis on the available number of patients at the time. In the FM group 3 patients did not indicate their residential status, 1 patient did not complete the FMPS. In the remaining cases, an occasional missing value (1 percent) was handled by imputation, substituting it with the mean value of the subset.

Statistical analysis was performed with SPSS Statistics Version 28.0.1.1-14.

We explored all variables with the Kolmogorov-Smirnov test, which showed a sufficiently normal distribution.

We performed an independent samples t-test for all variables to compare the means of the FM group to those of the RA group. To reduce type I error for multiple comparisons we used the Bonferroni correction.

To explore the relationship between the variables we opted for Pearson's correlations since all variables can be regarded as interval data in a sufficiently large and normally distributed sample in which we found no outliers.

Residential status was controlled for, using it as co-variate in a MANCOVA. We tested p two-tailed in all computations.

We used the STROBE cross-sectional reporting guidelines.

Results

After discarding 3 RA cases and 1 FM case due to incompletely filled out questionnaires, we included 100 patients with FM and 36 patients with RA.

Sociodemographic characteristics were similar in both groups, but the FM group showed a higher percentage of singles (**Table 1**).

Table 1. Sociodemographic characteristics.

		Total (n=136)	Fibromyalgia (n=100)	Rheumatoid Arthritis(n=36)
Age (average)		43.80	43.23	45.39
Age (range)		22-63	22-63	27-55
Residential status	living together	96 (70.6 %)	65 (65.0 %)	31 (86.1 %)
	single	37 (27.2 %)	32 (32.0 %)	5 (13.9 %)
Educational level	primary education	2 (1.5 %)	2 (2.0 %)	0 (0 %)
	secondary education	58 (42.6 %)	45 (45.0 %)	13 (36.1 %)
	baccalaureate	49 (36.0 %)	35 (35.0 %)	14 (38.9 %)
	master	27 (19.9 %)	18 (18.0 %)	9 (25.0 %)
Peer position in family of origin	eldest	43 (31.6 %)	30 (30.0 %)	13 (36.1 %)
	in between	33 (24.3 %)	25 (25.0 %)	8 (22.2 %)
	youngest	32 (23.5 %)	22 (22.0 %)	10 (27.8 %)
	only child	25 (18.4 %)	20 (20.0 %)	5 (13.9 %)

The duration of symptoms in the FM group ranged from 6 to 300 months, with a mean of 91.6 and a median of 72 months. This was comparable with the RA group that showed a range from 8 to 270 months, with a mean of 96.6 and a median of 70 months.

All dependent variables were normally distributed.

The means of all variables (**Table 2**) were higher in the FM group compared to the RA group.

On the FMPS (**Table 2**), 5 subscales were significantly increased in the FM group: 'concern over mistakes' $t(133) = 6.403, p < .001$; 'personal standards' $t(133) = 4.087, p < .001$; 'parental expectations' $t(133) = 3.764, p < .001$; 'parental criticism' $t(133) = 4.037, p < .001$; 'doubts about actions' $t(133) = 6.620, p < .001$. The subscale 'organization' was not significantly different between groups with $t(133) = .373, p = .710$. The mean sum score of the FMPS (score of all subscales except 'organization') was significantly increased in the FM group with $t(133) = 6.380, p < .001$. Cohen's d indicated the largest effect sizes for the 'concerns' and 'doubts' subscales which are most strongly associated with the maladaptive type of perfectionism.

On the YSQ-L3 (**Table 2**) all 3 subscales showed a significantly higher score for the FM group: 'subjugation' $t(134) = 6.704, p < .001$; 'self-sacrifice' $t(134) = 7.901, p < .001$; 'approval seeking' $t(134) = 6.270, p < .001$. Cohen's d indicated large effect sizes.

All results were maintained after controlling for residential status (**Supplementary Table 1**). All levels of significance were maintained after Bonferroni correction, except "parental expectations" ($p = .003$).

On the HADS we found high scores in the FM group for anxiety; mean 11.42 (SD 4.392, range 1-21) and moderate scores for depression; mean 9.41 (SD 4.221, range 0-19). The mean HADS sum score was 20.84 (SD 7.932, range 4-40). These scores are similar to the scores obtained from research in an outpatient group of patients with various psychiatric disorders [24].

We calculated the Pearson correlations within the FM group (**Table 3**). The non-significant correlation ($r = .163$) of the subscale 'organization' with the other subscales and sum score of the FMPS is in conform with our expectations, given the adaptive character of

Table 2. Student's t-test for independent groups FM and RA.

Self-report scale	FM group (N=100)* M(SD)	RA group (N=36) M(SD)	t(df)	p (2-sided)	Cohen's d (95% CI)
Y-SJ	36.56 (9.85)	24.28 (8.11)	6.70 (134)	<.001	1.30 (.89 - 1.71)
Y-SS	77.14 (11.60)	58.61 (13.23)	7.90 (134)	<.001	1.54 (1.11 - 1.96)
Y-AS	52.19 (13.04)	36.92 (10.99)	6.27 (134)	<.001	1.22 (.81 - 1.65)
FMPS -Co	30.84 (8.36)	20.86 (6.94)	6.40 (133)	<.001	1.25 (.83 - 1.65)
FMPS-PS	25.96 (5.93)	21.33 (5.50)	4.09 (133)	<.001	.79 (.40 - 1.19)
FMPS -PE	13.64 (6.54)	9.94 (4.37)	3.76 (133)	<.001	.61 (.22 - 1.00)
FMPS -PC	11.71 (4.83)	8.11 (3.78)	4.04 (133)	<.001	.79 (.39 - 1.18)
FMPS -Do	13.62 (3.39)	9.33 (3.14)	6.62 (133)	<.001	1.29 (.88 - 1.70)
FMPS -Or	24.26 (5.22)	23.89 (4.97)	0.37 (133)	.710	.07 (-.31 - .45)
FMPS SUM	95.76 (22.06)	69.58 (18.06)	6.38 (133)	<.001	1.13 (.71 - 1.54)

*For FMPS, N=99

Y: YSQ-L3; SJ: Subjugation; SS: Self-Sacrifice; AS: Approval Seeking; Co: Concern over mistakes; PS: Personal Standards; PE: Parental Expectations; PC: Parental Criticism; Do: Doubts about actions; Or: Organization

Table 3. Pearson correlations between the variables in the FM group.

		Y-SJ	Y-SS	Y-AS	FMPS -Co	FMPS- PS	FMPS -PE	FMPS -PC	FMPS -Do	FMPS- Or	FMPS SUM	HADS-a	HADS-d	HADS SUM
Y-SJ	Pearson r	--												
	N	100												
Y-SS	Pearson r	.640 **	--											
	P (2 sided)	<.001												
	N	100	100											
Y-AS	Pearson r	.700 **	.509 **	--										
	P (2 sided)	<.001	<.001											
	N	100	100	100										
FMPS Co	Pearson r	.627 **	.486 **	.601 **	--									
	P (2 sided)	<.001	<.001	<.001										
	N	99	99	99	99									
FMPS PS	Pearson r	.357 **	.428 **	.416 **	.636 **	--								
	P (2 sided)	<.001	<.001	<.001	<.001									
	N	99	99	99	99	99								
FMPS PE	Pearson r	.402 **	.365 **	.290 **	.334 **	.453 **	--							
	P (2 sided)	<.001	<.001	.004	<.001	<.001								
	N	99	99	99	99	99	99							
FMPS PC	Pearson r	.463 **	.469 **	.317 **	.407 **	.398 **	.719 **	--						
	P (2 sided)	<.001	<.001	.001	<.001	<.001	<.001							
	N	99	99	99	99	99	99	99						
FMPS Do	Pearson r	.541 **	.346 **	.505 **	.528 **	.381 **	.337 **	.259 **	--					
	P (2 sided)	<.001	<.001	<.001	<.001	<.001	<.001	.010						
	N	99	99	99	99	99	99	99	99					

FMPS-Or	Pearson r	.017	.277 **	.017	.041	.266 **	.090	.152	.106	--				
	P (2 sided)	.866	.005	.864	.690	.008	.375	.132	.298					
	N	99	99	99	99	99	99	99	99	99				
FMPS SUM	Pearson r	.637 **	.563 **	.572 **	.819 **	.789 **	.754 **	.733 **	.612 **	.163	--			
	P (2 sided)	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	.106				
	N	99	99	99	99	99	99	99	99	99	99			
HADS-a	Pearson r	.222 *	.147	.329 **	.082	-.069	-.004	-.007	.278 **	.121	.054	--		
	P (2 sided)	.027	.148	<.001	.420	.502	.968	.945	.006	.237	.596			
	N	99	99	99	98	98	98	98	98	98	98	99		
HADS-d	Pearson r	.273 **	.201 *	.259 **	.174	-.009	-.029	.012	.141	-.001	.080	.696 **	--	
	P (2 sided)	.006	.046	.010	.088	.926	.775	.908	.166	.990	.434	<.001		
	N	99	99	99	98	98	98	98	98	98	98	99	99	
HADS SUM	Pearson r	.269 **	.188	.320 **	.138	-.043	-.018	.002	.229 *	.066	.073	.924 **	.918 **	--
	P (2 sided)	.007	.062	.001	.176	.674	.862	.982	.023	.518	.478	<.001	<.001	
	N	99	99	99	98	98	98	98	98	98	98	99	99	99

HADS: Hospital Anxiety and Depression Scale; a: Anxiety; d: Depression

this dimension (see above, 2.2.). Furthermore, we found moderately strong to strong positive correlations between the YSQ-L3 subscales and the FMPS sum score and its subscales. The anxiety subscale of the HADS showed weak positive correlations with ‘subjugation’ (r=.222, p=.027), ‘approval seeking’ (r=.329, p<.001), and ‘doubts’ (r=.278, p=.006). The depression subscale of the HADS showed weak positive correlations with ‘subjugation’ (r = .273, p = .006), ‘self-sacrifice’ (r =.201, p = .046), and ‘approval seeking’ (r = .259, p = .010).

Based on the correlation between the HADS-scores and the YSQ-L3 subscales on the one hand and between the HADS- scale and the FMPS- subscale “doubts about actions” on the other hand, we isolated the subgroup of FM patients with a score < 8 on both HADS- subscales (22 patients). We found the same significance

levels as in the comparison between the full FM and RA groups (Table 4). The mean difference on the FMPS subscale “parental expectations” persisted but at a slightly lower level of significance with t (56) = 2.319, p = .024. Again, we found no statistically significant differences for the subscale “organization”. The Mann-Whitney test confirmed the levels of significance (Supplementary Table 2).

Discussion

We found all perfectionism subscales to be significantly elevated in the FM group, except for the ‘organization’ subscale which reflects an adaptive dimension of perfectionism. This is in accordance with previous studies [18-20,36] and with the high degree of maladaptive perfectionism found in CFS research [25,37].

Table 4. Student’s t-test for independent groups. RA group versus FM group with both HADS-a and HADS-d scores <8.

Self-report scale	FM group (N=22) M(SD)	RA group (N=36) M(SD)	Group stat t(df)	P(2-sided)	Cohen’s d (95% CI)
Y-SJ	33.82 (6.79)	24.28 (8.11)	4.62 (56)	<.001	1.25 (.67 -1.82)
Y-SS	76.00 (11.03)	58.61 (13.29)	5.15 (56)	<.001	1.39 (.80 -1.98)
Y-AS	46.23 (9.18)	36.92 (10.99)	3.33 (56)	.002	.90 (.34 -1.45)
FMPS- Co	31 (8.73)	20.86 (6.94)	4.89 (56)	<.001	1.32 (.74 -1.90)
FMPS-PS	26.73 (4.68)	21.33 (5.50)	3.83 (56)	<.001	1.04 (.47 -1.60)
FMPS-PE	12.95 (5.44)	9.94 (4.37)	2.32 (56)	.024	.63 (.08 -1.17)
FMPS-PC	12.45 (3.93)	8.11 (3.78)	4.19 (56)	<.001	1.13 (.56 -1.70)
FMPS-Do	12.73 (3.49)	9.33 (3.14)	3.82 (56)	<.001	1.04 (.47 -1.60)
FMPS-Or	23.41 (5.30)	23.89 (4.97)	-.35 (56)	.729	-.09 (-.62 - .44)
FMPS SUM	95.86 (18.42)	69.58 (18.06)	5.34 (56)	<.001	1.44 (.85 -2.03)

SJ: Subjugation; SS: Self-Sacrifice; AS: Approval Seeking; Co: Concern over mistakes; PS: Personal Standards; PE: Parental Expectations; PC: Parental Criticism; Do: Doubts about actions; Or: Organization

Furthermore, we showed that FM patients perceive themselves as more excessively 'other-directed', i.e. submissive, approval-seeking (pleasing) and self-sacrificing than their RA counterparts. These findings are in accordance with research on a similar construct, namely 'self-silencing' [38] that may mediate the association between early childhood adversities and various affective and functional somatic symptoms [39,40].

Although our clinical experience, based on the patients' attitudes and behaviors, but also their life stories and reports from family members, suggest that the above personality factors may play a role in the emergence as well as after the onset of FM, we will in the following discussion only consider the role of these factors once the patient has become ill.

As a matter of fact, several reasons make it plausible that maladaptive perfectionism and excessive 'other directedness' may both co-determine the course, therapeutic outcome and prognosis of FM [1,2]. First of all, due to their maladaptive nature, these personality patterns and interpersonal styles are likely to generate chronic stress and may, consequently, contribute to the pathophysiological mechanisms underlying the illness (for example, play a role in flare-ups) [41]. Moreover, they may increase the risk of comorbid depression and anxiety, which may negatively interfere with illness severity and quality of life.

Furthermore, these factors may lead to inappropriate attitudes and coping behaviors, including neglect of therapeutic advice about activity management and necessary lifestyle changes. Notably, maladaptive perfectionism may be associated with a tendency of physical or mental overexertion, by continuing a premorbid hyperactive lifestyle or pursuing unrealistic goals despite functional limitations [42,43]; or, conversely, it may lead to activity-avoidance which may compromise overall functionality [18,42], both impeding recovery. In the same vein, a tendency to systematically push aside one's own needs may lead to a lack of self-care which is crucial in self-management of pain and fatigue. In the long term, the above personality traits make it less probable that FM patients eventually accept the necessary bodily limits, reorganize necessary life-priorities and search for a 'new equilibrium' that reduces the risk of relapse [1,2].

Taking these considerations into account, we suggest – in line with recent authors [44-47] that clinicians should be aware of these patterns during the diagnostic screening and, if relevant, address them in a personalized treatment and rehabilitation plan. Evidently, the pros and cons of these patterns should be discussed with the patient, their origins retraced, and alternatives proposed that are more appropriate to the reality of the illness and functional limitations.

According to our clinical experience, current standard treatment protocols for FM – consisting of graded exercise, psychoeducation, cognitive-behavioral therapy (CBT), relaxation techniques and activity pacing [48] – may often fall short of addressing maladaptive personality dynamics. Such patterns are indeed mostly rooted in early childhood which makes them rigid, deeply ingrained, and stored in implicit memory [49]. Even more importantly, they often play a crucial role in intrapsychic functioning, such as maintaining self-esteem and/or inner safety [38,39]. Hence, we suggest that for many FM patients additional psychotherapy could make therapeutic efforts more effective.

Limitations

First, a group investigation always implies heterogeneity. For example, the wide range in symptom duration may not only reflect differences in symptom severity and level of functioning but also in (inter)personal dynamics.

Second, since we only included female FM patients, it remains to be investigated whether male FM patients might show comparable characteristics. Of note, we also did not control for ethnicity.

Third, there are limitations inherent in self-reporting. For example, a patient's representation of herself as a self-sacrificing person may be biased by the need for recognition of her suffering.

Finally, the possibility that 'reversed causation' plays a role in some results cannot totally be excluded. For example, the globally high scores on the HADS in the FM group may reflect an emotional bias on the patient's self-reporting, linked to the uncertainty, controversy and stigmatization surrounding the diagnosis of a 'functional somatic disorder'. It seems unlikely, however, that this plays a major role since the differences in all personality traits were maintained at a significant level when comparing the RA group with the FM subgroup showing low HADS scores.

Conclusion

The aim of this controlled cross-sectional study was to investigate to what extent FM is associated with personality features and interpersonal characteristics frequently observed in our clinical practice. The results show that, as a group, women with FM perceive themselves significantly more as perfectionist, and also as more submissive, approval-seeking, and self-sacrificing than their counterparts with RA.

Since it seems plausible that the above-described personality aspects may co-determine severity of the illness, degree of disability, and/or play a role as illness-sustaining factors, we suggest that they should be sufficiently addressed in the diagnostic screening of FM patients and taken into account in treatment and rehabilitation. Overall, our results add to recent pleas for an integrative, biopsychosocial approach of FM [1,41,42].

However, longitudinal research is needed to confirm the impact of these personality traits on illness course, treatment response and prognosis. In the context of a personalized therapeutic approach, future research should also find out which kind of psychotherapy is best suited to complement standard treatment and identify those patients for whom this addition would be beneficial.

In addition, further research may consider these traits as predictive factors in a multivariate logistic regression model to control for potential confounding. To enhance generalizability, it would be valuable to replicate the study with inclusion of male patients, statistically control for sociodemographic variables and include a larger multi-center sample of FM patients. Finally, we recommend using objective clinician-rated and hetero-anamnestic measures in addition to the self-report questionnaires to corroborate findings without reliance on subjective patient reporting.

Acknowledgments

We thank Dr. Stijn Michiels, Prof. Dr. Jan Lenaerts, Dr. Anneleen Moeyersoons, Dr. Marc Walschot, Dr. Evelien De Boeck, Dr. Jan Remans for recruiting RA patients; Amber Maes and Ulysse

Maes for the logistical support; Prof. Patrick Luyten, Prof. Dr. Jan De Lepeire and Dr. Tine Vanfleteren for their advice; Mr. Jarl Kampen, UAntwerpen, for the statistical advice; and Dr. Aileen Doyle for the translational and stylistic work.

Disclosures

The authors declare no conflicts of interest.

No financial support was received for this study nor for this manuscript.

Author Contributions Statement

All authors contributed to this manuscript. F Maes, E Goossens, and G Vanaerschot conceived and designed the analysis. F Maes and E Goossens collected the data. F Maes performed the analysis. F Maes, B Van Houdenhove, and G Vanaerschot wrote the paper.

Liability and Copyright

All authors hereby declare that they agree with the imposed rules regarding liability and copyright.

Ethical Publication Statement

The authors declare that the study was conducted according to ICH-GCP E6R2 guidelines. It was approved by “Ethisch comité UZA/UA” and “Commissie Ethiek-vzw Emmaüs” and registered at <https://be.edge-clinical.org> with trial number EDGE 001796.

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