Measuring disability in patients with chronic fatigue syndrome: reliability and validity of the Work and Social Adjustment Scale

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Abstract

Background: Disability is a defining feature of chronic conditions, and it is an increasingly used measure of therapy effectiveness. The Work and Social Adjustment Scale (WSAS) is a simple and clear measure of disability. Although the scale is widely used, no study has yet investigated its psychometric properties in patients with chronic fatigue syndrome (CFS).

Methods: Data from two samples of patients were used, one from a multicenter randomized controlled clinical trial of treatments for CFS (n = 639) and the other from a clinic that specializes in CFS (n = 384). All patients completed the WSAS as well as other measures.

Results: Internal consistency and the Spearman–Brown split-half coefficient values indicated that the scale is reliable. CFS patients who had comorbid diagnoses of depression, anxiety or fibromyalgia had higher WSAS scores. High levels of disability were associated with high number of physical symptoms, severe fatigue, depression, anxiety, poor sleep quality and poor physical fitness, with correlation coefficients ranging between 0.41 and 0.11. Lower scores on the WSAS were modestly associated with better physical functioning as well as higher levels of physical capacity as assessed by a walking test. Sensitivity to change was evaluated in a subgroup of patients who had undergone a course of cognitive behavioral therapy. Disability significantly decreased after therapy and remained stable at follow-ups. Conclusion: The WSAS is a reliable and valid assessment tool for disability in patients with CFS.

Keywords: Chronic fatigue syndrome; Work and Social Adjustment Scale; Disability; Reliability; Validity

Introduction

The World Health Organization defines disability as an umbrella term covering impairments, activity limitations and participation restrictions. This definition describes impairment as a problem in body function or structure, activity limitation as a difficulty encountered by an individual in executing a task or action and participation restriction as a problem experienced by an individual in involvement in life situations [1]. Temporary episodes of disability are generally accepted as part of an illness course, but when disability is long lasting, these can become less tolerable. Disability is increasingly perceived as an important index of recovery, and intervention studies often include measures of disability as primary outcomes along with symptom reduction [2,3].

Disability is a characteristic feature of chronic fatigue syndrome (CFS). Between 27% and 65% of CFS patients are reported not to be working, and less than a third of untreated patients are estimated to resume employment within 3 years after diagnosis [4,5]. However, occupational outcomes tend to improve substantially for CFS patients who receive treatment such as cognitive behavioral therapy and graded exercise therapy [6]. Impairment in social and relational activities is also often reported by CFS patients [7]. Social and relational limitations are also likely to contribute to the high prevalence of emotional problems such as anxiety and depression observed in CFS [8].
The Work and Social Adjustment Scale (WSAS) is a five-item scale that assesses an individual’s ability to perform everyday activities including work, home management, family and relationship interaction and social and private leisure activities. Each of the five items is rated on a 9-point scale ranging from 0 (not at all a problem) to 8 (very severely impaired) so that total scores range between 0 and 40, with high scores denoting higher levels of disability. The scale was first introduced by Marks [9], but the first study evaluating its psychometric proprieties in psychiatric groups [i.e., obsessive-compulsive disorder (OCD) and depression] was conducted by Mundt et al. [10]. These authors found that the WSAS had good internal consistency (i.e., Cronbach’s α ranging between .70 and .90) and that it positively correlated with depressive symptom severity in depressed individuals as well as with obsessive-compulsive symptom severity in a group of patients with OCD. In a later study, Mataix-Cols et al. [11] extended the validation of the scale to phobic disorders and, using principal component analyses, confirmed the monofactorial structure of the scale. These authors also assessed sensitivity to change and found that WSAS total scores reflected differences in phobic severity and improvement with treatment. In the last decade, disability measures have been increasingly included in chronic and severe mental illness interventions studies [12,13].

The use of WSAS in other conditions is less well established. Up to date, the scale has been used in patients with CFS [14,15], irritable bowel syndrome [16] and nonepileptic attack disorder [17]. However, studies of the psychometric proprieties of the WSAS in these populations are lacking.

We aimed to determine the reliability and validity of the WSAS in two large samples of patients with CFS, as well as its sensitivity to change.

Methods

Participants

Two groups of patients with CFS were recruited for this study. Both groups were used to demonstrate the psychometric properties of the WSAS; only the second group was used to investigate sensitivity to change.

Cohort 1: the Pacing, graded Activity and Cognitive behaviour therapy: a randomized Evaluation (PACE) trial

Baseline data from the 640 patients assessed for the PACE trial were used. One patient did not complete the WSAS and was therefore excluded from the analysis. This is a large UK-based multicenter randomized controlled trial comparing the effectiveness of four treatments for people with CFS (see White et al. [18], for the study protocol). These are standardized specialist medical care alone, or standardized specialist medical care plus one of three therapies, namely, adaptive pacing therapy, cognitive behavior therapy (CBT) or graded exercise therapy. The main inclusion criteria for entering the trial were as follows: meeting the Oxford research diagnostic criteria for CFS [19], a score of 6 or more on the Chalder Fatigue Questionnaire [20], a score of 65 or less on the 36-item Short Form Health Survey (SF-36) physical function subscale [21] and at least 18 years old at randomization. The exclusion criteria were relevant alternative medical diagnosis explaining fatigue [22], diagnosis of a psychiatric condition excluded by the Oxford diagnostic criteria for CFS or self-harm risk, trial treatments inappropriate for the patient’s clinical needs (e.g., someone with significant posttraumatic stress disorder) or having previously received a trial treatment in one of the PACE trial centers. Patients were recruited between November 2004 and November 2009, and the baseline (prerandomization) data only were used in this study.

Cohort 2: CFS patients attending a CFS specialist unit

Data from 384 patients assessed in a UK secondary care specialist clinic were used to form cohort 2. These patients were initially referred from primary or secondary care and assessed by a consultant psychiatrist or senior therapist who confirmed the diagnosis of CFS. Patients included had a minimum age of 18 years at intake and a diagnosis of CFS according to the Oxford criteria [19]. Patients with severe psychiatric comorbidity (e.g., severe depression) are generally not treated by the CFS clinic; nevertheless, a number of comorbid psychiatric problems such as moderate depression and anxiety are frequently observed in CFS patients. All patients in cohort 2 received a course of CBT from an experienced clinical psychologist or nurse. Data collection for cohort 2 was conducted as part of the clinic audit and service evaluation.

Patients in cohort 2 received between 10 and 15 sessions of individual CBT and completed the WSAS and the Chalder fatigue scale (CFQ) both before and after therapy and again at 6- and 12-month follow-up after discharge from treatment. A number of cohort 2 patients had missing follow-up measures. One hundred sixty-one did not complete the WSAS after treatment, 174 did not complete the measure at the first follow-up and 159 did not complete it at the second follow-up. Reasons for not completing the measure were as follows: poor compliance and delay in returning the measures (e.g., more than 2 months from the due date). Only 114 patients completed the WSAS at 4 time points. Preliminary analysis conducted on baseline levels of WSAS, fatigue and basic demographic variables (i.e., age and gender) did not reveal any significant difference between patients who complete the measures at all assessment points and those who did not.

All patients in both cohorts underwent a range of laboratory investigations under the supervision of either the patients’ general practitioners or hospital doctors, to exclude alternative medical causes, as recommended by the
National Institute for Health and Clinical Excellence (NICE) guidelines [23].

Measures

Patients in cohort 1 were assessed with a number of measures in addition to the WSAS. These included the following: the CFQ, a 11-item scale assessing severity of fatigue [20–22,24]; the SF-36 physical functioning subscale [21]; the Hospital Anxiety and Depression Scale (HADS), a 22-item scale assessing symptoms of anxiety (HADS-A) and depression (HADS-D) [25] form, which an independent score for anxiety and depression can be derived; a 15-item assessment of common physical symptoms [26]; Centre for Disease Control (CDC) criteria for CFS symptom count [22]; Jenkins sleep scale [27]; the 6-min walking test to give an objective measure of physical capacity [28]; and the self-paced step test, a measure of fitness [29]. The Structured Clinical Interview for Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (SCID), Research Version, was used to assess the presence of concomitant psychiatric disorders [30].

Analysis

Statistical analyses were performed using SPSS 17. Scale reliability was measured by Cronbach’s coefficient and Spearman–Brown split-half coefficient [31,32]. Conventionally, coefficients above 0.70 are considered satisfactory [33]. Correlations were assessed with Pearson r. Analysis of variance and t test were used to investigate construct validity by comparing mean WSAS scores between different subgroups of CFS patients defined by gender, age and marital status. Sensitivity to change was evaluated with repeated-measure analysis of variance (ANOVA) across four consecutive assessments. Partial eta squared (η²) describing the proportion of total variation attributable to WSAS excluding other factors and error variance is reported for effect size estimation [34]. All tests were two tailed, and α of .05 indicated significance.

Principal component analysis with varimax rotation was used to investigate the factorial structure. An orthogonal rotation (i.e., varimax) was preferred to oblique rotation (i.e., promax) in line with previous studies [11–22,24]. Kaiser’s criterion (i.e., retention for factors above eigenvalue 1) was used to assess the number of components to be retained [35].

Results

Patients from the two cohorts did not differ by age, cohort 1 (mean=38.3, S.D.=11.8), cohort 2 (mean=39.1, S.D.=10.1), t(1021)=−1.04, P=.29, but did differ in gender distribution (χ²(1)=22.6, P<.0001) with a higher proportion of males in cohort 2 (37%) compared with cohort 1 (22%).

The two cohorts did not differ in mean WSAS scores at initial assessment (cohort 1: mean=27.2, S.D.=6.3) and cohort 2 (mean=26.9, S.D.=8.5), t(1021)=0.56, P=.57.

Internal consistency

Cronbach’s α [31] for the WSAS was .79 for cohort 1 and .89 for cohort 2 at initial assessment, and for cohort 2, it was .93 posttreatment and .94 at both 6 and 12 months.

Split-half reliability

Spearman–Brown split-half coefficient for WSAS was 0.73 for cohort 1 and 0.85 for cohort 2 at initial assessment, 0.90 at posttreatment, 0.93 at 6-month follow-up and 0.94 at 12-month follow-up.

Factor structure

Four principal components analyses with Varimax rotation were conducted on cohort 1 and at the three assessment points for cohort 2. Results strongly supported the monofactorial structure of the WSAS; eigenvalues for the single factor solution ranged from 2.81 to 3.23, and variance explained in the four solutions retrieved ranged from 59.1% to 67.6%. Individual items factor loading was between 0.63 and 0.81, with the only exception of items 1 (work) and 5 (relationship) in cohort 1 that loaded 0.51 and 0.47, respectively.

Relationship with sociodemographic variables

Independent t tests conducted on cohort 1 indicated that there was no significant difference between males (mean=27.7, S.D.=6.1) and females (mean=27.1, S.D.=6.3) on the total WSAS scores, t(637)=−1.05, P=.29. When patients were divided by age, median split greater disability was shown in those older than 38 years (mean=27.9, S.D.=6.5) compared with those younger than 38 year (mean=26.6, S.D.=6), t(637)=2.66, P=.008. The Pearson correlation (r) between age at randomization and WSAS total score was 0.11, P=.005. When differences in disability were analyzed in association with marital status, disability levels were found to be comparable in single (mean=26.6, S.D.=6.3), married (mean=27.6, S.D.=6.4), living with partners (mean=27.4, S.D.=6.1) and separated/divorced (mean=28, S.D.=6.1) patients, F(4,639)=1.73, P=.124.

Construct validity

In cohort 1, CFS patients with a concomitant SCID diagnosis of depression at baseline (n=208) had a higher WSAS score (mean=28.9, S.D.=6.2) compared with nondepressed CFS patients (n=431 mean=26.4, S.D.=6.2), t(638)=−4.73, P<.0001. Similarly, CFS patients with a concomitant SCID [30] diagnosis of anxiety disorder (i.e., panic disorder, obsessive-compulsive disorder, posttraumatic stress...
disorder, phobias and generalized anxiety disorder) had higher disability levels \((n=203, \text{mean}=28.3, \text{S.D.}=5.9)\) compared with CFS patients without a concomitant anxiety disorder \((n=435, \text{mean}=26.7, \text{S.D.}=6.4)\), \(t(637)=-4.71, P<.0001\). CFS patients with a concomitant diagnosis of fibromyalgia according to the widespread pain criteria [36] had higher scores on the WSAS scale \((n=138, \text{mean}=28.6, \text{S.D.}=6.4)\) compared with those who did not meet the fibromyalgia criteria \((n=500, \text{mean}=26.9, \text{S.D.}=6.2)\), \(t(636)=-2.76, P=.006\).

Table 1 shows the correlations between WSAS scores and other measures including fatigue, physical function, depression, anxiety, physical symptoms, sleep, CFS symptoms, walking and step test.

ANOVA was used to compare differences between measures among quartiles on the WSAS. Group differences were apparent, with the more disabled individuals scoring higher on the other measures (Table 2).

**WSAS sensitivity to change (cohort 2)**

Sensitivity to change was evaluated with repeated-measure ANOVA across the four WSAS assessments. For this analysis, only 114 cohort 2 CFS patients who completed all WSAS items could be used. Across the four assessments points, there was a significant reduction of WSAS scores \(F(2.3,262.3)=42.81, P<.0001, \eta^2=0.28\) (Fig. 1). Contrast analysis showed a significant reduction in WSAS scores between initial assessment and posttreatment, \(F(1,113)=41.4, P<.0001, \eta^2=0.27\), and between posttreatment and the first follow-up, \(F(1,113)=23.8, P<.0001, \eta^2=0.17\).

**Discussion**

To our knowledge, this is the first study to investigate the psychometric proprieties of the WSAS in two large cohorts of CFS patients, one from a large randomized controlled trial and one from a clinical service. Results from the two cohorts were comparable, suggesting that the WSAS is an acceptable measure of disability in both research and in everyday clinical contexts. Reliability analysis further supports this claim showing similarly high internal consistency and split-half reliability coefficients in the two cohorts considered. Nunnally criteria of Cronbach’s \(\alpha\) interpretation suggest that values in the range of 0.8 to 0.9 should be considered indicative of good internal consistency [11]. The current results are largely within this range and therefore can be interpreted as indicative of strong reliability.

Disability was not found to differ between genders but was found to be higher in older patients. This is perhaps unsurprising as self-rated disability has been shown to increase with age [37]. However, mean differences in the disability scores between the age classes were not very high, and the correlation showed a significant but very modest trend in the expected direction. What is perhaps more interesting is that levels of disability were comparable between persons of different marital status, suggesting that the potential support from partners did not have an effect on self-reported levels of disability. Previous research has shown that oversolicitous behavior is associated with worse disability in CFS [38,39].

Construct validity as assessed with correlations and variance analysis showed moderate but statistically

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**Table 1**

Correlations between WSAS and other assessment measures used for cohort 1

<table>
<thead>
<tr>
<th>CFQ</th>
<th>SF-36</th>
<th>HADS-A</th>
<th>HADS-D</th>
<th>PHQ-15</th>
<th>JSS</th>
<th>CDC total</th>
<th>WT (min)</th>
<th>ST (s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CFS cohort 1 ((n=639))</td>
<td>WSAS</td>
<td>.329**</td>
<td>-.381**</td>
<td>.169**</td>
<td>.411**</td>
<td>.253**</td>
<td>.113**</td>
<td>.183**</td>
</tr>
</tbody>
</table>

**Table 2**

Groups divided by WSAS quartiles

<table>
<thead>
<tr>
<th>WSAS quartiles</th>
<th>1 ((n=169))</th>
<th>2 ((n=151))</th>
<th>3 ((n=179))</th>
<th>4 ((n=140))</th>
<th>(F)</th>
<th>(P)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fatigue</td>
<td>26.6 (4.1)</td>
<td>27.6 (3.6)</td>
<td>28.8 (3.3)</td>
<td>29.8 (3.1)</td>
<td>24.1</td>
<td>.0001</td>
</tr>
<tr>
<td>SF-36</td>
<td>45.2 (14.5)</td>
<td>41.2 (13.9)</td>
<td>35.5 (15.5)</td>
<td>29.1 (14.3)</td>
<td>35.1</td>
<td>.0001</td>
</tr>
<tr>
<td>HADS-A</td>
<td>7.21 (3.7)</td>
<td>7.8 (3.8)</td>
<td>8.1 (4.3)</td>
<td>9.2 (4.6)</td>
<td>6.2</td>
<td>.0001</td>
</tr>
<tr>
<td>HADS-D</td>
<td>6.6 (2.8)</td>
<td>7.6 (3.4)</td>
<td>8.5 (3.7)</td>
<td>10.7 (3.7)</td>
<td>38.1</td>
<td>.0001</td>
</tr>
<tr>
<td>PHQ-15</td>
<td>12.5 (4.2)</td>
<td>14 (4.4)</td>
<td>14.3 (4.4)</td>
<td>15.9 (4.7)</td>
<td>15.8</td>
<td>.0001</td>
</tr>
<tr>
<td>JSS</td>
<td>11.5 (4.8)</td>
<td>11.9 (4.3)</td>
<td>12.3 (4.9)</td>
<td>13.1 (4.9)</td>
<td>2.9</td>
<td>.032</td>
</tr>
<tr>
<td>CDC total</td>
<td>4.2 (1.8)</td>
<td>4.5 (1.7)</td>
<td>4.9 (1.7)</td>
<td>5.1 (1.6)</td>
<td>8.1</td>
<td>.0001</td>
</tr>
<tr>
<td>WT (min)</td>
<td>349.8 (74.6)</td>
<td>334.9 (82.1)</td>
<td>309.1 (89.6)</td>
<td>285.4 (88.9)</td>
<td>8.4</td>
<td>.0001</td>
</tr>
<tr>
<td>ST (s)</td>
<td>101.9 (30.9)</td>
<td>105.5 (31.1)</td>
<td>107 (38.1)</td>
<td>114.4 (42)</td>
<td>3.1</td>
<td>.024</td>
</tr>
</tbody>
</table>

Assessment measures, means and S.D. for each quartile are presented. Analysis of variance, \(F\) values and significance values are also reported. ST, self-paced step test; CDC total, number of CDC symptoms.
significant values. The correlation coefficients, although modest, pointed to a stronger association between higher levels of disability with higher depression and fatigue scores and lower scores on the SF-36 physical functioning scale. These associations in particular may be relevant to the construct validity of the WSAS as both depression and fatigue are constructs that per se are associated with increased disability. Higher levels of disability may be an indication that clinicians should consider screening for anxiety and depression. Other associations were rather weak but in the expected direction. Associations between objective tests of physical fitness, such as the walking and the step test, although significant, were small. This may be indicative of a degree of dissociation between physical capacity and patient’s perception of their disability levels. Fear of exercising and overly cautious attitudes to physical activity is a common thinking style observed in individuals with CFS [38]. An alternative explanation for the low correlation observed between physical capacity and WSAS scores may be in the nature of the disability the scale measures. It is possible that physical capacity, as assessed by the walking and step test, is not associated with WSAS items such as ability to work, as most jobs would not require high levels of fitness to be performed. Similarly, leisure and social activity may not be associated, for some people, with physical fitness. Also, the higher values of disability observed in those with a concomitant diagnosis of depression and anxiety may suggest that the disability concept as measured by the WSAS may depart from the more traditional physically related concept of disability. The higher correlations with depression, in particular, hint at the possibility that the WSAS scale may measure a slightly different concept of disability more associated with the capacity to enjoy and participate in life. Therefore, the use of the WSAS may be more appropriate for those investigations with a specific target on a concept of disability less reliant strictly on physical capacity and accounting more for the capacity to be active.

The short and the uncomplicated nature of the scale makes the WSAS an excellent and quick assessment tool for the degree to which people with CFS can participate in life, an aspect of disability. Its use is recommended both for assessment and for treatment evaluation. A number of controlled studies have recently started to include the WSAS as a primary outcome for treatment evaluation [2,3]. This is both an acknowledgment of the value that such an outcome might have for patients but may also be perceived as a reevaluation of clinical priorities. It is becoming increasingly accepted that reducing patients’ disability is as important as improving symptoms severity.

In cohort 2, WSAS scores decreased significantly after a course of CBT, indicating that the scale is sensitive to change. This sensitivity to change is particularly important and suggests that the WSAS is a valuable tool for assessing treatment effectiveness in CFS.

A number of limitations to this study need to be noted. We could not perform a test–retest reliability analysis as consecutive assessments in cohort 2 were conducted to evaluate intervention effectiveness. This therefore limits the extent of our reliability findings. A further limitation is the considerable proportion of missing data in cohort 2. As a result of this, only a subset of the original sample could be used to investigate WSAS sensitivity to change. Preliminary analysis conducted to investigate the presence of a systematic bias between patients with missing and complete data did not evidence any significant difference. It is therefore unlikely that those patients with missing WSAS data represent a different sample to those who completed the measure in full at all assessments time.

The WSAS has acceptable validity, reliability and sensitivity to change in patients with CFS, and its use to assess disability in both research and clinical practice is recommended.

References


