

**Translation and Validation of the Dutch Language Version
of the CDC Symptom Inventory for Assessment of Chronic
Fatigue Syndrome (CFS)**

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Abstract

Background

In a study by Wagner et al, the CDC Symptom Inventory was validated in a population that was selected from the inhabitants of a city in the USA, and proofed reliable for the assessment of the additional symptoms of CFS. The Dutch translation of the CDC Symptom Inventory is compared to the original and the psychometric properties are presented for patients in a tertiary care setting.

Methods

One hundred nine patients who visited the CFS Center Amsterdam for the first time were asked to complete the CDC Symptom Inventory in the Dutch Language Version (DLV) together with the usual set of questionnaires. Forty-four patients had Chronic Fatigue and 65 patients fulfilled the criteria for CFS. Forty-three accompanying persons completed the CDC Symptom Inventory DLV, the Physical Functioning scale of the Medical Outcome Survey Short Form-36 DLV and the Fatigue and Concentration scales of the Checklist Individual Strength (CIS-20).

Results

The healthy controls group contained fewer women and was overall older than the patient groups. The influence of the sex difference on the CDC Symptom Inventory DLV and the effect of age were not significant. The Dutch version had a very good internal consistency and convergent validity. The results were comparable to the original English version.

Conclusion

The Dutch version of the CDC Symptom Inventory is a reliable tool for the assessment of the secondary criteria for CFS. The results show that it is comparable to the outcome of studies in English speaking countries.

Background

Chronic Fatigue Syndrome (CFS) is a disabling state that was defined by a working group in 1994 [1]. The main components of the definition are fatigue that is not related to exercise and not relieved by rest, and eight minor symptoms, of which four must be present. The CFS is incapacitating, with a serious reduction in daily activity. Several self-rating scales for the presence and severity of fatigue were developed. Of these, the Multidimensional Fatigue Inventory (MFI-20) [2] and the Checklist Individual Strength (CIS-20) [3] were selected by an international CFS study group [4]. The same group advised the Medical Outcomes Survey Short-Form-36 (SF-36) as the tool for the assessment of functional impairment. For the presence of the secondary symptoms of CFS, a symptom checklist developed by the Centers for Disease Control and Prevention was suggested. The MFI-20 and the CIS-20 were developed in the Dutch language and validated. The SF-36 was translated and validated [5]. The CDC Symptom Inventory was validated for the English-speaking countries [6]. The translation in Dutch was considered necessary for comparison of data in CFS research in the Netherlands and other countries. The objective of the

present study was to translate the CDC Symptom Inventory and to validate it in the Dutch speaking population.

Methods

The participants in the study were patients who attended the CFS Center Amsterdam for the first time for diagnosis and treatment of chronic fatigue and healthy volunteers. All participants gave informed consent for the use of their data for this study. No investigations were added to the standard diagnostic protocol for new patients in the Center and the healthy volunteers were asked to complete the questionnaires only. The CIS-20 is a 20-item self-report instrument that measures 4 dimensions of fatigue: fatigue, concentration, impaired motivation and impaired activity. For clinical assessment of fatigue we used the fatigue and concentration subscales. The CDC Symptom Inventory was used for the assessment of the presence of additional symptoms and their severity. Symptoms were rated as suggested by Wagner et al. [6]. We calculated the CDC Symptom Inventory Total Score, the CDC Symptom Inventory Short Form, the CDC Symptom Inventory Case Definition Score and the CDC Symptom Inventory Other symptoms Score as indicated by the authors. The severity of physical impairment was measured with the physical functioning subscale of the SF-36. All healthy controls completed a list of questions about health, medical interventions in the past and drug use. A physical checkup and laboratory data according to the recommendations of Fukuda et al [1] were obtained from all patients. In fatigued patients depression was measured with the Zung Self-rating Depression Scale, 20 items designed to assess symptoms of major depression [7]. Depression, anxiety, somatisation and distress were measured in fatigued patients with the 4 Dimensional Symptom Questionnaire 4DSQ [8], a validated 50 item questionnaire that discriminates core symptoms of major depression from irritability or distress, anxiety and somatisation.

Translation

The English version of the CDC Symptom Inventory was translated into Dutch by a native Dutch speaker with fluency in English. The translation was presented to 4 native Dutch speakers for problems in acceptance and comprehension of the questionnaire content or the phrasing. The provisional Dutch version was translated backward into English by a native English speaker with fluency in Dutch.

Statistical analysis

We evaluated the internal consistency of the CDC Symptom Inventory by performing a reliability analysis based on the model of averaging the inter-item correlation. The convergent validity between the CDC Symptom Inventory, the CIS-20, the physical score of the SF-36, the Zung Self-rating Depression Sale and the 4DSQ was tested by the calculation of Pearson's correlation coefficient. Construct validity by one-way of variance analysis and Bonferroni post-hoc group comparisons were used to compare the CDC Symptom Inventory scores, the CIS-20 scores and the SF-36 score across the three groups and the Zung Self-rating Depression Inventory score and the 4DSQ scores across the two fatigue groups.

All statistical analyses were carried out using the Statistical Package for the Social Sciences (SPSS version 14.0).

Results

Forty-three healthy controls completed the questionnaires. Forty-four patients fulfilled the Fukuda criteria for chronic fatigue (CF-group) and 65 patients those for chronic fatigue syndrome (CFS-group). There was no difference in age or sex between the CF and the CFS group. The control group was older and contained less women (Student's t -test $P < 0.001$). The influence of age on the CDC scores was limited, as shown by a correlation coefficient of -0.19 till -0.26 in Student's t -test.

Reliability analysis

Reliability analyses showed good internal consistency for the CDC Symptom Inventory Total score with a Cronbach's alpha coefficient of 0.90. Cronbach's alpha was 0.89 for the Symptom Inventory Short Form, 0.84 for the Symptom Inventory Case Definition Score and 0.81 for the Symptom Inventory Other Symptoms Score.

The CIS-20 revealed good internal consistency with a Cronbach's α coefficient of 0.80 for the fatigue subscale and 0.92 for concentration. Cronbach's α coefficient was 0.84 for the somatisation score of the 4DSQ, 0.89 for the depression subscale, 0.91 for depression and 0.85 for anxiety. The Zung Self-rating Depression Inventory revealed a Cronbach's α coefficient of 0.83.

Validity

Convergent validity of the CDC Symptom Inventory

The Pearson's correlation coefficient indicated a good convergent validity of the CDC Total, Case Definition and Short Form scores (Table 4.) with positive correlations with the CIS fatigue and concentration scores and an inverse correlation with the SF-36 Physical functioning score. In contrast, the correlations with the depression, distress and anxiety scores were much lower, especially for the Case Definition score. These results indicate that an influence of mood on the rating of the CDC Symptom Score is present, with higher scores for lower mood, but the effect is minor.

Construct validity

The Bonferroni post-hoc comparisons between healthy controls, chronic fatigue and chronic fatigue syndrome patients showed significant mean differences related to CDC Symptom Inventory scores (Bonferroni post-hoc test; $P < 0.001$).

Discussion

This evaluation of the clinical application of the Dutch translation of the CDC Symptom Inventory shows that is a reliable tool for the assessment of CFS.

The patients differ in some respects from the population that was studied by Wagner et al [6]. We analyzed patients who attended a tertiary care setting and their accompanying relatives and friends. This explains the difference in the male – female ratio and the age difference between the healthy controls and the patients. The differences were analyzed and proved not relevant for the outcome. The differences

of the populations explain the different results of the analyses in the two studies, but the trend is comparable. The reliability of the scores, expressed as Cronbach's α coefficient was almost identical in the two studies. The relation of the outcome of the CDC Symptom Inventory and the SF-36 Physical Functioning score was comparable. The CIS-20 Fatigue and Concentration scores in our analysis were closely related to the CDC Symptom Inventory scores with correlation coefficients that were comparable to the MFI General Fatigue and Mental Fatigue scores in the study of Wagner et al [6]. We decided to analyze the interaction of mood on the outcome of the CDC Symptom Inventory scores. They were available from all patients at the first visit screening. As expected we found some relation, a higher score of distress, depression and anxiety correlated with a higher score of the CDC Symptom Inventory. The lowest correlation coefficients were found for the Case Definition score, indicating that mood had a limited influence on this score or vice versa.

We limited the number of tests because of clinical relevance for the patients. More tests would have added little to the clinical diagnosis of CFS.

Conclusion

The Dutch translation of the CDC Symptom Inventory proved to be a reliable tool in the clinical setting of a tertiary care center. The translated version is reliable and the results are comparable to the study of a different population in an English-speaking country.

Competing interests

The author declares that he has no competing interests.

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Tables

Table 1: Characteristics by subject classification (n = 152). CFS: patients with chronic fatigue syndrome, CF: patients with chronic fatigue, not meeting the criteria for CFS, and healthy controls without fatigue complaints.

Classification	n	Women (%)	Age (Mean \pm SD)
CFS	65	48 (74%)	39.8 \pm 13.3
CF	44	32 (73%)	37.6 \pm 11.1
Controls	43	19 (44%)	47.6 \pm 14.0

Table 2: Corrected item to total correlations for the CDC symptom inventory total score, the symptom inventory short form score and the symptom inventory case definition score.

Symptom	Corrected item total correlations		
	Total Score	Short Form	Case Definition
Sore throat	.40		.39
Tender nodes	.45		.34
Diarrhea	.35		
Unusual fatigue after exertion	.76	.79	.74
Muscle aches	.58	.50	.64
Joint pain	.48		.51
Feverishness	.36		
Chills	.51		
Unrefreshing sleep	.80	.83	.76
Sleeping problems	.74	.78	
Headaches	.48		.51
Memory problems	.62	.62	
Concentration	.79	.82	.71
Nausea	.57		
Stomach pain	.50		
Sinus problems	.33		
Shortness of breath	.44		
Sensitivity to light	.53		
Depression	.47		

Table 3: Descriptive data of the CDC Symptom Inventory Scores

CDC Symptom Inventory Scores	Mean	SD	Min	Max
Total	70.29	50.91	0	201.0
Short Form	39.20	28.69	0	92.0
CDC Case Definition	39.67	27.59	0	104.0
Other Symptoms	30.92	26.01	0	104.5

Table 4: Pearson's correlation matrix of CDC Symptom Inventory Scores, CIS-20, SF-36, Zung self-rating Depression Inventory and 4DSQ.

Questionnaires	Total score		Short Form		Case Definition	
	r	P	r	P	r	P
CIS-20						
Fatigue	.76	<.001	.78	<.001	.79	<.001
Concentration	.77	<.001	.80	<.001	.78	<.001
SF-36						
Physical functioning	-.70	<.001	-.69	<.001	-.70	<.001
Zung						
Depression	.44	<.001	.48	<.001	.35	<.001
4DSQ						
Somatisation	.60	<.001	.43	<.001	.49	<.001
Distress	.46	<.001	.49	<.001	.31	.001
Depression	.33	<.001	.34	<.001	.23	.016
Anxiety	.32	.001	.28	.003	.18	.067
CDC Symptom Inventory						
Total			.94	<.001	.94	<.001
Short Form			.94	<.001	.93	<.001

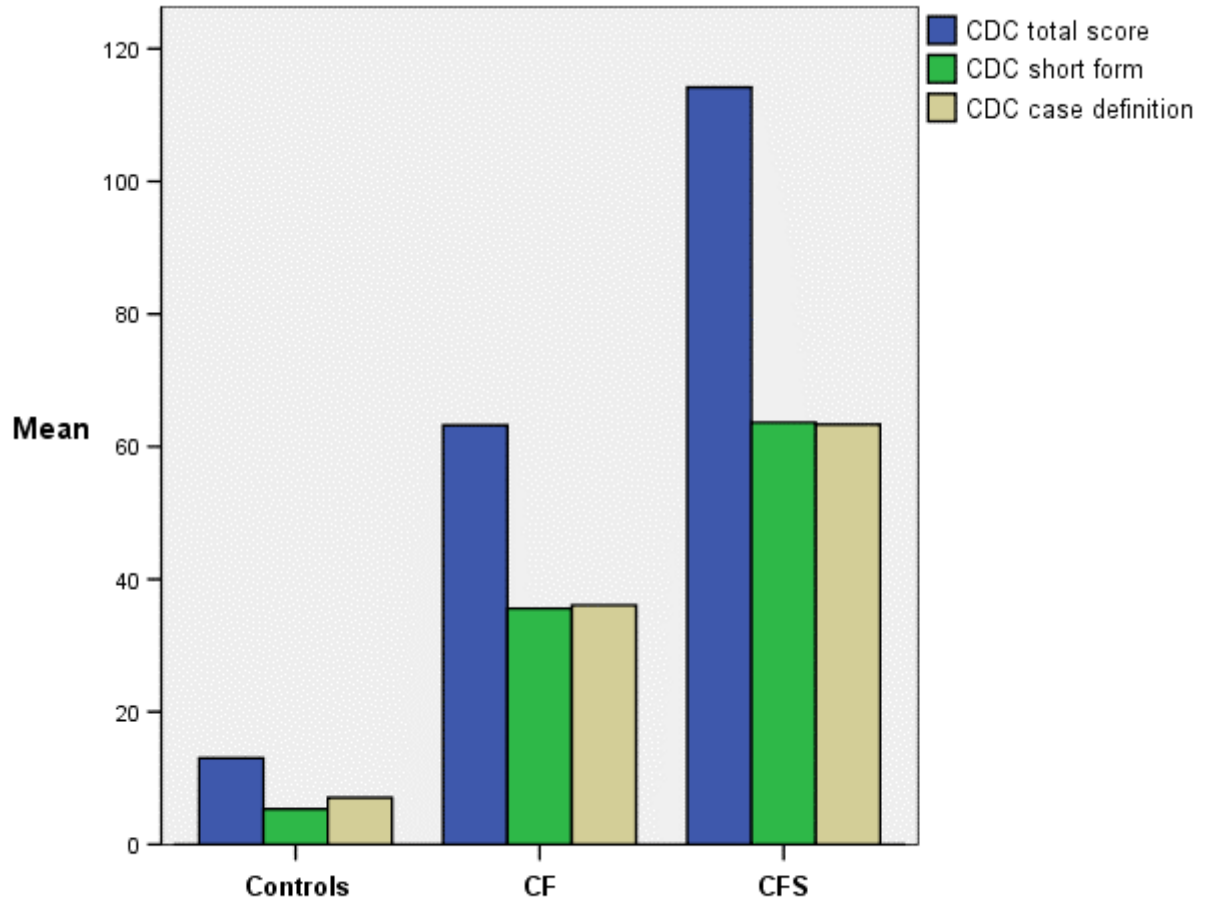


Figure 1. Total, Short Form and Case Definition score of the CDC Symptom Inventory for healthy controls, Chronic Fatigue patients who did not fulfill the criteria for CFS (CF) and patients with Chronic Fatigue Syndrome (CFS).

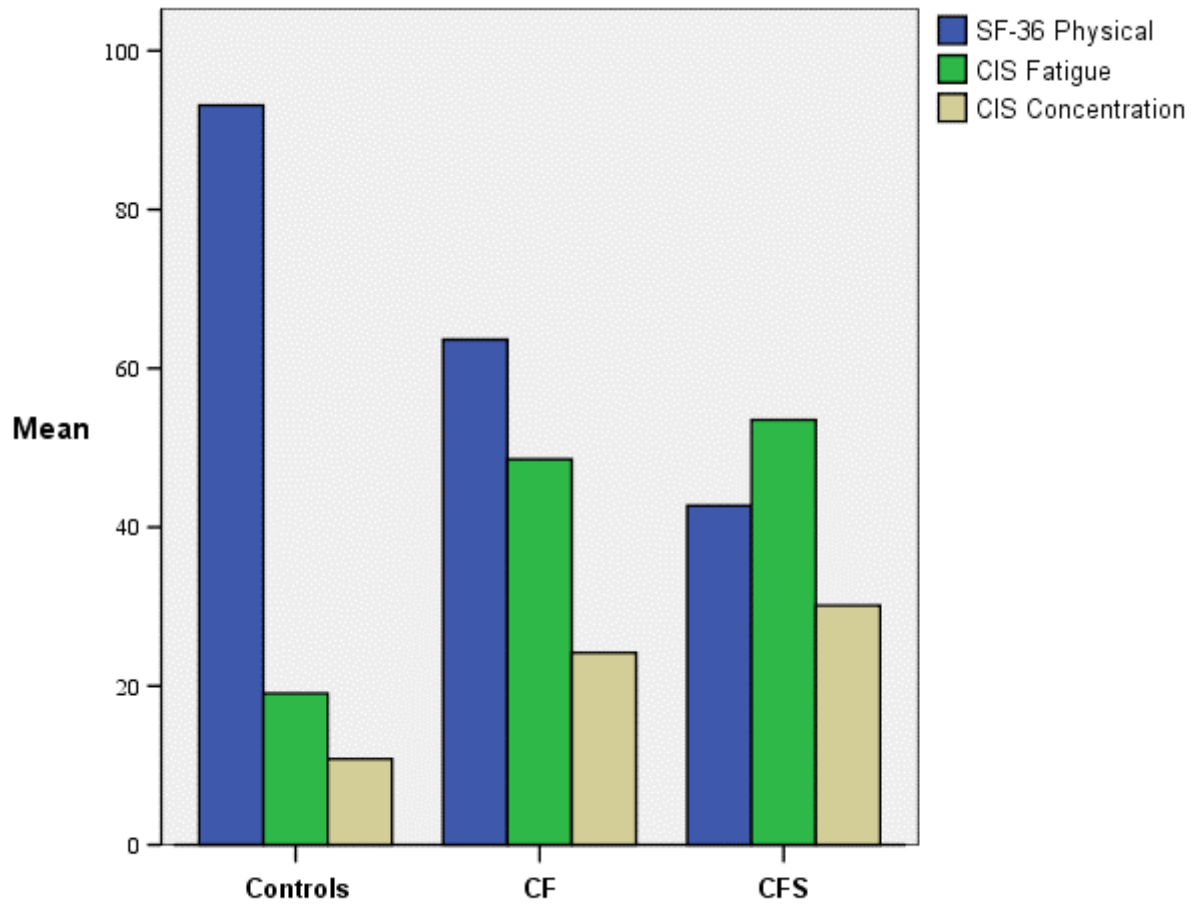


Figure 2. SF-36 Physical Functioning, CIS Fatigue and CIS Concentration scores for healthy controls, Chronic Fatigue patients who did not fulfill the criteria for CFS (CF) and patients with Chronic Fatigue Syndrome (CFS).