



# Personality and chronic fatigue syndrome: The role of the five-factor model<sup>☆</sup>

Mohammad Ali Besharat<sup>\*</sup>, Ahmad Behpajoo, Hamid Poursharifi, Fariba Zarani

Department of Psychology, University of Tehran, P.O. Box 14155-6456, Tehran, Iran

## ARTICLE INFO

### Article history:

Received 1 February 2010  
Received in revised form 6 December 2010  
Accepted 19 December 2010

### Keywords:

Personality  
Chronic fatigue syndrome  
Five-factor model

## ABSTRACT

The aim of this study was to examine the relationships between personality factors and the symptomatology of fatigue among people with chronic fatigue syndrome (CFS), and compare them to people from the general population. Seventy-seven CFS patients (47 women, 30 men) were compared with 72 healthy individuals (44 women, 28 men) to investigate whether personality factors are related to the symptomatology of fatigue. All participants were asked to complete the NEO Five Factor Inventory (NEO-FFI), the Modified Fatigue Impact Scale (MFIS), the Fatigue Severity Scale (FSC), and the Mental Health Inventory (MHI). The results revealed that the CFS group reported higher levels of neuroticism and conscientiousness than the control group. These two personality factors were significantly related to fatigue symptoms, impact, and severity in both groups. These findings suggest that personality factors of neuroticism and conscientiousness may play an important role in the development and perpetuation of fatigue symptoms.

© 2010 Elsevier B.V. All rights reserved.

## 1. Introduction

Chronic fatigue syndrome (CFS) is characterized by several disabling medically unexplained mental and physical fatigue of at least 6 months duration, accompanied by a number of additional nonspecific symptoms, including muscle pain, sleep disturbances, depression and impaired concentration (Fukuda et al., 1994). Studies on CFS have suggested several etiological factors, including active viral infection, immune dysfunction, dysfunctions in neuroendocrine system, psychiatric disorders, neuropsychological deficits, and impaired cognitive functioning. However, there is no consistent evidence for any of these explanations (see Van Geelen et al., 2007).

The evidence in support of psychological nature of the illness is also convincing (Henderson and Tannock, 2004; Moss-Morris, 1997; Taillefer et al., 2003; Van Geelen et al., 2007; White and Schweitzer, 2000). Some researchers have shown that personality characteristics may play a predisposing or perpetuating role in CFS (see Van Geelen et al., 2007; Henderson and Tannock, 2004). Powell et al. (1990) found that CFS subjects have a tendency to minimize psychological contributions to their illness and to use a depressive attribution style or learned helplessness. A tendency to view the causes for bad events as external, stable, and global was found as a typical feature within the CFS subjects (Chubb et al., 1999). Alexithymia characteristics such as marked externalization,

difficulty identifying and describing feelings, and difficulty distinguishing emotions from bodily sensations are also associated with CFS (Friedberg and Quick, 2007). Patients with CFS were also found to have a maladaptive perfectionistic personality style (White and Schweitzer, 2000) and to be more action-prone (Van Houdenhove et al., 1995, 2001). However, in contrast to these findings some researchers did not find higher maladaptive perfectionism in patients than in controls (Blenkiron et al., 1999; Wood and Wessely, 1999). Van Houdenhove et al. (2001) also failed to prove the role of an idealistic appraisal of the premorbid self in CFS.

Further studies have tried to examine the role of personality in CFS within the frameworks of personality dimensions and personality disorders. In the first study on personality disorders and CFS, Millon et al. (1989) using the Millon Clinical Multiaxial Inventory (MCMI), found that CFS patients met criteria for a variety of personality pathology including histrionic (33%), schizoid (29%), and avoidant, narcissistic and aggressive/sadistic (25% each) compared with normative data. Ciccone et al. (2003) and Henderson and Tannock (2004) also found a high level of personality disorders in patients with CFS. Similarly, other studies using the Minnesota Multiphasic Personality Inventory (MMPI) showed that CFS patients scored higher on most scales than patients and normal control groups (Pepper et al., 1993; Schmalting and Jones, 1996; Stricklin et al., 1990). Adopting a categorical approach to personality assessment with CFS patients, Pepper et al. (1993) showed that the most common personality disorders (PDs) among the CFS patients were obsessive-compulsive (16%), histrionic (13%), and dependent (11%), while Johnson et al. (1996) reported the most common PDs of the CFS patients as

<sup>☆</sup> This study was supported by University of Tehran.

<sup>\*</sup> Corresponding author. Tel.: +98 21 220 7450.

E-mail address: [besharat@ut.ac.ir](mailto:besharat@ut.ac.ir) (M.A. Besharat).

histrionic (23%) and borderline (17%). Although these findings give some support for the higher rate of personality disorders in patients with CFS than in general populations, a recent study by Courjaret et al. (2009) failed to prove any significant difference in personality disorders between CFS and general populations. Further methodological limitations regarding the study of personality disorders in patients with CFS are discussed in Van Geelen et al. (2007). Therefore, the generalizability of these findings can be questioned.

Preliminary evidence on personality dimensions in patients with CFS is limited to neuroticism and extraversion. While most empirical evidence shows an increased level of neuroticism in patients with CFS (Blakeley et al., 1991; Buckley et al., 1999; Johnson et al., 1996; Taillefer et al., 2003), findings regarding extraversion in this group of patients are less definitive. For example, while Buckley et al. (1999) found that patients with CFS scored lower extraversion than healthy individuals, Chubb et al. (1999) found the scores on extraversion of their CFS group not to be significantly different from those of their healthy control group. Further studies are obviously needed to clarify the possible relationships between personality characteristics and CFS.

McCrae and Costa (1987) conceptualized personality along five broad dimensions, including neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness. Neuroticism refers to a tendency to experience anxiety, tension, self-pity, hostility, impulsivity, self-consciousness, irrational thinking, depression, and low self-esteem (John, 1989; McCrae and Costa, 1987; McCrae and John, 1992). Extraversion refers to a tendency to be positive, assertive, energetic, social, talkative, and warm (John, 1989; McCrae and John, 1992; Watson and Clark, 1997). Openness refers to a tendency to be curious, artistic, insightful, flexible, intellectual, and original (John, 1989; McCrae and Costa, 1987; McCrae and John, 1992). Agreeableness refers to the tendency to be forgiving, kind, generous, trusting, sympathetic, compliant, altruistic, and trustworthy (John, 1989; McCrae and John, 1992). Finally, conscientiousness refers to a tendency to be organized, efficient, reliable, self-disciplined, achievement-oriented, rational, and deliberate (John, 1989; McCrae and John, 1992).

Although the relationship between personality and CFS is becoming clearer, relatively little is known about how personality dimensions are related to CFS. Therefore, the objective of the present study was to test whether specific dimensions of personality, those of the five factor model, are differentially related to CFS. Literature reviews have suggested the five-factor model (FFM) of personality as a useful heuristic framework relevant to the description and understanding of specific vulnerability styles (e.g., Costa and Widiger, 2002). Based on the previous findings, it was predicted that CFS would be positively related to neuroticism and conscientiousness. Further the association of personality dimensions and fatigue symptoms was compared between CFS patients and a control group of care-seeking sample without CFS in the present study.

## 2. Method

### 2.1. Participants

The participants were 77 patients with CFS (47 women, mean age = 31.4 years, SD = 7.41, and 30 men, mean age = 34.9 years, SD = 8.22) referred to Tehran University Clinic, and 72 volunteers (44 women, mean age = 33.2 years, SD = 8.54, and 28 men, mean age = 37.00 years, SD = 9.63) drawn from comparable care-seeking individuals without CFS. Age of participants in each group ranged from 22 to 60 years. Participants were primarily drawn from the middle socioeconomic classes. There were no significant differences between the groups in terms of age, gender or socioeconomic

**Table 1**  
Demographic and clinical characteristics.

Variable	CFS group (n = 77)		Control group (N = 72)		P
	M(SD)	F(%)	M(SD)	F(%)	
Age <sup>a</sup>	32.51(8.02)		34.75(9.12)		NS
Education (year) <sup>a</sup>	12.31(2.34)		13.00(2.69)		NS
Sex <sup>b</sup>					
Male		30(39)		29(40.3)	NS
Female		47(61)		43(59.7)	
Marital status <sup>b</sup>					
Married		29(37.7)		32(44.4)	NS
Single		34(44.2)		31(43.1)	
Divorced		14(18.2)		9(12.5)	
Occupational status <sup>b</sup>					
Employed		24(31.2)		24(33.3)	NS
Unemployed		27(35.1)		22(30.6)	
Housewife		22(28.6)		19(26.4)	
Retired		2(2.6)		4(5.6)	
Student		2(2.6)		3(4.2)	
Duration of illness	5.11(3.25)				
PWB <sup>a</sup>	33.07(8.66)		53.55(8.96)		S
PD <sup>a</sup>	48.72(10.82)		30.48(8.60)		S

<sup>a</sup> Independent group *t*-test; PWB = Psychological Well-Being; PD = Psychological Distress; NS = not significant; S = significant ( $P < 0.001$ ).

<sup>b</sup> Chi-square.

class. Demographic information is presented in Table 1. Group (CFS vs. Control) differences on demographic factors were not significant by independent *t* and chi-square tests. Results of independent *t*-test revealed significant differences between the CFS group and the control group on Mental Health Inventory (MHI; Veit and Ware, 1983) subscales Psychological Well-Being and Psychological Distress. These results meet the inclusion criteria for both groups (see Table 1). The protocol was approved by the Department of Psychology, University of Tehran. All participants signed an informed consent document prior to performing the research procedure.

### 2.2. Procedure

Patients were included in this study if they fulfilled the CDC criteria (Fukuda et al., 1994) for the diagnosis of CFS. Participants with CFS were administered the present tests in regular sessions at the Tehran University Clinic by a research assistant trained in this experimental procedure. Tests administered to the CFS group consisted of a locally developed Sociodemographic Questionnaire. The Sociodemographic Questionnaire contained questions regarding demographic information, CFS course, current medications, and psychiatric history. Specific information obtained through this questionnaire was then used as a basis for exclusion from the present study. Exclusion criteria for both clinical and control groups were (a) having no significant health problems other than CFS and psychological distress (symptoms of depression and anxiety measured by the MHI) for the clinical group, (b) prior psychiatric treatment, and (c) drug or alcohol history. Participants of both CFS and control groups were asked to complete the NEO Five Factor Inventory (NEO-FFI), the Modified Fatigue Impact Scale (MFIS), the Fatigue Severity Scale (FSS), and the Mental Health Inventory (MHI).

### 2.3. Instruments

*NEO Five Factor Inventory* (NEO-FFI; Costa and McCrae, 1992). The NEO-FFI is a 60-item self-report measure of five-factor model of personality. It consists of five 12-item scales measuring neuroticism, extraversion, openness, agreeableness, and conscientiousness. Respondents rate each item on a five-point scale from 1 "strongly disagree" to 5 "strongly agree." The NEO-FFI has been

used extensively in psychology research and has demonstrated good internal consistency, test-retest reliability, and validity (Costa and McCrae, 1992).

**The Modified Fatigue Impact Scale (MFIS).** This is a 21-item scale selected from the Fatigue Impact Scale (FIS; Fisk et al., 1994). The MFIS is a multidimensional scale developed to assess the predictive impact of fatigue on a variety of daily activities. Each item is rated on a five-point Likert scale ranging from 1 (never) to 5 (almost always). It provides a total MFIS score and also three sub-scores to assess the impact of fatigue on Physical, Cognitive, and Psychosocial domains. All items are scaled so that higher scores indicate a greater impact of fatigue on a patient's activities. Adequate psychometric properties of the scale have been reported (Fisk and Doble, 2002; Tellez et al., 2005).

**Fatigue Severity Scale.** Taillefer et al. (2002) derived this three-item scale from earlier work (Pope and Hudson, 1991; Sharpe et al., 1991) to assess fatigue severity. This scale measures how many separate days in the last month the patient has been: (1) tired and fatigued for 1 full day following activities, which previously did not cause him/her to become tired; (2) tired for a whole day without exerting him/herself even though he's had enough sleep; and (3) tired even though resting. Each item is rated on a four-point scale from (0) none, (1) 1–6 days, (2) 7–14 days and (3) more than 14 days. The items are summed to yield a score from 0 to 9.

**Mental Health Inventory.** This is a 28-item measure that provides two subscales of Psychological Well-Being and Psychological Distress. Psychological Well-Being measures the extent to which people report positive mental health states and Psychological Distress measures the extent to which people report negative mental health states. Psychological Well-Being is divided into two factors: General Positive Affect and Emotional Ties. Psychological Distress is divided into three factors: Anxiety, Depression, and Loss of Behavioral and Emotional Control. Satisfactory psychometric properties of the MHI have been reported (Manne and Schnoll, 2001; Veit and Ware, 1983).

### 3. Results

The means and standard deviations of all scales are presented for the clinical and control samples in Table 2.

The preliminary analysis involved examining all scales to determine if there were gender differences. A multivariate analysis of variance (MANOVA) was performed between measures of five personality factors, MFIS-total and fatigue severity and the categorical variable of gender. The use of Wilks' criterion analysis revealed that there was no multivariate main effect for gender  $F(3,145) = 0.85$ ,  $P > 0.05$ . As no significant differences were evident, subsequent analyses were collapsed across gender.

Zero order correlations between personality factors and measures of psychological well-being, psychological distress, fatigue impact, and fatigue severity were conducted for the CFS group and the control group separately. The pattern of correlations between personality factors and clinical measures was relatively

**Table 2**

Mean scores and standard deviations for all scales.

Variable	CFS group (n = 77)		Control group (N = 72)	
	M	SD	M	SD
MFIS total score	46.70	11.20	25.43	10.49
Fatigue severity	5.11	1.44	2.58	1.47
Neuroticism	33.44	6.88	28.20	7.76
Extraversion	38.76	6.15	40.05	7.37
Openness	39.28	6.40	40.28	7.60
Agreeableness	42.15	7.48	43.47	6.05
Conscientiousness	45.38	6.76	42.45	6.14

MFIS = Modified Fatigue Impact Scale.

similar for the two groups. The results of correlational analysis are presented in Table 3.

To determine if the CFS group and the control group differ on any of the five personality factors, a MANOVA was performed with the five personality factors scores as the dependent variables. The results revealed significant differences between the CFS group and the control group on neuroticism,  $F(1,147) = 19.03$ ,  $P < 0.001$  and conscientiousness,  $F(1,147) = 7.57$ ,  $P < 0.007$ , of the NEO-FFI. CFS patients had higher levels of neuroticism and conscientiousness than the control group. No significant differences were found in extraversion, openness, and agreeableness between patients with CFS and individuals without CFS.

Separate multiple linear stepwise regressions were conducted to determine the extent to which personality factors predicted fatigue impact and fatigue severity for CFS and control groups. The independent variables in each regression equation showed that conscientiousness and neuroticism accounted for significant independent variance in fatigue impact and fatigue severity, respectively, for patients with CFS. These analyses also revealed that neuroticism and conscientiousness accounted for significant independent variance in fatigue impact and fatigue severity, respectively, for individuals without CFS (see Table 4). These results indicate that more neuroticism and conscientiousness was associated with more fatigue symptoms. For the CFS group, these variables accounted for 61% and 41% of the variance in fatigue impact and fatigue severity, respectively. For the control group, these variables accounted for 34% and 18% of the variance in fatigue impact and fatigue severity, respectively.

### 4. Discussion

The present study examined the relationships between personality factors and the symptomatology of fatigue among people with chronic fatigue syndrome (CFS), and compared them with people without CFS. The five-factor model of personality used in this study revealed a consistent and unique relationship between personality factors and fatigue symptoms. Findings showed that neuroticism and conscientiousness featured unique patterns concerning fatigue symptoms. These factors were

**Table 3**

Zero order correlations between personality factors and measures of mental health, fatigue impact, and fatigue severity for all cases.

Variable	CFS group (n = 77)				Control group (N = 72)			
	PW	PD	MFIS	FS	PW	PD	MFIS	FS
Neuroticism	-0.64**	0.62**	0.54**	0.48**	-0.60**	0.52**	0.51**	0.34**
Extraversion	0.14	-0.16	-0.25*	-0.34**	0.27*	-0.22	-0.22	-0.12
Openness	-0.11	0.09	0.13	0.10	-0.13	0.13	0.07	-0.14
Agreeableness	-0.29*	0.22	-0.10	-0.10	0.18	-0.20	-0.08	0.10
Conscientiousness	-0.16	0.21	0.73**	0.58**	-0.28*	0.28*	0.34**	0.29*

PWB = Psychological Well-Being; PD = Psychological Distress; MFIS = Modified Fatigue Impact Scale; FS = Fatigue Severity.

\*  $P < 0.05$ .

\*\*  $P < 0.01$ .

**Table 4**

Separate regression equation predicting fatigue impact and fatigue severity for the CFS and control groups.

Variables	Fatigue Impact			Fatigue Severity		
	B	SEB	Beta	B	SEB	Beta
<i>CFS group</i>						
Step 1						
Conscientiousness	1.22	0.12	0.73**	0.12	0.02	0.58**
Step 2						
Conscientiousness	1.02	0.13	0.61**	0.09	0.02	0.46**
Neuroticism	0.48	0.12	0.29**	0.06	0.02	0.29**
		(R <sup>2</sup> = .54; ΔR <sup>2</sup> = .07)			(R <sup>2</sup> = .34; ΔR <sup>2</sup> = .07)	
<i>Control group</i>						
Step 1						
Neuroticism	0.69	0.13	0.51**	0.06	0.02	0.34**
Step 2						
Neuroticism	0.64	0.13	0.47**	0.05	0.02	0.30**
Conscientiousness	0.48	0.16	0.28**	0.06	0.26	0.26*
		(R <sup>2</sup> = .26; ΔR <sup>2</sup> = .08)			(R <sup>2</sup> = .11; ΔR <sup>2</sup> = .06)	

\*  $P < 0.01$ .\*\*  $P < 0.001$ .

vulnerable to CFS. As predicted, neuroticism and conscientiousness were related to higher levels of CFS. This was invariant with respect to sex, attesting to the importance of studying personality factors in relation to CFS. These findings are consistent with the psychological literature that have provided evidence of a relationship between personality characteristics and CFS (Chubb et al., 1999; Ciccone et al., 2003; Friedberg and Quick, 2007; Henderson and Tannock, 2004; Powell et al., 1990; Van Geelen et al., 2007; Van Houdenhove et al., 1995, 2001; White and Schweitzer, 2000).

If the factors are ranged according to ascending vulnerability to impact and severity of fatigue symptoms, conscientiousness is of primary importance in determining CFS vulnerability closely followed by neuroticism. Conscientiousness was particularly important for CFS, a finding that is consistent with the existing evidence in the literature (e.g., Pepper et al., 1993; Schmalzing and Jones, 1996; Stricklin et al., 1990; Wood and Wessely, 1999). Specifically, this is consistent with notions of conscientious individuals as self-disciplined and achievement-oriented (McCrae and John, 1992; O'Brien and DeLongis, 1996). The self-disciplined, goal-oriented behavior characteristic of conscientiousness may also explain the positive association between conscientiousness and CFS found in the present study.

In line with past associations between neuroticism and CFS (Blakeley et al., 1991; Buckley et al., 1999; Johnson et al., 1996; Taillefer et al., 2003; Wood and Wessely, 1999), we found that neuroticism was positively correlated with CFS. This is, specifically, consistent with the description of neuroticism as a tendency to experience anxiety, tension, self-consciousness, and low self-esteem (John, 1989; McCrae and Costa, 1987; McCrae and John, 1992). These characteristics explain the positive association between neuroticism and CFS found in this study.

Conscientiousness was the most powerful predictor of fatigue impact and severity followed by neuroticism in patients, while the order of predictive variables was reverse for the control group. This can be explained in terms of the pattern of combination of personality traits. Such a typology was suggested by Vollrath and Torgersen and showed its advantage in understanding the relationship between personality, stress and coping and in predicting risky health behaviors (Vollrath and Torgersen, 2002). Although investigating different combinations of personality traits was not aimed by the present study, a different distance between conscientiousness and neuroticism was found in the two groups. The distance between conscientiousness and neuroticism in patients with CFS is shorter than that of individuals without CFS (see mean scores of these variables in Table 2). It can be concluded that a closer relationship between conscientiousness and neuroti-

cism, as a specific combination/interaction of the two traits, produces higher risk for CFS. However, the relationship between personality traits combination and fatigue symptoms needs to be tested by further empirical research.

This study failed to demonstrate any significant association between extraversion, openness and agreeableness with fatigue symptoms in both groups. The exception was a low significant negative correlation between extraversion and impact ( $r = -.25$ ), as well as severity ( $r = -.34$ ) of fatigue, only in patients with CFS. A negative correlation between extraversion and fatigue symptoms is quiet possible, since negative association of this personality trait with neuroticism has been repeatedly confirmed in empirical findings and theoretical evidence. A high level of neuroticism in the CFS group with a significant positive correlation with fatigue symptoms imply a low level of extraversion with a significant negative correlation with fatigue symptoms in these people. However, the pattern of association between this specific personality trait, as well as its combination with other traits, and fatigue symptoms remains to be explored in future work.

Results obtained in this research also demonstrated that the association between personality factors of conscientiousness and neuroticism, and to a lesser degree extraversion, and fatigue symptoms follows the same pattern both in CFS and control groups. Excessive conscientiousness makes individuals vulnerable to clinical conditions such as CFS through critical self-disciplined and goal-oriented characteristics. High levels of neuroticism also make individuals vulnerable to CFS through increasing anxiety, tension, self-consciousness, and low self-esteem. In contrast, extraversion makes individuals able to be positive and assertive (John, 1989; McCrae and John, 1992; Watson and Clark, 1997), and less vulnerable to fatigue. The similar pattern of association between these personality factors and fatigue symptoms found in this study for both patient and control groups further supports the idea that etiology and pathogenesis of CFS is multifactorial. It is possible that specific combination of personality traits along with biological factors may be responsible for developing CFS in the patient group; factors which have not completely existed in the normal group.

Several limitations to the present study must be recognized. First, the present study was cross-sectional and utilized self-report measures. Although this study provides evidence for a link between personality and CFS, the cross-sectional design prevents an understanding of the exact nature of the relationships, particularly with respect to directionality. As pointed out by Christodoulou et al. (1999), it is possible that the personalities of patients may have been altered by their chronic illness; a possibility that was not investigated in this study. Second, these

data were based upon a sample of CFS patients with some degree of chronicity. It would be of value to investigate personality factors in a population of newly diagnosed CFS patients. Such a study may lead to a better understanding of the role of personality in the development of the condition over time. It is also possible that personality factors may interact with other variables to produce positive or negative consequences. This suggests that personality factors may have different effects, depending on their interaction with other variables such as stress and daily hassles. Future studies need to be pursued to address this issue. Furthermore, it should be noted that although care was taken to match the control group in terms of demographic and socioeconomic factors, it cannot be discounted that persons volunteering to take part in the study may not be representative of the general population.

## References

- Blakeley, A.A., Howard, R.C., Sosich, R.M., Campbell Murdoch, J., Menkes, D.B., Spears, G.F.S., 1991. Psychiatric symptoms, personality and ways of coping in chronic fatigue syndrome. *Psychol. Med.* 21 (2), 347–362.
- Blenkiron, P., Edwards, R., Lynch, S., 1999. Associations between perfectionism, mood, and fatigue in chronic fatigue syndrome. *J. Nerv. Ment. Dis.* 187, 566–570.
- Buckley, L., MacHale, S.I., Cavanagh, J.T.O., Sharpe, M., Deary, I.J., Lawrie, S.M., 1999. Personality dimensions in chronic fatigue syndrome and depression. *J. Psychosom. Res.* 46 (4), 395–400.
- Christodoulou, C., DeLuca, J., Jhonson, S.K., Lange, G., Gaudino, E.A., Natelson, B.H., 1999. Examination of Cloninger's basic dimensions of personality in fatiguing illness: chronic fatigue syndrome and multiple sclerosis. *J. Psychosom. Res.* 47 (6), 597–607.
- Chubb, H., Jones, I., Hillier, J., Moyle, C., Sadler, S., Cole, T., Redman, K., Farmer, A., 1999. Chronic fatigue syndrome – personality and attributional style of patients in comparison to healthy controls and depressed individuals. *J. Ment. Health* 8, 351–359.
- Ciccone, D.S., Busichio, K., Vickroy, M., Natelson, B.H., 2003. Psychiatric morbidity in the chronic fatigue syndrome: are patients with personality disorder more physically impaired? *J. Psychosom. Res.* 54 (5), 445–452.
- Costa, P.T., McCrae, R.R., 1992. Revised NEO Personality Inventory (NEO-PI-R) and NEO Five-Factor Inventory (NEO-FFI) Professional Manual. Psychological Assessment Resources, Odessa, FL.
- Costa, P.T., Widiger, T.A., 2002. Personality Disorders and the Five-Factor Model of Personality. American Psychological Association, Washington, DC.
- Courjaret, J., Schotte, C.K.W., Wijnanta, H., Moorkens, G., Cosyns, P., 2009. Chronic fatigue syndrome and DSM-IV personality disorders. *J. Psychosom. Res.* 66 (1), 13–20.
- Fisk, J.D., Doble, S.E., 2002. Construction and validation of a fatigue impact scale for daily administration (D-FIS). *Qual. Life Res.* 11 (3), 263–272.
- Fisk, J.D., Ritvo, P.G., Ross, L., Haase, D.A., Marrie, T.J., Schleich, W.F., 1994. Measuring the functional impact of fatigue: initial validation of the fatigue impact scale. *Clin. Infect. Dis.* 18 (Suppl. 1), S79–S83.
- Friedberg, F., Quick, J., 2007. Alexithymia in chronic fatigue syndrome: associations with momentary, recall, and retrospective measures of somatic complaints and emotions. *Psychosom. Med.* 69 (1), 54–60.
- Fukuda, K., Straus, S.E., Hickie, I., Sharpe, M.C., Dobbins, J.G., Komatoff, A., 1994. The chronic fatigue syndrome: a comprehensive approach to its definition and study. *Ann. Intern. Med.* 121, 953–959.
- Henderson, M., Tannock, C., 2004. Objective assessment of personality disorder in chronic fatigue syndrome. *J. Psychosom. Res.* 56 (2), 251–254.
- John, O.P., 1989. Towards a taxonomy of personality descriptors. In: Buss, D.M., Cantor, N. (Eds.), *Personality Psychology: Recent Trends and Emerging Directions*. Springer, New York, pp. 261–271.
- Johnson, S.K., DeLuca, J., Natelson, B.H., 1996. Personality dimensions in the chronic fatigue syndrome: a comparison with multiple sclerosis and depression. *J. Psychiatr. Res.* 30 (1), 9–20.
- Manne, S., Schnoll, R., 2001. Measuring cancer patients' psychological distress and well-being: a factor analytic assessment of the Mental Health Inventory. *Psychol. Assess.* 13 (1), 99–109.
- McCrae, R.R., Costa, P.T., 1987. Validation of a five-factor model of personality across instruments and observers. *J. Pers. Soc. Psychol.* 52 (1), 81–90.
- McCrae, R.R., John, O.P., 1992. An introduction to the five-factor model and its application. *Special Issue: the five-factor model: issues and applications. J. Pers.* 60 (2), 175–215.
- Millon, C., Salvato, F., Blaney, N., Morgan, R., Mantero-Atienza, E., Klimas, N., Fletcher, M., 1989. A psychological assessment of chronic fatigue syndrome/chronic Epstein-Barr virus patients. *Psychol. Health* 3, 131–141.
- Moss-Morris, R., 1997. The role of illness cognitions and coping in the aetiology and maintenance of the chronic fatigue syndrome (CFS). In: Petrie, K.J., Weinman, J.A. (Eds.), *Perceptions of Health and Illness: Current Research and Applications*. Harwood Academic Publishers, Australia, pp. 411–440.
- O'Brien, T.B., DeLongis, A., 1996. The interactional context of problem-, emotion-, and association-focused coping: the role of the big five personality factors. *J. Pers.* 64 (4), 775–813.
- Pepper, C.M., Krupp, L.B., Fridberg, F., Doscher, C., Coyle, P., 1993. A comparison of neuropsychiatric characteristics in chronic fatigue syndrome, multiple sclerosis, and major depression. *J. Neuropsychiatry Clin. Neurosci.* 5, 200–205.
- Pope, H.G., Hudson, J.I., 1991. A supplemental interview for forms of "affective spectrum disorder". *Int. J. Psychiatry Med.* 21, 205–232.
- Powell, R., Dolan, R., Wessely, S., 1990. Attributions and self-esteem in depression and chronic fatigue syndrome. *J. Psychosom. Res.* 34 (6), 665–673.
- Schmaling, K.B., Jones, J.F., 1996. MMPI profiles of patients with chronic fatigue syndrome. *J. Psychosom. Res.* 40 (1), 67–74.
- Sharpe, M.C., Archard, L.C., Banatvala, J.E., Borysiewicz, L.K., Clare, A.W., David, A., Edwards, R.H., Hawton, K.E., Lambert, H.P., Lane, R.J., 1991. A report – chronic fatigue syndrome: guidelines for research. *J. Res. Soc. Med.* 84, 118–121.
- Stricklin, A., Sewell, M., Austad, C., 1990. Objective measurement of personality variables in epidemic neuromyasthenia patients. *S. Afr. Med. J.* 77 (1), 31–34.
- Taillefer, S.S., Kirmayer, L.J., Robbins, J.M., Lasry, J.C., 2002. Psychological correlates of functional status in chronic fatigue syndrome. *J. Psychosom. Res.* 53 (6), 1097–1106.
- Taillefer, S.S., Kirmayer, L.J., Robbins, J.M., Lasry, J.C., 2003. Correlates of illness worry in chronic fatigue syndrome. *J. Psychosom. Res.* 54 (4), 331–337.
- Tellez, N., Rio, J., Tintore, M., Nos, C., Galan, I., Montalban, X., 2005. Does the Modified Fatigue Impact Scale offer a more comprehensive assessment of fatigue in MS? *Mult. Scler.* 11 (2), 198–202.
- Van Geelen, S.M., Sinnema, G., Hermans, H.J., Kuis, W., 2007. Personality and clinic fatigue syndrome: methodological and conceptual issues. *Clin. Psychol. Rev.* 27, 885–903.
- Van Houdenhove, B., Neerinx, E., Onghena, P., Lysens, R., Vertommen, H., 2001. Premorbid "overactive" lifestyle in chronic fatigue syndrome and fibromyalgia: an etiological factor or proof of good citizenship? *J. Psychosom. Res.* 51 (4), 571–576.
- Van Houdenhove, B., Onghena, P., Neerinx, E., Hellin, J., 1995. Does high 'action-proneness' make people more vulnerable to chronic fatigue syndrome? A controlled psychometric study. *J. Psychosom. Res.* 39 (5), 633–640.
- Veit, C.T., Ware, J.E., 1983. The structure of psychological distress and well-being in general population. *J. Consult. Clin. Psychol.* 51 (5), 730–742.
- Vollrath, M., Torgersen, S., 2002. How takes health risks? A probe into eight personality types. *Pers. Individ. Dif.* 32, 1185–1197.
- Watson, D., Clark, L.A., 1997. Extraversion and its positive emotional core. In: Hogan, R., Johnson, J.A., Briggs, S.R. (Eds.), *Handbook of Personality Psychology*. Academic Press, San Diego, pp. 767–793.
- White, C., Schweitzer, R., 2000. The role of personality in the development and perpetuation of chronic fatigue syndrome. *J. Psychosom. Res.* 48 (6), 515–524.
- Wood, B., Wessely, S., 1999. Personality and social attitudes in chronic fatigue syndrome. *J. Psychosom. Res.* 47 (4), 385–397.