

SHORT REPORT

**Validation of the Symptom Checklist SCL-27 in psychiatric patients:
Psychometric testing of a multidimensional short form**

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Abstract

SCL-90-R, a multidimensional assessment instrument for mental health status, is among the most widely used instruments for the evaluation of therapies and quality management in mental institutions. With 90 items it is rather long and has a high redundancy as can be seen in its highly correlated scales. Thus many short versions have been constructed, among them the SCL-27, which was devised as a screening tool. It has 27 items, retains six of the nine SCL-90 dimensions and has shown a good factor structure. So far it has only been validated in non-psychiatric samples. The aim of this study is to determine validity and other psychometric qualities of the SCL-27, compared to the SCL-90-R within a group of 449 psychiatric patients. The study found a large concordance between the symptom scales of the SCL-27 and the corresponding scales of the SCL-90-R. The SCL-27 further showed good reliability and a sensitivity to change comparable to that of the 90-item version. A confirmatory factor analysis yields an acceptable factor validity which is better than that of the long version. This study concludes that the SCL-27 is suitable as a short assessment instrument for psychological health in psychiatric patients.

Key Words: *SCL-90-R, symptom check list, short form, factor validity, screening instrument*

Introduction

The Symptom Checklist-90-Revised (SCL-90-R) is a widely used multidimensional self-assessment instrument that measures a broad range of symptoms of psychopathology [1,2]. Its popularity is attributable to its comprehensive assessment of subjectively perceived psychological problems across different symptom dimensions, which yields an individual profile across nine dimensions for each patient [1]. It is applied as an outcome measure in quality management, treatment evaluation and clinical studies, and in addition as a screening tool [3,4]. Used internationally, it has been translated and validated in many different languages, e.g., [5, 6].

Yet the SCL-90-R is not without statistical flaws. Its scale structure lacks factor validity and the scales correlate strongly, which shows a high redundancy and is contrary to its conceptualization as a multidimensional test [7–10]. With 90 items the instrument is rather long, which is particularly disadvantageous for the use in psychiatric samples. Long questionnaires can be quite challenging for patients with psy-

chological impairments particularly in routine clinical assessment and findings show that response rate depends on length of a questionnaire [11].

These weaknesses of the SCL-90-R lead to the development of shorter versions, which are easier and quicker to fill out, yet still yield reliable results. Short forms also have a greater range of application for example as a screening instrument or part of test batteries, where assessment instruments are often used in combination, which makes the brevity of each instrument very advantageous. Generally two types of abbreviated tests were developed. There are one-dimensional ones that allow only a global assessment like the SCL-9-K, which contains one item out of every subscale of the SCL-90-R yielding one score for global severity other examples for one-dimensional tests include SCL-5, -8, -9, -10 [5,6,12,13].

The second type of short form is multidimensional and still retains some or all of the dimensions of the SCL-90-R with fewer items. The most widely applied examples are the Brief Symptom Inventory (BSI) that still consists of all the original scales, while

reducing the number of items to 51 or the Brief Symptom Inventory 18, which retains only three of the SCL-90-R dimensions [14]. Though the BSI allows a multidimensional assessment, it has the same test statistical issues as the long version it is based upon. Due to these statistical problems, further short forms have been created [13]. In a comparison of 11 SCL-90-R short forms Müller et al. [15] recommend the use of multidimensional short forms for their superior discriminative ability.

The multidimensional short form SCL-27 developed by Hardt et al. is a good compromise [16]. It contains only six scales: depressive, dysthymic, vegetative and agoraphobic symptoms, and symptoms of social phobia and mistrust. Each scale consists of four to six items. In addition a Global Severity Index (GSI-27) can be calculated. Originally developed for patients with chronic pain, this SCL short form shows good reliability for each scale (Cronbach's $\alpha > 0.70$) and the GSI-27 (Cronbach's $\alpha > 0.90$) as well as a superior factor structure compared to the long version in a sample of chronic pain patients as well as a normative healthy sample [17–19]. Its main drawback is the relatively high correlations among the scales, though they are lower than for the SCL-90-R. Overall the SCL-27's six-factor structure has proven to be superior to that of the original SCL-90-R as well as a one-dimensional version [16]. To further reduce the SCL-27's intercorrelations Hardt has made further changes to the checklist, yet so far this new test has only been assessed in a healthy normative sample [20].

So far the SCL-27 has been validated with chronic pain patients and a normative sample, yet its psychometric properties and brevity in addition to its multiple dimensions suggest great utility particularly in psychiatric populations, where the SCL-90-R is standard. This investigation aims to examine the psychometric properties of the SCL-27 and evaluate its factor structure in a psychiatric sample.

Methods

The sample consists of 453 Swiss patients from an outpatient therapy unit ($N=159$, 35%), an inpatient

addiction unit (illegal substances: $N=48$, 10.7% and alcohol $N=174$, 38.8%), an inpatient ward for depression and an acute mental care unit (72, 15.9%) at the Psychiatric University Clinics in Basel. No exclusion criteria were employed and all patients were included consecutively.

The SCL-90-R was included as part of the clinic's routine patient assessment prior to treatment. Four patients were excluded from analysis due to more missing items than allowable according to SCL-90-R manual [2]. None of the patients had more than one missing item for each of the SCL-27 scales.

The SCL-27 as described by Hardt et al. [16] was administered. Since the items of the SCL-27 are a subset of the SCL-90-R, the SCL-90-R was used to determine the SCL-27 scores and the two tests were compared directly within the same sample.

Values for all six of Hardt's subscales were generated and correlated with their original SCL-90-R counterparts. Furthermore reliabilities for all SCL-27 and their corresponding SCL-90-R subscales were calculated and compared. Factor validity was proofed with a confirmatory factor analysis.

To assess sensitivity to change for both instruments 48 patients repeated the questionnaire at the end of their stay. For this subgroup standardized effect sizes were calculated for each scale of the SCL-27 and SCL-90-R. For statistical analysis, SPSS 15 (SPSS inc., Chicago, IL) was used.

Results

The patients' ages ranged from 14 to 71 with a mean age of 38.4 years. Women made up 43% of the sample. The patients were diagnosed according to the International Classification of Diseases 10th revision (ICD-10). The two largest diagnostic groups were psychoactive substance use (F1: 52%) and affective disorders (F3: 31%), while two much smaller groups, neurotic disorders (F4) with 9.6% and schizophrenia (F2) with 7.4%, made up the rest of the sample.

To determine the psychometric quality of the SCL-27, reliability and validity were examined. Since the procedure for the SCL-90-R and the SCL-27 was the same, the two measures are equally objective.

Table I. Internal consistency (Cronbach's α) of SCL-90-R and SCL-27 dimensions.

SCL-27 dimension (number of items)	Cronbach's α SCL-27	SCL-90-R dimension (number of items)	Cronbach's α SCL-90-R
Depressive symptoms (4)	0.83	Depression (13)	0.92
Agoraphobic symptoms (5)	0.84	Phobic anxiety	0.88
Dysthymic symptoms (4)	0.85	Obsessive-compulsive	0.86
Vegetative symptoms (6)	0.79	Somatisation (12)	0.88
Symptoms of social phobia (4)	0.80	Interpersonal sensitivity (9)	0.86
Symptoms of mistrust (4)	0.75	Paranoid ideation (6)	0.80
Global Severity Index 27 (27)	0.94	Global Severity Index (90)	0.98

Table II. Correlation of SCL-90-R dimensions with corresponding SCL-27 dimensions.

SCL-27 dimension/SCL-90 dimension	(N=449)
Depressive symptoms/depression	0.87*
Agoraphobic symptoms/phobic anxiety	0.95*
Dysthymic symptoms/obsessive compulsive	0.87*
Vegetative symptoms/somatisation	0.90*
Symptoms of social phobia/interpersonal sensitivity	0.93*
Symptoms of mistrust/paranoid ideation	0.96*
Global Severity Index 27 (GSI-27)/Global Severity Index (GSI)	0.98*

*P value < 0.001.

Shortening of tests can lead to a reduction in reliability. Table I shows that in spite of the smaller item number internal consistency of the SCL-27 in comparison to the SCL-90-R remained good with nearly comparable Cronbach α values.

To examine the validity of the SCL-27 scales, each was correlated with their corresponding SCL-90-R scale (see Table II). Overall there is a high concordance between the six symptom areas of the SCL-27 and the SCL-90-R. Furthermore the GSI-27 shows a very high correlation (0.98) with its SCL-90-R counterpart.

Validity

For evaluation of discriminant validity, means and standard deviations of each dimension were calculated for different diagnostic groups. As can be seen in Table III, differences in means between long and short version of the SCL are small. As expected the standard deviations are slightly larger in the short form due to lower precision associated with a smaller number of items. The differences between diagnostic

groups are much larger than the differences of long and short form. Analyses of Variance for diagnostic groups mainly reveal P values smaller than 0.05, thus demonstrating comparable discriminative validity of the short version with the original SCL-90-R.

Factor validity

It was further investigated whether the factor structure of the SCL-27 as proposed by Hardt et al. [16] shows a good fit for this psychiatric sample. Factor validity was therefore analyzed with a confirmatory factor analysis resulting in an acceptable fit of the factor structure to our sample (Chi²/df = 2.7; CFI = 0.91; RMSEA = 0.063; Amos, Version 16 [21]). The standardized regression weights of each item on its respective scale is good (see Table IV), though the intercorrelations of the scales are rather high and lie between 0.55 and 0.81 (see Table V).

Sensitivity to change

For outcome assessment and the use in clinical studies the sensitivity to change of a psychometric instrument is crucial [22]. The much shorter SCL-27 showed only slightly lower standardized effect sizes compared to the 90-item version ranging from 0.37 for phobic anxiety to 0.67 for the GSI (see Table VI).

Discussion

The SCL-27 with less than a third of the length of the SCL-90-R is a very efficient self-assessment tool for psychological health. Its scales correlate highly with the SCL-90-R scales and show sufficient

Table III. Means and standard deviations (SD) of short and long version of the SCL for different diagnostic groups.

ICD-10 Diagnoses SCL-27 dimension/ SCL-90 dimension	F1		F2		F3		F4		Anova (P value)	
	SCL-27	SCL-90	SCL-27	SCL-90	SCL-27	SCL-90	SCL-27	SCL-90	SCL-27	SCL-90
Depressive symptoms/ depression	0.8 (0.7)	1.1 (0.7)	0.6 (0.6)	0.7 (0.7)	1.7 (1.2)	1.9 (1)	1.3 (1.7)	1.3 (1.4)	0.006	0.004
Agoraphobic symptoms/ phobic anxiety	0.4 (0.5)	0.5 (0.6)	0.6 (0.5)	0.4 (0.4)	1.2 (1.1)	1 (1.1)	1.3 (1.7)	1 (1.5)	0.03	0.166
Dysthymic symptoms/ obsessive compulsive	0.9 (0.8)	0.8 (0.6)	0.8 (0.7)	0.7 (0.5)	2.3 (1.3)	1.8 (1)	0.8 (1.0)	0.8 (0.4)	0.001	0.001
Vegetative symptoms/ somatisation	0.6 (0.6)	0.7 (0.5)	0.9 (0.5)	0.6 (0.5)	1.0 (0.9)	1.1 (1)	0.3 (0.4)	0.5 (0.6)	0.02	0.005
Symptoms of social phobia/interpersonal sensitivity	0.8 (1.0)	0.8 (0.8)	0.5 (0.4)	0.6 (0.2)	1.4 (1.1)	1.3 (1)	0.7 (0.9)	0.7 (0.9)	0.28	0.27
Symptoms of mistrust/ paranoid ideation	0.8 (0.9)	0.8 (0.8)	0.7 (0.7)	0.8 (0.7)	1.5 (1.1)	1.4 (1)	0.5 (0.4)	0.4 (0.2)	0.09	0.16
Global Severity Index 27/ Global Severity Index (GSI)	0.7 (0.5)	0.8 (0.5)	0.7 (0.4)	0.7 (0.4)	1.4 (0.8)	1.4 (0.8)	0.8 (1.0)	0.8 (0.8)	0.002	0.002

Table IV. Standardized regression weights of the SCL-27 items (*P* value for all weights < 0.001).

Item_number	Scale	Standardized regression weight
Item_13	Agoraphobic symptoms	0.78
Item_25	Agoraphobic symptoms	0.81
Item_33	Agoraphobic symptoms	0.68
Item_50	Agoraphobic symptoms	0.71
Item_82	Agoraphobic symptoms	0.61
Item_15	Depressive symptoms	0.55
Item_30	Depressive symptoms	0.79
Item_54	Depressive symptoms	0.86
Item_59	Depressive symptoms	0.67
Item_14	Dysthymic symptoms	0.78
Item_51	Dysthymic symptoms	0.64
Item_55	Dysthymic symptoms	0.82
Item_9	Dysthymic symptoms	0.80
Item_18	Symptoms of mistrust	0.73
Item_68	Symptoms of mistrust	0.55
Item_76	Symptoms of mistrust	0.62
Item_83	Symptoms of mistrust	0.74
Item_37	Symptoms of social phobia	0.67
Item_41	Symptoms of social phobia	0.75
Item_61	Symptoms of social phobia	0.73
Item_69	Symptoms of social phobia	0.69
Item_39	Vegetative symptoms	0.67
Item_4	Vegetative symptoms	0.64
Item_40	Vegetative symptoms	0.59
Item_48	Vegetative symptoms	0.63
Item_49	Vegetative symptoms	0.63
Item_53	Vegetative symptoms	0.59

reliability. Though these high correlations are to be expected, since the same items are partly used for both the SCL-90-R and SCL-27 scales, they nevertheless show that the variance of the SCL-90-R scales can be sufficiently represented by fewer items used in the SCL-27. Furthermore the SCL-27 factor structure originally created by Hardt et al. [16] for a sample of chronic pain patients is also valid for the psychiatric sample of this investigation and an improvement over the longer SCL-90-R [9,17]. In summary the application of the SCL-27 can be recommended particularly with regard to psychiatric environments.

Drawbacks this shorter instrument partly shares with its longer version, are the skewness and the relatively high intercorrelations of the scales. In altering the SCL-27 Hardt has attempted to reduce these

Table V. Intercorrelations of the SCL-27 scales in confirmatory factor analysis.

SCL-27 scales	Agoraphobic symptoms	Dysthymic symptoms	Vegetative symptoms	Symptoms of social phobia	Symptoms of mistrust
Depressive symptoms	0.68*	0.74*	0.68*	0.76*	0.76*
Agoraphobic symptoms		0.55*	0.77*	0.65*	0.62*
Dysthymic symptoms			0.70*	0.67*	0.69*
Vegetative symptoms				0.61*	0.71*
Symptoms of social phobia					0.81*

**P* value < 0.001.

Table VI. Sensitivity to change of SCL-90-R and SCL-27.

SCL-27	SES	SCL-90	SES
Vegetative symptoms	0.58	Somatization	0.57
Dysthymic symptoms	0.61	Obsessive-compulsive	0.69
Symptoms of social phobia	0.56	Interpersonal sensitivity	0.57
Depressive symptoms	0.64	Depression	0.80
Agoraphobic symptoms	0.37	Phobic anxiety	0.34
Symptoms of mistrust	0.42	Paranoid ideation	0.46
GSI SCL-27	0.67	GSI SCL-90-R	0.75

N=48; SES, standardized effect size.

intercorrelations, but only with marginal success, since their median is still 0.50 [20]. Yet compared to a one-dimensional global assessment the differentiation between several dimensions provides more information by allowing for a multidimensional symptom profile. This profile is of particular interest in psychiatric patients, since it allows clinicians a broad overview of domains, in which a patient may have problems.

The reduction of items from 90 to 27 might also have a positive impact on patients' ability and willingness to complete the test [11,23]. Impairments of cognitive processes, such as lack of concentration are frequent in psychiatric patients and often hinder test administration. Fewer items could certainly contribute to make the SCL-27 less strenuous for patients, positively affecting their compliance especially in test batteries with more than one assessment tool and several assessment times. Further investigation should determine any such effects.

Key points

- The SCL-27 with less than a third of the length of the SCL-90-R is a very efficient and also multidimensional self-assessment tool for psychological health.
- The psychometric examination of the SCL-27 shows nearly the same test characteristics as the much longer SCL-90-R.
- The application of the SCL-27 can be recommended particularly with regard to psychiatric environments.

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