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# A Finnish validation study of the SCL-90

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The Symptom Check-List-90 (SCL-90) is a widely used psychiatric questionnaire which has not yet been validated in Finland. We investigated the utility of the translated version of the SCL-90 in the Finnish population, and set community norms for it. The internal consistency of the original subscales was checked and found to be good. Discriminant function analysis, based on the nine original subscales, showed that the power of the SCL-90 to discriminate between patients and the community is good. Factor analysis of the items of the questionnaire yielded a very strong unrotated first factor, suggesting that a general factor may be present. This together with the fact that high intercorrelations were found between the nine original subscales suggests that the instrument is not multidimensional. The SCL-90 may be useful in a research setting as an instrument for measuring the change in symptomatic distress, or as a screening instrument. The American community norms should be used with caution, as the Finnish community sample scored consistently higher on all subscales.

Key words: Symptom Check-List; Finland; community norms

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## Introduction

The Symptom Check-List-90 (SCL-90) is a questionnaire designed to measure self-reported symptom intensity on a number of different subscales. Its long developmental history started with the Cornell Medical Index (1948) (1), from which the Discomfort Scale (1953) (2) and later the 58-question version of the Hopkins Symptom Check-List (HSCL) (2) were developed. After several revisions and additions of new items, the SCL-90 was introduced (3).

A revised version of the SCL-90 (SCL-90-R) is now available, in which two of the 90 questions are different to those in the SCL-90 (4).

The 90 items of the questionnaire are rated by the patient on a 5-point scale of distress, ranging from 0 (not at all) to 4 (extremely). The SCL-90 normally takes 12–15 min to complete. The time reference of the instrument is flexible, usually between 7 and 14 days (4).

The check-list reportedly consists of the following nine primary symptom dimensions: somatization, obsessive-compulsive disorder, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation and psychoticism. The first five dimensions were developed from factor analytical studies, and the last four were rationally developed and later validated (3). The instrument's three global indices of distress are the Global Severity Index (GSI), the Positive Symptom Distress Index (PSDI) and the Positive Symptom Total (PST).

The results of studies concerning the validity of the instrument are controversial. Many studies claim convergent validity for the SCL-90 (5, 6). In these studies the nine SCL-90 dimensions were found to correlate with analogous measures from other tests. Few studies also claim discriminant validity for the instrument. In Derogatis' study (6), the finding that the dimensions correlated less strongly with non-analogous scales than they did with analogous scales is interpreted as a demonstration of discriminant validity. Rief and Fichter (7) found that, using discriminant analysis, the SCL-90 can distinguish between patients with dysthymia, anxiety disorders and anorexia nervosa. Dinning and Evans (5) found that the original dimensions correlated both with non-analogous measures and with one another, indicating low discriminant validity. Clark and Friedman (8) only found differences in the mean intensity level between anxious, depressed and schizophrenic patients, and did not observe different profile shapes. There is mounting evidence of difficulties in replicating the nine factor groups, which calls into question the dimensionality of the SCL-90 (8). According to Hoffman's (9) data, within a heterogenous clinical population the check-list measures

only a single global distress factor, rather than nine distinct dimensions.

The factor structure of the SCL-90 must be empirically established for each new population to which it is applied, because it tends to depend on the sample being examined (8, 7). This has been done so far for certain populations, including different groups of psychiatric out-patients such as those with dysthymia, anxiety disorders and anorexia nervosa (7), psychiatric in-patients with mainly functional psychoses and neuroses (5), veteran psychiatric populations of patients with anxiety, depression and schizophrenia (8), a non-psychiatric healthy population (4) and a geriatric population for which no factor analysis was performed (10). Cross-cultural studies have also been conducted in different countries, and in a population of immigrants (11). In Finland this kind of validation has not yet been undertaken, although the SCL-90 has been used in several studies (12, 13).

The present study was designed as a validation study of the Finnish translation of the SCL-90. The instrument's ability to discriminate between patient and community samples was tested, its factor structure in the Finnish population was checked briefly and the dimensionality was evaluated. The internal consistency of the nine subscales was investigated, and community norms were set and compared to those of earlier studies. The effect of age and gender on the SCL-90 scores was also checked. The implications for clinical and research work with the SCL-90 are discussed.

## Material and methods

The community sample ($n$=337) for this study was recruited from employees of the city of Espoo. The questionnaire was mailed to 600 subjects, of whom 56% returned it. In total, 50% of the subjects returned the questionnaire after the first mailing, and the remaining 6% returned it after the second mailing. Of this sample, 40% ($n$=136) were men and 60% ($n$=201) were women. The average age of the returners was 37 years (range 18–64 years). The level of education of the sample was as follows: 25%, primary school; 23%, secondary school; 15%, high school or college; 37%, academic degree.

Of the subjects who did not return the questionnaire, 63% were men and 37% were women. The average age of these subjects was 35 years, and their level of education was as follows: 18%, primary school; 37%, secondary school; 12%, high school or college; 32%, academic degree.

The out-patient sample ($n$=249) was a consecutive sample of patients attending the Helsinki University Out-patient Clinic of Psychiatry between 1 March 1992 and 31 December 1993. In total 31% of the patients were men and 69% were women. Their average age was 36 years (range 18–62 years) and their level of education was as follows: 15%, primary school; 34%, secondary school; 39%, high school or college; 11%, academic degree.

The questionnaire used was a Finnish translation of the SCL-90. The translation from American English to Finnish was made by two separate translators. The two translations were compared and found to be identical. The time of reference for the symptoms was 1 year. The questionnaire was administered together with three other self-rating scales, namely Bond's Defense Style Questionnaire (DSQ) (14), Antonowsky's Sense of Coherence Questionnaire (15) and Goldberg's General Health Questionnaire (GHQ) (16). The results obtained from these three questionnaires have been reported elsewhere (17).

The mean values of the original nine subscales and the General Severity Index (3) were calculated for the two samples, and the two average profiles were compared.

The ability to distinguish between patients and controls was checked by means of the $t$-test, and by discriminant function analysis. The average profiles of men and women, as well as the profiles of subjects under and over 40 years of age, were compared. The internal consistency of the original subscales was tested by means of Cronbach's coefficient alpha.

In order to evaluate the dimensionality of the questionnaire, the intercorrelations between the individual subscales were calculated so as to determine the extent of their interdependence.

The dimensionality of the questionnaire was also tested by factor analysis. Principal-component analysis (PCA) of the whole material as well as of both samples separately was performed.

## Results

The mean values of the original subscales are shown in Table 1. Figure 1 shows the profiles of the community sample and the patient sample.

The internal consistency of all of the original nine subscales was good, and Cronbach's coefficient alpha ranged from 0.77 to 0.90 (see Table 1).

Each of the subscales as well as the General Severity Index (GSI) discriminated well between the community sample and the patient sample (Table 1). The $t$-test showed a highly significant difference between the mean scores of the two groups ($P$<0.001) on all of the dimensions.

In the discriminant function analysis based on the nine subscales, 93.1% of the community sample and 77.9% of the patient sample were classified correctly (Table 2). The total hit rate was 86.4%.

Table 1. Descriptive statistics of the SCL-90 subscales

| Subscale | Community sample ($n$=337) | | | Patient sample ($n$=249) | | |
|---|---|---|---|---|---|---|
| | Mean value | SD | Cronbach's coefficient alpha | Mean value | SD | Cronbach's coefficient alpha |
| Somatization | 0.67 | 0.55 | 0.87 | 1.39 | 0.77 | 0.90 |
| Obsessive-compulsive disorder | 0.82 | 0.57 | 0.86 | 1.91 | 0.85 | 0.86 |
| Interpersonal sensitivity | 0.74 | 0.55 | 0.83 | 1.60 | 0.84 | 0.84 |
| Depression | 0.73 | 0.55 | 0.88 | 2.17 | 0.87 | 0.90 |
| Anxiety | 0.53 | 0.49 | 0.86 | 1.59 | 0.80 | 0.79 |
| Hostility | 0.58 | 0.53 | 0.79 | 1.13 | 0.72 | 0.77 |
| Phobic anxiety | 0.24 | 0.39 | 0.79 | 1.05 | 0.85 | 0.83 |
| Paranoid ideation | 0.53 | 0.58 | 0.82 | 1.18 | 0.82 | 0.82 |
| Psychoticism | 0.31 | 0.40 | 0.81 | 0.94 | 0.65 | 0.79 |
| General Severity Index | 0.60 | 0.44 | 0.97 | 1.56 | 0.61 | 0.97 |

No significant differences between the sexes were found in the profiles of the community sample, as the only dimension to come close to the level of significance was paranoid ideation ($P$=0.069), on which men scored higher. In the patient sample, women scored higher on the subscales for interpersonal sensitivity ($P$=0.003) and depression ($P$=0.026).

In the community sample, subjects aged 40 years or older scored consistently higher than those below 40 years of age (Fig. 2). For three of the subscales the difference was highly significant ($P$<0.001). The differences remained significant after using gender as a covariate in the analysis of variance. The same result was obtained for the patient sample, but the differences were less significant (Fig. 2). Table 3 shows the mean values and the number of subjects in each age group.

There was a high level of interdependence between the original dimensions of the questionnaire in both samples. The average intercorrelation was 0.67 in the community sample (range 0.44–0.81, SD=0.09) and 0.57 in the patient sample (range 0.33–0.74, SD=0.12).

Principal-component analysis of the whole material produced a very strong first unrotated factor, accounting for 39.7% of the variance, and 13 weaker factors fulfilling an eigenvalue criterion of >1. Cattell's scree test led to a 4-factor solution. The principal-component analysis of the community sample as well as that of the patient sample also yielded a very strong first unrotated factor and, in both samples, 19 weaker factors fulfilling an eigenvalue criterion of >1. The first factor accounted for 31.1% of the variance in the community sample 28.0% of the variance in the patient sample, which in both samples was more than five times as much variance as the next largest, and more than the variance of all of the other factors combined. The scree test in the two samples led to a 6-factor solution.

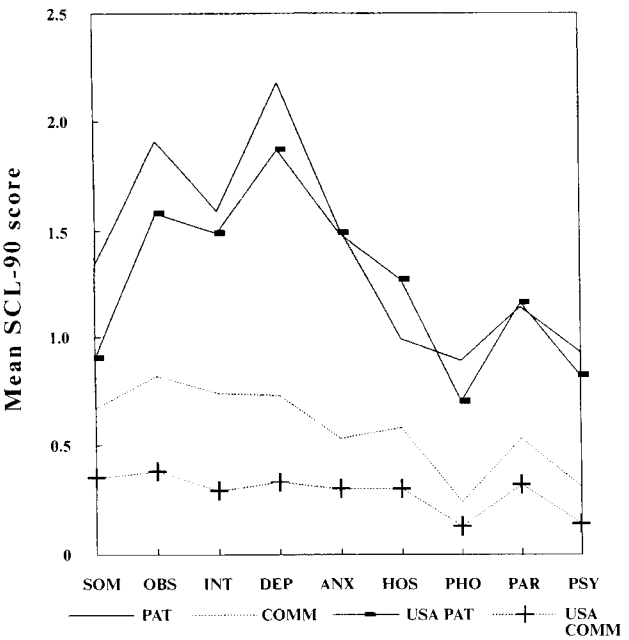


*Fig. 1.* SCL-90 mean scores of the community sample ($n$=337) and the out-patient sample ($n$=249) from the Finnish population and of the American samples (4, 2). SOM, somatization; OBS, obsessive-compulsive disorder; INT, interpersonal sensitivity; DEP, depression; ANX, anxiety; HOS, hostility; PHO, phobic anxiety; PAR, paranoid ideation; PSY, psychoticism; PAT, patient sample; COMM, community sample; USA PAT, American patient sample; USA COMM, American community sample.

Table 2. Discriminant function analysis: percentage hit rates for the original subscales of the SCL-90

| Actual group | Predicted group | |
|---|---|---|
| | Patient | Community |
| Patient | 77.9% | 22.1% |
| Community | 6.9% | 93.1% |
| Total | — | 86.4% |

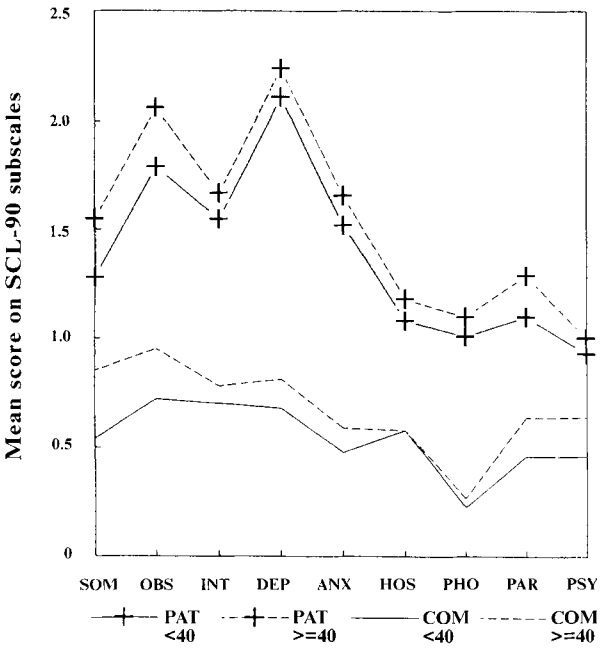


*Fig. 2.* The effect of age on the SCL-90 profile. Comparison of profiles between subjects under 40 years of age and those aged 40 years or over in both samples. PAT, patient sample; <40, under 40 years of age; >40, 40 years or over; COM, community sample. Other abbreviations are as indicated in the legend to Fig. 1.

## Discussion

The results of this study suggest that the Finnish translation of the SCL-90 is acceptable for several reasons.

First, the instrument showed a good discriminant validity. The scores of the patient sample were clearly and significantly higher than the scores of the community sample, and the questionnaire's average hit rate in the discriminant analysis between the two samples was 86.4%. It must be remembered that some of the subjects in the community sample could have had a psychiatric diagnosis, as epidemiological studies have shown that 17.4% of the Finnish adult population have some kind of psychiatric disorder (12), and therefore the hit rate for discriminating between truly healthy people and patients could be even higher.

Secondly, the symptom profiles of both Finnish samples in our study resemble the profiles of the American samples (6, 4), supporting the cross-cultural validity of the questionnaire. The profile of Finnish out-patients is similar in both shape and level to the profile of American out-patients. The profiles of the community samples are similar in shape, but the Finnish community sample scored consistently higher than the American sample. We can speculate about the extent to which this disparity indicates authentic differences in psychiatric symptoms, and the extent to which it reveals the lack of comparability of the two versions of the questionnaire (the English version and the Finnish one). One reason for the different symptomatic levels may also be the symptom time reference of 1 year which was used in our study. With our time reference, the 1-year compiled incidence of certain symptoms is measured, rather than current psychological symptom status at a particular point in time, which is the case with a time reference of 1 week as was used for the American samples. It is clear that over a period of 1 year there is a greater probability that a given person will experience psychiatric symptoms than over a period of 1 week. A healthy person, like most of the subjects in our employee sample, would remember that period and report it in the questionnaire. The subjects in our out-patient sample came to the clinic to seek help for a psychiatric problem bothering them at that time, and most of their reported symptoms are probably part of their current psychological symptom status at that point in time. This could

Table 3. SCL-90 scores on the different subscales: comparison of subjects under and over 40 years of age

| | Community | | | Patients | | |
|---|---|---|---|---|---|---|
| Subscale | <40 years ($n$=195) | ⩾40 years ($n$=142) | $P$-value | <40 years ($n$=141) | ⩾40 years ($n$=108) | $P$-value |
| Somatization | 0.54 | 0.85 | 0.000 | 1.28 | 1.55 | 0.008 |
| Obsessive-compulsive disorder | 0.72 | 0.95 | 0.001 | 1.79 | 2.06 | 0.014 |
| Interpersonal sensitivity | 0.70 | 0.78 | NS[a] | 1.55 | 1.67 | NS |
| Depression | 0.68 | 0.81 | 0.025 | 2.11 | 2.24 | NS |
| Anxiety | 0.48 | 0.59 | NS | 1.52 | 1.66 | NS |
| Hostility | 0.58 | 0.58 | NS | 1.08 | 1.18 | NS |
| Phobic anxiety | 0.23 | 0.27 | NS | 1.01 | 1.10 | NS |
| Paranoid ideation | 0.46 | 0.64 | 0.005 | 1.10 | 1.29 | NS |
| Psychoticism | 0.24 | 0.41 | 0.000 | 0.93 | 1.00 | NS |
| General Severity Index | 0.53 | 0.69 | 0.001 | 1.57 | 1.41 | 0.044 |

[a] NS, non-significant.

explain why the symptomatic levels were more similar in the out-patient samples. In a cross-cultural study by Noh and Avison (11), a Korean community sample also scored higher than an American one. Whatever the reason for the disparity, the cross-cultural differences in the scores are so marked for the community samples that the American norms cannot be used in a clinical setting in Finland. The Finnish norms set in this study may be useful for that purpose.

Thirdly, the nine subscales showed high levels of internal consistency, suggesting adequate reliability.

In both of our samples the tendency to display psychiatric symptoms, or at least to report them, increased with age. On most of the subscales, subjects over 40 years of age scored on average higher than persons under 40 years of age. The General Severity Index of the older age group was higher in both samples (patient sample, $P=0.04$; community sample, $P=0.001$). Gender did not have a notable effect on the scores of the SCL-90, although female patients scored higher than male patients on two of the subscales.

Our results do not support the dimensionality of the SCL-90 in the sense that the nine subscales would represent separate symptom dimensions. As in several previous studies of the questionnaire, the average intercorrelation between the original nine subscales was strong (8, 9). The strong interdependence of the original subscales and the fact that the principal-component analysis yielded for both samples a very strong first unrotated factor and several weak ones suggest that a general factor may be present. Thus the instrument appears to measure a single global distress factor instead of nine independent symptom subscales.

In conclusion, the SCL-90 appears to be a good instrument for use in a research setting, when measuring the change in average symptom levels. The mean GSI values of the patient sample and the community sample were sufficiently different to enable the detection of change, e.g. as a result of different treatments.

In a clinical setting, when employing the GSI norms set in this study, the SCL-90 might be useful as a psychiatric screening instrument. The SCL-90 does not have potential as an instrument for making specialized interpretations, such as distinguishing between different diagnostic groups. According to the results of the present study the SCL-90 is not a multi-dimensional instrument.

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