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## Chronic fatigue syndrome and personality: A case-control study using the alternative five factor model



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### ABSTRACT

Neuroticism is the personality dimension most frequently associated with chronic fatigue syndrome (CFS). Most studies have also shown that CFS patients are less extraverted than non-CFS patients, but results have been inconsistent, possibly because the facets of the extraversion dimension have not been separately analyzed. This study has the following aims: to assess the personality profile of adults with CFS using the Alternative Five-Factor Model (AFFM), which considers Activity and Sociability as two separate factors of Extraversion, and to test the discriminant validity of a measure of the AFFM, the Zuckerman–Kuhlman Personality Questionnaire, in differentiating CFS subjects from normal-range matched controls. The CFS sample consisted of 132 consecutive patients referred for persistent fatigue or pain to the Department of Medicine of a university hospital. These were compared with 132 matched normal population controls. Significantly lower levels of Activity and significantly higher levels of Neuroticism–Anxiety best discriminated CFS patients from controls. The results are consistent with existing data on the relationship between Neuroticism and CFS, and clarify the relationship between Extraversion and CFS by providing new data on the relationship of Activity to CFS.

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### 1. Introduction

Chronic fatigue syndrome (CFS) is a poorly understood medical condition characterized by the presence of chronic and persistently debilitating fatigue for at least 6 months. Additionally, the diagnosis requires at least four of the following symptoms: new headaches, muscle and multi-joint pain, tender lymph nodes, recurrent sore throat, sleep disturbances and impaired memory or concentration. These symptoms lead to a substantial reduction in occupational, personal, social and educational status (Fukuda et al., 1994). Estimates of the prevalence of CFS range from 0.2% to 2.6% (Jason et al., 1999; Reyes et al., 2003; Reeves et al., 2005). Several etiological factors have been proposed, but no consistent explanation of this disorder has emerged. The etiology of CFS is

probably multi-factorial (Harvey and Wessely, 2009). It is useful to distinguish among predisposing, precipitating, and perpetuating factors (Prins et al., 2006). Some researchers have suggested that personality plays a predisposing and/or perpetuating role in CFS (Henderson and Tannock, 2004). Unfortunately, studies focused on personality and CFS have generally employed heterogeneous methodologies (i.e., diversity of designs, lack of consensus about case definition, and comparison samples including psychiatric populations), and this heterogeneity constitutes an important limitation in terms of replication and generalization. Most importantly, research in this field has frequently ignored the relevance of normal personality traits. Ignoring the study of normal personality structure could lead to bias in characterizing CFS patients by emphasizing abnormal instead of normal personality traits (van Geelen et al., 2007). Research assessing normal personality in patients with CFS has mostly been carried out within the framework of the Eysenck or the Five-Factor Model (FFM) perspective, using either the Eysenck Personality Questionnaire (EPQ; Eysenck and Eysenck, 1975) or the revised NEO Personality Inventory (NEO PI-R; Costa and McCrae, 1992). Empirical evidence has shown Neuroticism, the disposition to experience negative affect (i.e., anxiety and depression), to be one of the most consistent personality dimensions associated with CFS (Taillefer et al., 2003;

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Besharat et al., 2011). However, results regarding Extraversion, the second most widely studied personality dimension in CFS, are less clear. Most studies have shown that CFS subjects are less extraverted than non-CFS subjects (Buckley et al., 1999; Chubb et al., 1999; Deary and Chalder, 2010; Besharat et al., 2011), but results have not been as consistent as with the neuroticism dimension. For example, in a recent twin study, Poeschla et al. (2013) found that lower extraversion was associated with CFS, and that this relationship might be causal and bidirectional, whereas in the study by Kato et al. (2006), also using twin pairs, extraversion was not significantly associated with CFS. These inconsistencies may indicate the need to assess extraversion more precisely by paying more attention to the different facets of this dimension. A study by Deary and Chalder (2010) found that Neuroticism and Extraversion, assessed with the NEO PI-R, significantly differentiated CFS from control groups. CFS patients scored higher on Neuroticism, and only two out of the six facets of Extraversion, Activity and Gregariousness, were significantly lower in CFS subjects. Findings regarding the other personality dimensions assessed by the EPQ or by the NEO PI-R were less consistent.

In this research, we assessed personality with the Alternative Five-Factor Model (AFFM), which has some advantages over the aforementioned models. The AFFM (Zuckerman et al., 1991, 1993) emerged from a series of factor analyses of scales that had already been widely used in studies of temperament. The traits of the AFFM are measured with the Zuckerman–Kuhlman Personality Questionnaire (ZKPQ; Zuckerman et al., 1993). In this model, Activity and Sociability constitute two separate traits of Extraversion. This differentiation may provide a better understanding of the discriminant role of Extraversion in this illness. In addition, the dimension of Neuroticism does not include either impulsivity or hostility traits, as does the NEO PI-R; instead, specific scales for these two traits are included in the ZKPQ.

The objective of this study is twofold: to assess the personality profile of adults with CFS from the AFFM perspective, and to test the discriminant validity of the ZKPQ in differentiating CFS subjects from normal-range controls. The accuracy of the resulting model was tested by a cross-validation procedure described below. It was hypothesized that participants with CFS, compared with a community control sample, would score higher on Neuroticism-Anxiety and lower on Activity and Sociability.

## 2. Methods

### 2.1. Participants

The CFS sample consisted of 132 consecutive patients, 125 (94.7%) women and 7 men (age:  $M=47.69$  years,  $S.D.=8.98$ , range=22–72) referred to the Department of Internal Medicine, Hospital Universitari Vall d'Hebron, Barcelona. CFS diagnosis was established according to the Centers for Disease Control (CDC) criteria (Fukuda et al., 1994). Inclusion criteria were as follows: age greater than 18, meeting CDC diagnostic criteria for CFS, completing a clinical assessment, and providing informed consent to participate. Exclusion criteria were the presence of a psychotic, major depressive or manic episode, substance use disorders (except for nicotine), or a diagnosis of an eating disorder.

The CFS sample was matched subject-to-subject with a normal-range sample which acted as a control group. This comparison sample comprised 132 subjects, 125 women and 7 men (age:  $M=47.69$  years,  $S.D.=8.98$ ). This control group was extracted from a general population sample consisting of 570 males and 599 females ranging in age from 18 to 93 years. This sample was part of a previous study aimed at obtaining the Spanish norms of the ZKPQ and matched the census projections of the Statistical Institute in the distribution of age and sex groups (Gomà-i-Freixanet et al., 2003). A similar selection of controls was used in other studies (Gomà-i-Freixanet et al., 2008a; Valero et al., 2012; Albiol et al., in press).

### 2.2. Assessment instruments

The *Fatigue Impact Scale* (FIS; Fisk et al., 1994) was used to assess the impact of fatigue on patients' lives. This multidimensional scale assesses the impact of fatigue

on different areas of daily functioning (cognitive, physical and psychosocial) rather than fatigue severity or phenomenology. The FIS consists of 40 statements that respondents rate on a Likert scale ranging from 0 (*no problem*) to 4 (*extreme problem*). All items are scaled and higher scores indicate a greater impact of fatigue on a patient's activities. This instrument has shown good discriminant and concurrent validity (Dittner et al., 2004).

The severity of symptoms of depression and anxiety was assessed by the *Hospital Anxiety–Depression Scale* (HAD; Zigmond and Snaith, 1983) aimed at the evaluation of these symptoms in patients with a physical illness. It contains 14 items, and scores range from 0 to 21 for each scale. Only scores of depression symptoms were considered in this research.

Personality was assessed with the *Zuckerman–Kuhlman Personality Questionnaire* (ZKPQ; Zuckerman et al., 1993). It consists of five content scales, plus an Infrequency scale. The ZKPQ requires true or false responses to 99 questions. The five scales can be described in terms of their typical content: *Neuroticism–Anxiety* (N-Anx) items describe frequent emotional upset, tension, lack of self-confidence and sensitivity to criticism. *Activity* (Act) items describe the need for general activity, an inability to relax and a preference for hard and challenging work and high energy level. *Sociability* (Sy) items describe the number of one's friends, outgoingness at parties and a preference for being with others as opposed to being alone. *Impulsive–Sensation Seeking* (ImpSS) items involve a lack of planning and the tendency to act impulsively without thinking, and the seeking of excitement and novel experiences. The ImpSS items are general in content and do not describe specific activities such as risky sports, drinking, drugs, or having sex. *Aggression–Hostility* (Agg-Host) items describe a readiness to express verbal aggression; rude, thoughtless or antisocial behavior; vengefulness and spitefulness; having a quick temper and impatience with others. The ZKPQ also includes an *Infrequency* scale (Infreq). This scale rather than being regarded as a scale in the normative sense should only be used to detect inattention to the task or simply as a validity measure for the individual test-taker. The items are mostly exaggerated, true scored, socially desirable but unlikely to be completely true statements about anyone. This scale is highly skewed, with most scores around 0 or 1.

In the present study, participants from both samples completed the Spanish version of the ZKPQ (Gomà-i-Freixanet et al., 2004). This instrument has shown good psychometric properties in Spanish samples, with internal consistency alpha coefficients ranging from 0.67 to 0.84. The factorial structure has also been replicated in Spanish samples, including general population samples (Gomà-i-Freixanet et al., 2008b, 2004) with congruence coefficients ranging from 0.88 to 0.96, and from 0.84 to 0.92 in female and male samples, respectively (Gomà-i-Freixanet et al., 2004). This test has also demonstrated consensual validity between self- and hetero-reports (Gomà-i-Freixanet et al., 2005) and good discriminant validity in clinical samples with borderline personality disorder or attention deficit disorder (Gomà-i-Freixanet et al., 2008a; Martínez et al., 2010; Pascual et al., 2007; Valero et al., 2012). The ZKPQ also provides normative data for the general population (Gomà-i-Freixanet and Valero, 2008).

### 2.3. Procedure

Before psychiatric assessment, all patients completed an extensive clinical history and underwent a medical examination at the Department of Internal Medicine by physicians with experience in CFS. Since fatigue is not specific to CFS, to exclude other medical conditions causing fatigue, we applied a diagnostic protocol described elsewhere (Alijotas et al., 2002). It included an extensive physical examination and a complete blood analysis, including hematologic, hepatic, renal, thyroid, and cortisol indices; and serologic antibodies to herpes simplex virus, cytomegalovirus, Epstein-Barr virus, and hepatitis B and C viruses. Complementary tests such as neuroimaging (computed tomography or magnetic resonance imaging), polysomnography, and tilt-table tests were also implemented when a differential diagnosis was needed. Participants with a probable CFS diagnosis were given a comprehensive assessment carried out in three sessions by a psychiatrist and a clinical psychologist who recorded sociodemographic and clinical data, interviewed the patient, conducted a psychopathological examination with the Structured Clinical Interview for DSM-IV (SCID-I; First et al., 1997), and administered questionnaires (FIS, HAD and ZKPQ).

We used a case-control design, randomly selecting one control for each case, matched by age and gender (Gomà-i-Freixanet et al., 2008a). Control subjects answered the personality questionnaire anonymously and only demographic data such as age, gender and educational level were recorded.

This study was performed in accordance with the Declaration of Helsinki guidelines (Rickham, 1964) and was approved by the Research Ethics Committee from the hospital. All participants provided written informed consent after receiving a detailed description of the study and were free to withdraw at any time.

### 2.4. Statistical analysis

Correlations among personality scales were calculated for both groups. To test for group differences, a two-tailed Student's *t*-test for independent groups and Cohen's *d* were calculated. Cronbach's alpha coefficients were also reported for both groups. In order to verify the accuracy of our estimations, a twofold cross-

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