

Distinctive personality profiles of fibromyalgia and chronic fatigue syndrome patients

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Objective: The current study is an innovative exploratory investigation, aiming at identifying differences in personality profiles within FMS and CFS patients. **Method:** 344 participants (309 female, 35 male) reported suffering from FMS and/or CFS and consented to participate in the study. Participants were recruited at an Israeli FM/CFS patient meeting held in May 2013, and through an announcement posted on several social networks. Participants were asked to complete a research questionnaire, which included FMS criteria and severity scales, and measures of personality, emotional functioning, positivity, social support and subjective assessment of general health. 204 participants completed the research questionnaire (40.7% attrition rate). **Results:** A cluster analysis produced two distinct clusters, which differed significantly on psychological variables, but did not differ on demographic variables or illness severity. As compared to cluster number 2 (N=107), participants classified into cluster number 1 (N=97) showed a less adaptive pattern, with higher levels of Harm Avoidance and Alexithymia; higher prevalence of Type D personality; and lower levels of Persistence, Reward Dependence, Cooperation, Self-Directedness, social support and positivity. **Conclusion:** The significant pattern of results indicates at least two distinct personality profiles of FM and CFS patients. Findings from this research may help improve the evaluation and treatment of FM and CFS patients, based on each patient's unique needs, psychological resources and weaknesses, as proposed by the current trend of personalized medicine.

1 Distinctive Personality Profiles of Fibromyalgia and Chronic Fatigue Syndrome Patients

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15 Abstract

16 Objective: The current study is an innovative exploratory investigation, aiming at identifying
17 differences in personality profiles within Fibromyalgia Syndrome (FMS) and Chronic Fatigue
18 Syndrome (CFS) patients.

19 Method: 344 participants (309 female, 35 male) reported suffering from FMS and/or CFS and
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32 Conclusion: The significant pattern of results indicates at least two distinct personality profiles of
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36 Introduction

37 Fibromyalgia (FMS) is a syndrome characterized by chronic widespread musculoskeletal pain
 38 and tenderness, associated with disturbed sleep patterns, chronic fatigue and a spectrum of
 39 additional functional symptoms. While the pathogenesis and etiology of FMS remain
 40 incompletely understood, a leading paradigm in this aspect currently holds that FMS is the result
 41 of a process of pain centralization, whereby the central nervous system has become extremely
 42 hyper-sensitive to the processing and transmission of pain, thus causing amplification of painful
 43 as well as non-painful stimuli and leading to a state of chronic pain (Clauw 2015). Chronic
 44 Fatigue Syndrome (CFS) is a clinical syndrome characterized by fatigue lasting over six months
 45 which is not associated with physical effort and is not relieved by rest (Afari & Buchwald 2003).
 46 Considerable clinical overlap existed between FMS and CFS, with many patients fulfilling
 47 criteria for both conditions simultaneously. Similar to other chronic medical conditions,
 48 psychiatric comorbidity such as anxiety and depression have been documented in a portion of
 49 FMS patients, while other patients appear to be surprisingly psychologically resilient in the face
 50 of ongoing pain and fatigue (Giesecke et al. 2003).

51 The purpose of the current study was to evaluate personality types found among FMS/CFS
 52 patients. The study was not specifically designed to compare FMS patients to CFS patients, but
 53 rather to characterize this generally overlapping population of patients in terms of personality
 54 types.

55 In the current study, we have focused on the following four aspects of personality and
 56 psychological coping: Alexithymia – the inability to identify and describe emotions in the self;
 57 Type D personality- the tendency towards negative affectivity and [social inhibition](#) and
 58 personality components, based on the psycho-biological model of Cloninger regarding

temperament and character; Level of positivity - self-confidence, optimism and satisfaction with life; Social support.

Alexithymia has been studied in patients suffering from chronic pain (Celikel & Saatcioglu 2006; Lumley et al. 2002) and FMS (Sayar et al. 2004; Steinweg et al. 2011). In a recent study, Castelli et al. reported alexithymia traits in 20% of a sample of FMS patients (Castelli et al. 2012). Thus, it has previously been suggested that the inability to correctly identify physical manifestations of emotions makes alexithymic individuals susceptible to incorrectly attributing innocent physical symptoms to physical disease (Tuzer et al. 2011). Originally identified by Denollet et al. as a predictor of long-term mortality among patients suffering from coronary heart disease (Denollet et al. 1996), type D personality was characterized by a tendency towards negative affectivity (NA) together with social inhibition (SI). Type D personality is strongly associated with both musculoskeletal pain, psychosomatic symptoms (Condén et al. 2013b) and sleep disorders (Condén et al. 2013a).

The psycho-biological model of temperament and character (Cloninger et al. 1993) suggests the existence of characteristic temperament dimensions, defined in terms of individual differences in associative learning in response to novelty, danger or punishment and reward. Thus, Novelty Seeking (NS) is described as a bias towards behaviors such as exploratory activity in response to novelty, impulsive decision making, as well as quick loss of temper in response to frustration. Harm Avoidance (HA) biases individuals to habitual pessimistic worry, fear of uncertainty, shyness and rapid fatigability. Reward Dependence (RD) is a tendency to sentimentality, to social attachment and dependence on the approval of others. Persistence (PS), refers to a tendency to continue specific behavior despite feelings of frustration, fatigue or lack of reward (Cloninger & Svrakic 1997). According to the "unified biosocial theory of personality", NS is associated with low basal dopaminergic activity, HA with high serotonergic activity, and RD with low basal

noradrenergic activity (Cloninger 1986). The psycho-biological model also identifies three dimensions of character, namely self-directedness (SD), Cooperativeness (CO) and Self-Transcendence (ST). Genetic analysis has confirmed a heritability component between 50% and 65% in each of the personality traits (Heath et al. 1994). Cohen et al. investigated the association between FMS and the serotonin transporter promoter region polymorphism, and the relationship to anxiety-related personality traits in FMS patients (Cohen et al. 2002). A subsequent study investigated the association between FMS and the dopamine D4 receptor gene and the relationship to NS trait (Dan et al. 2004). Glazer et al. comparing the personality of FMS patients and their relatives with and without FMS (Glazer et al. 2010) found that FMS patients, as well as their relatives with FMS, had higher scores on HA than relatives without FMS. Despite these studies, a recent systematic review failed to identify a specific "FMS personality"; instead it was proposed that personality may act as a filter, that modulates a person's response to psychological stressors and that certain personalities may facilitate translation of these stressors to physiological responses which culminate in FMS (Malin & Littlejohn 2012). While various aspects of both personality as well as psychiatric comorbidity have been frequently studied in the FMS syndrome, less attention has been focused on aspects of resilience and positivity, which is defined as a general dispositional determinant of subjective wellbeing, which may account for individual variation and stability in happiness, despite environmental challenge (Kozma et al. 2000).

Social support, the perception of the individual that he is cared for and loved, esteemed, and a member of a network of mutual obligations (Cobb 1976) may have a protective effect versus a broad range of pathological conditions. Social support is directly associated with the severity of physiological and psychological symptoms and may moderate the health-related effects of stress

(Procidano & Heller 1983; Sarason et al. 1985). Patients suffering from FMS and CFS have previously been reported to suffer from low levels of social support (Schoofs et al. 2004).

Methods:

Participants: Individuals who self-identified as suffering from FMS or CFS, female or male were recruited through an appeal made at an FMS patient organization meeting held in Tel Aviv, Israel on May 2013, as well as through internet forums of FMS/CFS patients. No reward was offered, for participation. Participants were offered to be notified of the study results. The study was approved by the IRB of the Ruppin Academic Center (IRB reference number 8/2013).

Procedure:

After providing consent to participate in the study, participants were given access to an on-line self-report, using Qualtrics as the delivery system at <http://www.qualtrics.com> website (Provo, UT, USA) (Bryson et al. 2012; Passmore et al. 2002). The online survey, which was anonymous, took about 20 minutes to complete, and participants were able to stop and restart as necessary, in order to minimize the discomfort FMS patients may experience during prolonged sitting. In total, 204 participants completed the entire survey while 140 (40.7%) completed it only partially.

Tools and measures: FMS: Meeting FMS diagnostic criteria as well as disease severity were determined through the Fibromyalgia Criteria and Severity Scales (FCSS) which are used for the diagnosis of FMS in epidemiological and clinical studies (Wolfe et al. 2011) and which are based on the 2010 proposed ACR criteria for the diagnosis of FMS (Wolfe et al. 2010). This questionnaire includes two scales: the widespread pain index (WPI) and the symptom severity scale (SSS). The results of these two scales are used both for establishing the diagnosis of FMS as well as for evaluating severity. Notably, in the current study a diagnosis of CFS was not specifically tested for separately; rather patients were surveyed for the fulfillment of FMS criteria

alone as described. We adopted this approach due to the overwhelming clinical epidemiological overlap between FMS and CFS.

Alexithymia was assessed through the Toronto Alexithymia Scale (Bagby et al. 1994) which measures inability to identify and describe emotions. The questionnaire includes 20 items on a Likert scale from 1 to 5 and measures 3 subscales: the Difficulty Describing Feelings subscale, the Difficulty Identifying Feeling subscale and the Externally-Oriented Thinking subscale. This tool has previously been translated into Hebrew and validated (Zohar et al. 2011).

Personality evaluation:

Personality was evaluated through the following questionnaires: Temperament and Character Inventory Revised TCI-R (Cloninger et al. 1994). In the current study the shortened, 140 item version was used (TCI-140). This questionnaire includes 7 scales: Harm avoidance (HA), Reward Dependence (RD), Persistence (PS), Self-Directedness (SD), Cooperativeness (CO) and Self Transcendence (ST). A validated Hebrew version was used in the current study (Zohar & Cloninger 2011). Type D personality was assessed using the DS-14 questionnaire (Denollet 2005) which includes 7 items referring to negative affectivity (NA) and 7 items referring to social inhibition (SI). Individuals who score 10 points or more on both NA and SI dimensions are classified as Type D personality. A validated Hebrew translation of this tool was utilized in the current study [31].

Positivity: this construct was assessed by the Positivity Orientation Scale (P scale) [58]. This tool is comprised of 8 items assessing an individual's positive attitude about himself about his life and his attitude towards the future.

Results:

151 344 participants (309 females and 35 males) participated.

152 Table 1 presents demographic details of the study participants.

153 Table 1: Demographic data, ethnicity, level of religiosity, employment status and level of physical
154 activity among study participants.

Age	16-69 (mean – 41.74, SD – 12.09)	Frequency	%
Gender	Female	309	89.8
	Male	35	10.2
Marital status	Unmarried	96	27.9
	Married	174	50.6
	Divorced	68	19.8
	Widow	6	1.7
Educational level	Partial high school (≤ 10 years)	18	5.2
	Full high school (12 years)	102	29.7
	≥ 13 years	84	24.4
	First degree	94	27.3
	Second or third degree	46	13.4
Ethnicity	Jewish	330	95.9
	Arab – Muslim	2	0.6
	Arab – Christian	1	0.3
	Other	11	3.2
Religiosity level	Secular	238	69.2
	Traditional	61	17.7
	Orthodox	38	11.1
	"Haredi" (ultra- orthodox)	6	1.7
Employment status	Not working or studying	115	33.4
	Fully employed	34	9.9
	Partial employment	100	29.1
	Occasional work/ volunteer	95	27.6
Level of physical activity	No physical activity	51	14.8
	Low physical activity	151	43.9
	Moderate activity	114	33.1
	High activity	27	7.8
	Very High activity	1	0.3

155 Patient characteristics:

156 260 participants, which represented 75.6% of the total, met diagnostic criteria for FMS, while 84
157 participants (24.4%) did not. Notably, participants not meeting FMS criteria nonetheless suffered
158 from chronic widespread pain, fatigue and other symptoms of variable severity and thus may be
159 considered as representing sub- threshold FMS cases. 235 (90.4%) of the participants who met
160 FMS criteria were female. 99 participants (28.8%) were characterized as type D personality,

including 29.1% of females and 25.7% of males respectively. No significant association was observed between gender and type D personality - $\chi^2(1) = 0.179$, $p = 0.673$ (NS) $N = 344$. 30% of participants meeting FMS criteria were characterized as type D personality compared with 25% of participants not fulfilling FMS criteria. No significant association was observed between type D and fulfilling FMS criteria $\chi^2(1) = 0.774$, $p = 0.379$ (NS), $N = 344$.

Cluster analysis:

In order to evaluate patterns of psychological coping, cluster analysis was performed on 204 participants, whose questionnaires were complete. The analysis yielded 2 groups, which differed from each other on psychological variables including type D personality, alexithymia, positivity, social support, Cloninger's temperament and character domains. 97 and 107 participants were classified into cluster 1 and cluster 2 respectively. Compared with cluster 2, cluster 1 was characterized by the following character dimensions: lower cooperativeness (CO) and lower self-directedness (SD). Cluster 1 was also characterized by the following temperament domains: lower persistence (PS), lower reward dependence (RD), and higher harm avoidance (HA). This cluster was also characterized by higher levels of alexithymia, less social support, lower levels of positivity and higher frequency of type D personality. Table 2 presents mean values of psychological variables for each cluster.

178 Table 2: Cluster analysis presenting mean values of psychological variables per cluster group.

	Cluster 1(N=98)	Cluster 2 (N=106)
	Mean(SD)	Mean(SD)
Self-transcendence (ST)	44.73(12.02)	44.49(12.65)
Cooperativeness (CO)	74.46(8.36)	82.60(7.27)
Self-directedness (SD)	57.59(9.09)	73.79(7.54)
Persistence (PS)	58.81(10.67)	69.69(9.16)
Reward dependence (RD)	65.53(9.99)	71.22(8.38)
Harm avoidance (HA)	73.76(9.69)	59.73(11.07)
Novelty seeking (NS)	55.87(7.97)	54.23(8.14)
Alexithymia	46.07(10.93)	34.75(7.19)
Social Support	43.65(11.52)	59.00(9.21)
Positivity	2.79(0.65)	3.62(0.51)
Type D personality	0.755(0.43)	0.20(0.04)

179 Demographic characteristics of clusters:

180 After the process of cluster analysis, demographic parameters were compared between the two

181 clusters including age, gender, educational level and employment status. No significant

182 differences were found between cluster 1 and cluster 2 regarding age, gender, marital status,

183 educational level, and employment status. In order to test the hypothesis that the two clusters

184 would not differ regarding FMS criteria, a Chi-Square Test for Independence was performed.

185 79.4% of individuals in cluster 1 and 72% of individuals in cluster 2 fulfilled FMS diagnostic

186 criteria. In accordance with the hypothesis, no significant association was found between cluster

187 designation and the diagnosis of FMS - $\chi^2(1)= 1.513$, $p=0.216$ (NS), $N=204$.

In order to compare the cluster analysis categories regarding the clinical parameters of FMS severity, as well as levels of physical activity, a Multivariate analysis of variance (MANOVA) was performed. In this analysis the independent variable was the cluster category and the dependent categories were the subjective health assessment, the extent of physical activity, the symptom severity score (SSS), and the widespread pain index (WPI). The results of the MANOVA indicated a significant difference between the cluster categories regarding the aggregate of dependent variables [Wilks' Lambda=0.93, $F(4,199) = 3.56$, $p < 0.01$]. Univariate analysis demonstrated a significant difference between the cluster categories regarding the SSS - $p < 0.0001$, with symptom severity significantly higher among individuals in cluster 1 (Mean =9.11, SD=2.18) compared with cluster 2 (Mean=7.99, SD=2.19). No significant difference was found when comparing cluster 1 with cluster 2 regarding subjective health assessment, WPI and levels of physical activity.

200 Discussion:

201 The current study constitutes a novel exploratory approach towards identifying psychological
 202 patterns and personality aspects of resilience among patients suffering from FMS and CFS. In
 203 this study we have attempted to elucidate the ways in which personality patterns interact with
 204 styles of coping with illness. While we recruited patients who self – reported a diagnosis of FMS,
 205 a significant proportion of the participants were found to be sub-threshold regarding the diagnosis
 206 of FMS, according to current diagnostic criteria. In the analysis of results we have chosen to
 207 compare this group of individuals, who suffer from varying degrees of chronic pain and fatigue,
 208 with individuals who fulfil the FMS diagnostic criteria. Individuals fulfilling the diagnostic
 209 criteria were found to rate significantly lower on scales of social support, positivity, physical
 210 activity, and subjective health assessment. These groups also differed in the level of self-
 211 directedness (SD), which was lower among the criteria-positive individuals compared with the
 212 sub-threshold individuals. This finding is in accordance with previous research, which indicates
 213 that the SD of FMS patients is lower than that found among healthy controls (Gencay-Can & Can
 214 2012). SD is a trait which indicates the extent to which an individual can depend on himself and
 215 on his capabilities, allowing him to feel responsible for his own fate, resourceful and hopeful
 216 (Cloninger et al. 1997). Low levels of SD (as well as low levels of cooperativeness and high
 217 levels of harm avoidance) have been described in chronic pain patients (Conrad et al. 2007).
 218 The most significant findings of the current study are related to the classification of the study
 219 participants (both FMS-criteria positive and sub-threshold individuals) into two clusters, based on
 220 the psychological styles of coping identified. This analysis yielded two clusters which clearly
 221 differ in their psychological profile, while not being significantly different on clinical grounds,
 222 and the clusters were nearly equal in the number of individuals they aggregated. The numerically
 223 larger cluster (107 vs. 97) was highly resilient in their psychological profile. Individuals in this
 224 cluster had a frequency of type D personality which was similar to the general population;

They were as high as healthy controls in the character traits of SD and CO, and in the temperament trait of PS, and as low in the temperament trait of HA. (Cloninger & Zohar 2011) This result is very similar to that of Leombruni et al. (Leombruni et al. 2016) who also found two distinct personality clusters for FM patients, with the bigger cluster characterized by resilient personality profile and emotional style. The first group of patients was the mal-adapted cluster, characterized by higher levels of HA and alexithymia, higher frequency of type D, and lower levels of CO, SD, PS, RD positivity and social support. No significant differences were identified between the groups regarding the traits of self-transcendence (ST) and novelty seeking (NS). The clear clustering of patients between these two groups and the striking differences found between them, indicate the existence of two uniquely separate styles of coping among FMS patients and sheds doubt on the findings of previous studies which implied the existence of one homogeneous personality pattern among FMS patients (Anderberg et al. 1999; Gencay-Can & Can 2012) and other patients suffering from chronic pain (Conrad et al. 2013). The emotional profile which emerges from the characteristics of the first group indicates a generally less adaptive pattern, associated with a decreased well-being. Due to high levels of HA, these individuals are more prone to be cautious, nervous, passive, negativistic, insecure and pessimistic. High levels of carefulness and pessimism may be associated with difficulty with expressing emotions, due to fear of negative implications (Cloninger & Zohar 2011). Individuals with high levels of alexithymia, as in this group, experience difficulty in identifying their own emotions and in differentiating between these emotions and physical sensations which are associated with emotional stimulation. They may have difficulty articulating emotions and tend to be self-centered, impatient and critical. The low levels of SD of such individuals is associated with low self-esteem, difficulty in taking responsibility, difficulty in setting long-term goals and in overcoming obstacles. Individuals in the first group are also characterized by low levels of PS and difficulty in coping with frustration. Low reward – dependence among these individuals has

the advantage of less dependence on satisfying others and more independence; it also however carries the disadvantages of a tendency towards social withdrawal and isolation (Cloninger 2008). Thus, individuals in this group are prone towards low levels of social support, and may not feel they have adequate bonds to fall back on (Zimet et al. 1988). Such individuals tend to have lower levels of positivity, lower self-esteem and higher degrees of pessimism (Caprara et al. 2012). Individuals in the first group were also found to have a higher frequency of type D personality, the characteristics of which appear to be in agreement with other personality characteristics identified among individuals in this group. Due to negative cognitive patterns, these individuals tend to experience difficulty in acquiring social support, tend to experience anxiety in social contexts and experience the surroundings as critical, thus augmenting negative feelings (Denollet 2005). Individuals in the second group, show a surprising psychological profile, of resilience and well-being, although they are no less prone to FM pain and fatigue. They are characterized by a healthier and more adaptive pattern of coping, compared with the first group. Due to lower levels of HA, these individuals tend to be freer of worries, energetic, extroverted and optimistic. The clear advantage of this pattern lies in the confidence such individuals feel when faced with danger or insecurity. On the other hand, such individuals are at an increased risk of exhibiting inadequate response to danger situations at the risk of actual harm. Individuals in the second group were also characterized by higher levels of RD and as such were more socially interactive and sensitive. They tend to be more tuned-in on social cues and to create more frequent relationships based on genuine affection and concern for others. They are frequently involved in efforts to satisfy others, as part of their social interactivity. These individuals were also characterized by higher levels of PS and setting higher personal goals. They increase their efforts in expectation of reward and view fatigue and frustration as challenges to be overcome. These individuals scored higher on scales of SD, and thus tend to be more responsible, reliable and resourceful. They are more realistic in setting goals and striving towards them. They also show higher levels of empathy,

patience, and compassion. All these qualities lead to higher levels of cooperation and social support. Individuals in this group showed lower levels of alexithymia, and a population prevalence of type D, leading to a more optimistic outlook and to less social withdrawal and negative feelings.

Our results indicate that the personality clusters identified did not differ regarding demographic characteristics including age, gender, marital status levels of education and employment. There was also no difference between the groups regarding the proportion of individuals who were FMS-criteria positive versus the sub-threshold individuals. Levels of widespread pain, as measured by the WPI index also did not differ between groups, indicating no difference in levels of chronic pain or pain distribution. The groups did however show a significant difference on the symptom severity score (SSS) which was significantly higher in the first group. Thus, individuals in the first group experienced higher levels of symptoms such as abdominal pain, non-refreshing sleep and cognitive difficulties.

The results of the current study have important potential therapeutic and research implications. Emotional profiles such as those identified in our study have previously been shown to be associated with various aspects of wellbeing and to be predictive of an individual's future health condition (Josefsson et al. 2011). Thus SD is strongly correlated to general mental health and absence of [personality disorder](#) (Suchankova et al. 2011). Higher levels of SD and CO have been found to be associated with better mental and physical health, increased social support and improved coping with stressful situations (Zohar et al. 2011).

High levels of HA on the other hand have been associated with the behavioral pattern of fear and avoidance (Conrad et al. 2007) and are associated with a poor response to treatment in the context of chronic pain (Asmundson et al. 1999).

The group clustering described in the current study has the potential of leading to development of patient – specific treatment plans, adjusted for the needs of FMS patients, in accordance with the

style of coping identified. Thus, patients exhibiting high levels of alexithymia, may benefit from interventions aimed at improving the ability to identify and express emotions, while patients exhibiting characteristics of the type D personality may gain through interventions aimed at improving social skills and reducing negative feelings. Targeted interventions aimed at strengthening personality characteristics which boost resilience, such as identified in our second group, may help patients not originally exhibiting these characteristics. Both cognitive treatment and anti-depressants have previously been shown to increase levels of SD, reduce vulnerability to depression and associated co-morbidities (Bulik et al. 1998; Joyce et al. 1994). Empirical testing of interventions aimed at increasing SD and decreasing HA among FMS patients is a future challenge.

Limitations:

While the current study appears to have identified two distinct personality patterns among patients suffering from FMS and CFS, these patterns may in fact not represent a dichotomous distinction, but rather a spectrum between which patients may be distributed. In addition, in the present study we have not looked at the effects of modifying factors such as anxiety and depression, which may well add important clinical information beyond the personality characteristics. Furthermore, in the current study we have not differentiated between patients suffering from FMS and those suffering from "pure" CFS (not fulfilling FMS criteria). Despite the large clinical overlap between these groups, they are not identical and future research may highlight personality-pattern differences between these two groups.

Implications and conclusion:

In the current study we have identified two distinctive clusters of personality characteristics among patients previously diagnosed as suffering from FMS or CFS. These results draw attention to the heterogenic psychological characteristics of this patient population and to the necessity to

avoid unwarranted generalization in characterizing these individuals. Additional research into the spectrum of personality characteristics of patients suffering from FMS/CFS, as well as further delineation of the differences between these groups, are called for in order to facilitate ideal personalized treatment of these individuals.

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