Use of the Temperament and Character Inventory (TCI) for Assessment of Personality in Chronic Fatigue Syndrome

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Background: Chronic fatigue syndrome (CFS) is characterized by severe and prolonged fatigue, along with a set of nonspecific symptoms and signs, such as sore throat, muscle pain, headaches, and difficulties with concentration or memory. Objective: The study examined whether CFS is associated with specific dimensions of Cloninger’s psychobiological model of personality.

Method: Personality profiles were compared between 38 CFS patients and 42 control subjects by means of the Temperament and Character Inventory (TCI).

Results: The CFS group showed significantly higher scores on Harm-Avoidance and Persistence.

Conclusion: The current study shows a significant association between specific personality characteristics and CFS. These personality traits may be implicated in the onset and/or perpetuation of CFS and may be a productive focus for psychotherapy.

Chronic fatigue syndrome (CFS) is characterized by severe and prolonged fatigue, along with a set of nonspecific symptoms and signs, such as sore throat, muscle pain, headaches, and difficulties with concentration or memory. The syndrome was defined by the Centers for Disease Control in 1994 (Table 1). Current knowledge about CFS suggests that genetic, physiological, and psychological factors work together to predispose an individual to the condition and to precipitate and perpetuate the illness.2

Personality factors are related to resilience across the lifespan and have been shown to influence the manner in which individuals cope with their environment.4,5 Studies examining personality in individuals with CFS describe high scores on Neuroticism on the NEO Five-Factor Inventory, and on Negative Perfectionism on the Multidimensional Perfectionism Scale.5-8

In the present study, the Temperament and Character Inventory (TCI) was used to measure four temperament dimensions and three character dimensions of Cloninger’s psychobiological model of personality.5,9,10 The strength of this model includes the homogeneity and etiological independency of the temperament dimensions.5 The model was extended to be more responsive to domains of personality that mature in adulthood (i.e., the character dimensions).9 These characteristics make the TCI an efficient and valid method for screening and differential diagnosis of personality disorders in clinical samples.11 Various psychological treatments may be relevant for the development of different aspects of character. For example, particular

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cognitive-behavioral techniques may facilitate the learning of self-directed behavior.5

Dimensions of temperament, according to Cloninger’s model, consist of novelty-seeking, harm-avoidance, reward-dependence, and persistence. Dimensions of characters include self-directedness, cooperativeness, and self-transcendence. The four temperament dimensions were found to be homogeneous and independent of each other. They are thought to delineate inherited automatic pre-conceptual responses that manifest early in life.7,10

Novelty-Seeking is defined as the heritable tendency to respond with excitement to novel stimuli or cues for potential relief of punishment, thereby activating behavior.

Harm-Avoidance involves the tendency to respond intensely to signals of aversive stimuli, thereby inhibiting behavior.

Reward-Dependence is a heritable tendency to respond intensely to signals of reward, thereby maintaining behavior.5

Persistence involves the tendency to persevere in behaviors that have been previously associated with reward or relief from punishment, despite frustration and fatigue.19

The three character dimensions mature in adulthood and are based on the development of self-concepts. Three aspects of self-concepts are distinguished according to the extent to which a person identifies the self as 1) an autonomous individual; 2) an integral part of humanity or society; or 3) an integral part of the unity of the universe. Each aspect of self-concept corresponds to one of the three character dimensions: 1) self-directedness; 2) cooperativeness; or 3) self-transcendence, respectively.5

Previously, Christodoulou et al.,12 examining the four temperament dimensions of Cloninger’s biosocial model, established a positive correlation of CFS with Harm-Avoidance and a negative correlation with Reward-Dependence. To the best of our knowledge, only one published study13 has focused on chronic-fatigue patients from the perspective of Cloninger’s seven-factor model. They found elevated levels of Harm-Avoidance and decreased levels of Self-Directedness; however, the authors did not use Centers for Disease Control (CDC) diagnostic criteria1 in the selection of the CFS patients. Moreover, control subjects were not matched for age, gender, or education.

The aim of the present study was to examine whether CFS is associated with specific personality traits, as evaluated by the TCI self-questionnaire.

METHOD

Subjects

Patients attending the outpatient clinic for CFS at the University Hospital of Antwerp were invited by letter to participate in the study. The majority of the patients were women, and only a few men responded to the invitation. For homogeneity of the study population, we decided to

<table>
<thead>
<tr>
<th>TABLE 1. Fukuda Criteria for Chronic Fatigue Syndrome (CFS)</th>
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<td><strong>Inclusion criteria</strong></td>
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The guidelines for clinical evaluation and for exclusion of possible underlying medical and psychiatric conditions are extensively described in the article by Fukuda et al.1
include only female patients. All patients fulfilled the 1994 CDC criteria for the diagnosis of CFS\textsuperscript{1} (Table 1). They underwent medical evaluation (performed by a specialist in internal medicine), comprising a standardized examination and a questionnaire on past and current medical problems. Exclusion criteria were the following: acute severe illness during the previous 6 months, and pregnancy. Routine laboratory tests included a complete blood count, 12-factor automated chemical analysis, liver-function tests, and 24-hour pooled urine analysis for proteinuria; also, chest X-ray and abdominal ultrasound were performed.

All the patients underwent a psychiatric interview, social anamnesis, and psychodiagnostic testing (done by psychiatrist FVDE). To evaluate the subject’s lifetime and actual DSM–IV Axis I psychopathology,\textsuperscript{14} all patients were interviewed with the Dutch version of the SCID–I/Patient Version 2.0.\textsuperscript{15} The validity and the reliability of the Dutch version of the Structural Clinical Interview (SCID) has previously been examined.\textsuperscript{16}

The CDC psychiatric exclusion criteria for CFS (Table 1) were adopted, with two exceptions. First, subjects who met criteria for a current major depression according to DSM–IV\textsuperscript{14} were excluded, to preclude a state effect of depression on the outcome of the TCI.\textsuperscript{17} Second, a past history of melancholic depression was not assessed, since the specification of melancholic features in the past is not provided in SCID–I/P and because it is difficult to assess this item retrospectively by means of an interview. A total of 38 patients were enrolled.

Forty-two healthy female volunteers without a history of CFS were recruited via the hospital staff. The volunteers were matched for age and education with the CFS patients. The Medical Ethical Committee of the University Hospital of Antwerp approved the study. All participants were over age 18 years and signed informed consent.

**Instruments**

**Checklist: Individual Strength (CIS)** The self-rated Checklist [of] Individual Strength, developed by Vercoulen et al.,\textsuperscript{18} was used to evaluate the perception of fatigue. The CIS possesses excellent psychometric properties concerning internal reliability and discriminant validity.\textsuperscript{19} The 20-item checklist consists of categories for severity of perceived fatigue, concentration, motivation, and physical activity.

**Temperament and Character Inventory (TCI)** For the assessment of Cloninger’s dimensions of personality,\textsuperscript{9} we used the Dutch version of the Temperament and Character Inventory (TCI). The validity of the Dutch version of the TCI has previously been confirmed.\textsuperscript{20} To restrict the influence of CFS on personality as much as possible, CFS patients were asked to fill in the questionnaire corresponding to their personality perspectives before the onset of their symptoms.

**Statistical Analysis**

Statistical analysis was done with SPSS for Windows, Version 12.0. The Kolmogorov-Smirnov test was used to examine the distribution of the data. To compare the TCI scores between patients and control subjects on the seven dimensions of personality, independent \( t \)-tests were used for normally-distributed personality dimensions, and Mann-Whitney tests were done for non-normally distributed dimensions.

When significant differences were found on a personality dimension, we performed additional analyses on the subscales of that dimension. To examine the influence of a past history of major depressive disorder, ANOVA or Kruskal-Wallis analysis was used to compare three independent samples (CFS patients with past history of depression, CFS patients without past history of depression, and the control group), followed by Bonferroni or Dunn test for post-hoc analysis, respectively. For the analysis of the sample characteristics, chi-square analysis was applied to compare frequencies. The Fisher’s exact test was applied when necessary.

If quantitative data failed to satisfy the assumptions for parametric statistical analyses, these were analyzed nonparametrically. For all analyses, a p value \(< 0.05\) was considered to be significant; Bonferroni correction for multiple testing was adopted.

**RESULTS**

**Characteristics of the Study Groups**

Groups were well matched for age (\( p = 0.867 \)) and education (\( p = 0.902 \); Table 2). All but one patient were unable to work because of CFS, whereas all control subjects were employed. The mean duration of the CFS diagnosis was 32.76 months. Twenty-one percent of the CFS patients had a current diagnosis of somatization disorder, and 29% had a current diagnosis of anxiety disorders. A past history of major depression was frequent (47%) in the patient population. As expected, the CFS patients scored
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higher than the healthy-controls on all the subscales of the self-rated CIS (p < 0.001; Table 2).

TCI Results

The comparison of the TCI scales between CFS patients and control subjects is shown in Table 3. The t-test for Harm-Avoidance was significant (p < 0.001). Individual t-tests for the Harm-Avoidance subscales resulted in significant differences for Subscale 1: Anticipatory Worry and Pessimism (p < 0.001) and for Subscale 4: Fatigability (p < 0.001). The Mann-Whitney test was significant for Persistence (p < 0.001) and Self-Directedness (p = 0.028). Individual Mann-Whitney tests for the Self-Directedness subscales resulted in a significant difference for Subscale 1: Blaming versus Responsibility (p = 0.033) and for Subscale 5: Bad Habits versus Congruent Second-Nature (p = 0.007). However, the findings with regard to Self-Directedness did not withstand Bonferroni correction for multiple testing (1 × 16 + 1 × 7 = 23 comparisons). No statistically significant differences were observed for the other dimensions.

Table 4 shows the comparison between CFS patients with a history of depression, CFS patients without a history of depression, and the control group. Three CFS patients were excluded because of a past history of a depression, not otherwise specified. The ANOVA test was significant for Harm-Avoidance (p < 0.001) and Persistence (p < 0.001).

The post-hoc Bonferroni test indicated that both CFS groups (with and without a history of depression) displayed significantly higher scores on Harm-Avoidance and Persistence than healthy controls. The Kruskal-Wallis test was significant for Total Self-Directedness (p = 0.024) and for Subscale 5: Self-Directedness (p = 0.006). The post-hoc Dunn test indicated that CFS patients with a history of depression scored lower on Self-Directedness than CFS patients without a history of depression and healthy controls. However, the findings with regard to Self-Directedness did not withstand Bonferroni correction for multiple testing (23 comparisons). No statistically significant differences were observed for the other dimensions.

### DISCUSSION

The aim of this study was to examine the association between CFS and personality traits measured with the TCI self-report questionnaire. The main findings are that CFS patients scored higher on Harm-Avoidance and Persistence, and lower on Self-Directedness compared with healthy-controls.

The elevated Harm-Avoidance scores suggest that CFS patients tend to be more cautious, careful, fearful, insecure, or pessimistic, even in situations that do not worry other people.9 The higher levels of the subscales Anticipatory Worry and Pessimism and Fatigability and Asthenia explain more specifically the elevated scores on the Harm-Avoidance scale. The present finding of increased Harm-Avoidance in CFS is consistent with the results of Jiang and colleagues.13 Furthermore, Christodoulou et al.12 also found increased levels of Harm-Avoidance in CFS; however, no elevated score on the subscale Shyness with Strangers was found in the present study.

The higher score of CFS patients on the Fatigability subscale was expected, since significant fatigue is the cardinal symptom of CFS. The elevated scores on the Anticipatory Worry and Pessimism subscale suggest that CFS patients tend to anticipate harm and failure and tend to have difficulties in getting over humiliating and embarrassing experiences.9

Heightened negativity is associated with a greater likelihood of developing an illness.22 Therefore, a negative outlook may include a vulnerability to developing CFS. However, a high Harm-Avoidance score is a nonspecific characteristic. Elevated Harm-Avoidance scores have also been reported in other conditions, including mood disorders, anxiety disorders, eating disorders, and sleep disorders.23–26 Therefore, a present Axis I disorder may influence the results of the personality profiles. In our study, for example, the prevalence of anxiety disorders in the patient group (29%) is higher than in the general population; this can influence the scores on Harm-Avoidance.24

Contrasting with results of other studies,12,13 these CFS patients had higher scores on Persistence than did the healthy-control subjects. Despite the lack of an exhaustive,
specific genetic and neuroanatomical base, phenotypic factor-analysis shows that the Persistence factor is a fairly distinct temperament dimension of personality.10 On the other hand, there are doubts about the internal consistency of the Persistence scale.20

The increased score on Persistence suggest that CFS persons tend to be industrious, hard-working, and stable, despite frustration and fatigue. They tend to perceive frustration and fatigue as a personal challenge. However, when contingencies change rapidly, persistence becomes a maladaptive behavioral strategy. CFS sufferers have been described as “workaholic,” “Type A-like,” “unable to set limits on demands of others,” and “high achievers.”27,28 It appears that in top competitors, overtraining can be a precipitating factor in developing CFS,29 and a premorbid “overactive” lifestyle frequently precedes the onset of illness in CFS patients.28,30

Consistent with these findings, exaggerated persistence may predispose to CFS. In the long run, maladaptive persistence may lead to physical overburdening by a negligent attitude toward the needs of the body, musculoskeletal overuse or strain, and/or sleep deprivation. Overburdening by physical and emotional stressors may, in susceptible individuals, lead to neuroendocrine and immunological dysfunction, paving the way for various stress-related disorders, including CFS.31

### TABLE 3. Temperament and Character Inventory (TCI) Results: Mean Scores of Chronic Fatigue Syndrome (CFS) Patients and Healthy-Control Subjects

<table>
<thead>
<tr>
<th>TCI Dimension</th>
<th>CFS Patients (n=38)</th>
<th>Control Subjects (n=42)</th>
<th>p</th>
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<tbody>
<tr>
<td>Novelty-Seeking</td>
<td>17.87 (4.46)</td>
<td>18.29 (5.72)</td>
<td>0.382</td>
</tr>
<tr>
<td>Harm-Avoidance</td>
<td>22.89 (6.07)</td>
<td>14.93 (6.23)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Subscale 1: Anticipatory Worry</td>
<td>6.45 (2.09)</td>
<td>4.38 (2.50)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Subscale 2: Fear of Uncertainty</td>
<td>4.95 (1.68)</td>
<td>4.24 (1.82)</td>
<td>0.092</td>
</tr>
<tr>
<td>Subscale 3: Shyness With Strangers</td>
<td>4.24 (2.42)</td>
<td>3.36 (2.06)</td>
<td>0.104</td>
</tr>
<tr>
<td>Subscale 4: Fatigability/Asthenia</td>
<td>7.26 (2.11)</td>
<td>2.95 (1.85)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Reward-Dependence</td>
<td>18.84 (3.34)</td>
<td>18.62 (3.39)</td>
<td>0.735</td>
</tr>
<tr>
<td>Persistence</td>
<td>5.45 (1.54)</td>
<td>3.67 (1.82)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Self-Directedness</td>
<td>31.29 (7.12)</td>
<td>34.60 (5.47)</td>
<td>0.028</td>
</tr>
<tr>
<td>Subscale 1: Responsibility vs. Blame</td>
<td>5.61 (2.14)</td>
<td>6.57 (1.71)</td>
<td>0.033</td>
</tr>
<tr>
<td>Subscale 2: Purposefulness</td>
<td>5.82 (1.83)</td>
<td>6.21 (1.41)</td>
<td>0.392</td>
</tr>
<tr>
<td>Subscale 3: Resourcefulness</td>
<td>3.55 (1.48)</td>
<td>3.90 (1.17)</td>
<td>0.379</td>
</tr>
<tr>
<td>Subscale 4: Self-Acceptance</td>
<td>8.11 (2.17)</td>
<td>8.26 (1.94)</td>
<td>0.796</td>
</tr>
<tr>
<td>Subscale 5: Congruent Second-Nature</td>
<td>8.21 (2.58)</td>
<td>9.64 (1.94)</td>
<td>0.007</td>
</tr>
<tr>
<td>Cooperativeness</td>
<td>35.13 (4.87)</td>
<td>35.64 (5.16)</td>
<td>0.422</td>
</tr>
<tr>
<td>Self-Transcendence</td>
<td>10.03 (6.17)</td>
<td>10.26 (6.47)</td>
<td>0.965</td>
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</table>

Mean scores (standard deviation) of CFS patients and healthy-control subjects are shown. A p level of <0.05 was adopted. CFS patients showed higher scores on Harm-Avoidance and Persistence (significant results are bolded). Patients also showed lower scores on Self-Directedness than healthy-controls, but these findings did not withstand Bonferroni correction for multiple testing (23 comparisons).

### TABLE 4. Temperament and Character Inventory (TCI) Results: Chronic Fatigue Syndrome (CFS) Patients Without History of MDD (CFS MDD−), CFS Patients With History of Depression (CFS MDD+), and Healthy-Control Subjects

<table>
<thead>
<tr>
<th>TCI Dimension</th>
<th>CFS MDD− (n=17)</th>
<th>CFS MDD+ (n=18)</th>
<th>Control Subjects (n=42)</th>
<th>p</th>
<th>Post-Hoc Analysis</th>
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<tbody>
<tr>
<td>Novelty-Seeking</td>
<td>17.94 (5.70)</td>
<td>17.50 (3.42)</td>
<td>18.29 (5.72)</td>
<td>0.867</td>
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<tr>
<td>Harm-Avoidance</td>
<td>21.53 (5.76)</td>
<td>24.22 (6.50)</td>
<td>14.93 (6.23)</td>
<td>&lt;0.001</td>
<td>CFS MDD+, CFS MDD− &gt; Control</td>
</tr>
<tr>
<td>Reward-Dependence</td>
<td>19.50 (3.00)</td>
<td>18.94 (3.52)</td>
<td>18.62 (3.39)</td>
<td>0.888</td>
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</tr>
<tr>
<td>Persistence</td>
<td>5.18 (1.63)</td>
<td>5.94 (1.35)</td>
<td>3.67 (1.82)</td>
<td>&lt;0.001</td>
<td>CFS MDD+, CFS MDD− &gt; Control</td>
</tr>
<tr>
<td>Self-Directedness</td>
<td>33.18 (7.25)</td>
<td>29.44 (7.04)</td>
<td>34.60 (5.47)</td>
<td>0.024</td>
<td>CFS MDD+ &lt; CFS MDD−, Control</td>
</tr>
<tr>
<td>Cooperativeness</td>
<td>35.00 (5.17)</td>
<td>35.61 (4.69)</td>
<td>35.64 (5.16)</td>
<td>0.762</td>
<td>—</td>
</tr>
<tr>
<td>Self-Transcendence</td>
<td>9.29 (5.70)</td>
<td>10.33 (5.89)</td>
<td>10.26 (6.47)</td>
<td>0.810</td>
<td>—</td>
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</table>

Mean scores (standard deviation) of CFS patients and healthy controls are shown; a p level of <0.05 was adopted. MDD: major depressive disorder. Three CFS patients were excluded because of a past history of a depression, not otherwise specified. Both CFS groups (with and without a history of MDD) showed significantly higher scores on Harm-Avoidance and on Persistence than healthy-controls. The findings with regard to Self-Directedness did not withstand Bonferroni correction for multiple testing (23 comparisons).
CFS patients showed an increased score on Harm-Avoidance and Persistence in our study, which is in contrast with the negative correlation (-0.27) between Persistence and Harm-Avoidance that has been reported elsewhere. This may point to a specific personality profile in CFS. In contrast with high Harm-Avoidance alone, which predisposes to a number of psychiatric and psychosomatic disorders, the combination of high Harm-Avoidance and high Persistence could be a more specific pattern in increasing the vulnerability to CFS. From a cognitive-behavioral perspective, it can be argued that the self-esteem of highly persistent individuals is, to a large extent, based on the rewards acquired by their behavior.28

A tendency to exceed physical limits (in work or sports) to support reward can be a way of coping in order to maintain self-esteem. A focus of psychotherapy, therefore, could be to help patients to better recognize and respect their limits and substitute their previous “overactive” lifestyle with a more balanced activity/rest schema. These therapeutic strategies may enable CFS patients to reduce chronic stress by making more realistic and priority-based life choices, learning more adequate ways of dealing with negative life events and distressing emotions, basing their self-esteem not solely on achievement-oriented activities, working less obsessively and perfectionistically, responding more assertively to the others’ demands and expectations, and expressing their own needs more directly and explicitly.30

CFS patients displayed a reduced Self-Directedness, as compared with healthy control subjects, although the levels of significance for Self-Directedness did not withstand Bonferroni correction for multiple testing. Nan Jiang and colleagues13 also reported a negative correlation between Self-Directedness and CFS. The subscales 1 (Responsibility versus Blaming) and 5 (Congruent Second-Nature versus Bad Habits) more effectively explain the decreased Self-Directedness score.

Individuals who score low on the Responsibility subscale (Subscale 1) tend to blame other people and external circumstances for what is happening to them. They feel that their attitudes, behavior, and choices are determined by influences outside their control or against their will.9 Lower levels of perceived control are associated with poor outcome in CFS.32 Surawy and colleagues27 established that responsibility can be increased by withstanding avoidance coping-mechanisms.

Individuals who score high on the Congruent Second-Nature versus Bad Habits subscale (Subscale 5) have developed a spectrum of goal-congruent good habits, so that they automatically act in accord with their long-term values and goals.9 This is achieved gradually, as a result of self-discipline, but eventually becomes automatic (“second-nature”). The low scores on this subscale in the CFS group suggest that CFS patients experience themselves as individuals who manifest habits that are inconsistent with and make it hard for them to accomplish worthwhile goals.9 Van Houdenhove53 suggested that CFS patients suffer from a fundamental discrepancy between what they want to do and what they are able to do. Unrealistic goals may explain this fundamental imbalance.

Low self-directedness strongly predicts the presence of personality disorders.31 Taking into account the discrepancy of the Self-Directedness score of CFS patients with and without a past history of major depressive disorder (MDD), the CFS group with a history of MDD may have higher comorbidity for personality disorders. On the other hand, it is possible that decreased self-directedness is an effect primarily of major depression, rather than CFS and major depression combined.

Some limitations need to be considered when interpreting the results of the study: First, this study lacks a comparison with any other chronic illness, so as to assess the influence of the chronic nature of CFS.6,7,12 Although dimensions of temperament are relatively stable and resistant to change,9 self-reported scores on them might be influenced by environmental factors.17,34 Harm-Avoidance scores, for instance, may be influenced by chronic diseases. More precisely, one’s outlook may become more negative when faced with the struggle to overcome the challenges of a chronic disorder. Elevated Harm-Avoidance scores may be a vulnerability factor for CFS, but the levels of Harm-Avoidance may rise further after the onset of the CFS. A “benchmarking” approach, using the TCI in different patient groups, would be an interesting issue for further research.

Second, the participants in the present study consisted of a selected group of CFS patients. All patients were women, and they were all attending a tertiary-care center. Consequently, we cannot directly extrapolate these results to male CFS patients and to CFS patients in primary or secondary care. Furthermore, CFS patients with current major depression were excluded. This strategy was taken in order to preclude a state effect of depression on the outcome in the TCI.17,23

Third, the applied method of a questionnaire (TCI) for the personality examination includes restrictions. The results are solely dependent on the statements and estimations of the persons themselves. Furthermore, the use of
closed questions resulted in high reliability, but it limited opportunities for nuancing reports. Moreover, although patients were asked to fill out the TCI on the basis of personality perspectives before the onset of CFS, we cannot exclude a confounding effect of disease status.

Finally, the number of the patients was too small to investigate the influence of a history of major depressive disorder on the personality scales. However, the comparison between those subgroups was only meant to be exploratory.

In conclusion, CFS patients displayed elevated Harm-Avoidance and Persistence, as well as a reduced Self-Directedness on the TCI (the latter finding did not withstand post-hoc correction). These personality traits have an influence on coping behavior and may thereby be implicated in the onset and/or perpetuation of CFS. They may also be an interesting focus for psychotherapy. Future studies may help to clarify the influence of personality factors on therapy effectiveness. Furthermore, it would be interesting to examine the value of therapy oriented to specific personality characteristics. Finally, a larger sample is required to examine whether CFS patients with a history of major depression constitute a subgroup with a different personality profile.

We are grateful to the patients and control subjects for their participation in this study.

Stephan Claes is a senior Clinical Researcher of the FWO-F.

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