Reliability and Validity of Using a Brief Psychiatric Symptom Rating Scale in Clinical Practice

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Summary To develop a reliable and valid psychiatric self-rating scale for use in medical practice, the authors modified Derogatis' Symptom Check List-90-R (SCL-90-R) and designed a shorter form, named Brief Symptom Rating Scale (BSRS). The BSRS comprises 50 items, which best reflect the original ten symptom dimensions and three indices of psychopathology from the SCL-90-R. The BSRS has been proven in different populations to have an excellent split-half reliability as well as good internal structure according to factor analysis. In addition, BSRS scores are highly correlated with the parental form SCL-90-R among medical populations for each symptom dimension and the three indices. The rate of accurate classification for BSRS between psychiatric and nonpsychiatric cases was 75.8%, with a sensitivity of 66.7% and a specificity of 86.7% by discriminant analysis based on 10 dimensional scores obtained from 1,638 subjects, randomly selected from the Psychiatric Outpatient Clinic, the Family Medicine Clinic and nonpsychiatric medical inpatients. Therefore, the BSRS is a satisfactory global measure and case-finding screening instrument for psychopathology in both psychiatric and nonpsychiatric medical settings.

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Key wrods: *psychiatric self-rating scale, Brief Symptom Rating Scale (BSRS), psychopathology, neurotic disorder*

The importance of minor mental disorders (neuroses) has been increasingly recognized over the years for the following reasons: (1) the high prevalence of minor mental morbidities in communities [1, 2] and in nonpsychiatric medical settings [3–5]; and (2) emotional problems are frequently concomitant, or associated, with physical diseases [6, 7]. Considered together with the important concept of holistic or patient-centered care based on a biopsychosocial model, skill in early detection of a patient's emotional disturbances becomes important. One possible way of doing this is to apply a self-rating scale for measuring psychopathology. The patient's self-reported scale can help therapists better understand the patients' problems within a short time period [8–10]. The Symptom Check List-90 or its revised form (SCL-90-R), has been widely used in a variety of settings abroad [11, 12], including the Taiwan area [13–16]. Although the reliability and validity of the SCL-90-R is good, according to the foreign literature [11, 12, 17–19], its contents are thought to be too lengthy for the medically or mentally ill. This report presents the process of developing a brief inventory for use in medical practice, and discusses its clinical application in terms of reliability and validity.

MATERIALS AND METHODS

Selection of symptom items for BSRS from SCL-90-R

The SCL-90-R comprises 90 items dealing with

various symptoms, each of which is self-rated by individuals on a 5-point scale of symptom severity distress (0-4). It can measure nine primary and one additional symptom dimension of psychopathology, as well as three indices of distress—General Severity Index (GSI), Positive Symptom Distress Index (PSDI), and Total Number of Positive Symptoms (PST).

The authors applied the SCL-90-R to 600 first-visit outpatients (290 males and 310 females) who visited the Psychiatric Clinic of the National Taiwan University Hospital (NTUH) on preselected days within a one-year period. All were diagnosed as having nonpsychotic disorders by two senior staff psychiatrists (Dr. M.B. Lee, and one of two psychiatric professors) and met the criteria of age (16-60 years) and education (more than 6 years). Their mean age was 31.19±9.69. An item from the SCL-90-R was selected to be used for the Brief Symptom Rating Scale (BSRS) if the correlation coefficient of that item's score with the score of its corresponding symptom dimension was greater than 0.80. Several modifications were also made, such as improvements in wording, and the combining of two items on sleep problems and two items on compulsive behavior into single new items. Eventually 50 symptom items were extracted. The results of the factor analysis of the BSRS items, tested on the aforementioned 600 subjects, showed a satisfactory internal structure.

Subjects and assessment of reliability and validity of BSRS

1.Subjects

Several groups of subjects were used to examine the reliability and validity of the BSRS. The BSRS was first given to 144 first-year students, 72 males and 72 females, randomly selected from a junior high school. The students were asked to fill out the BSRS twice, two weeks apart, at the beginning of the second semester.

The SCL-90-R questionnaire was subsequently given to the following three groups of patients at NTUH.

(1) A total of 319 psychiatric outpatients, 165 males and 154 females, diagnosed as having nonpsychotic disorders by two senior psychiatrists, and randomly selected from the treatment clinics of the Psychiatric Department. Their mean age was 33.2±9.0.

(2) A total of 317 first-time visitors at the Family Medicine Outpatient Clinic (120 males and 197 females with a mean age of 36.7±14.0). They were diagnosed by a senior physician (Dr. BH Lue), who had one year of experience working

with Dr. M.B. Lee at the Psychiatric Outpatient Clinic; she was also quite familiar with the diagnosis of minor mental disorders.

(3) A total of 100 postmastectomy cancer outpatients with a mean age of 48.1±10.1.

Finally, the BSRS questionnaires were applied to 721 medical inpatients without symptoms or signs of organic brain syndrome. Randomly selected from the 11 nonpsychiatric departments of NTUH, they included 406 (56.3%) males and 315 (43.7%) females with a mean age of 45.6 ± 16.0. Each patient was interviewed via the same protocol within a one-year period by one of the first two authors, who made the final formal consensual psychiatric diagnosis.

2.Methods of Assessment

The sample of junior high students was used to obtain the test-retest reliability estimates for each of the 10 dimensional symptoms, as well as, for each of the three global indices. The correlation coefficients for each symptom dimension of the BSRS and the SCL-90-R, and split-half reliability in terms of the GSI for the BSRS were measured from among the three groups of outpatients. Finally, the scores of the BSRS were compared across the different psychiatric diagnostic groups in three populations, which included the first-visit psychiatric outpatients, the first-time visitors of the Family Medicine Clinic and the above-described medical inpatients. These pooled 1,638 subjects were also used to analyze the predictive validity of the BSRS.

Statistical analysis

The following statistics were used in data analysis: (1) correlation for item selection, split-half reliability, test-retest reliability, and correlations between BSRS and its parent form SCL-90-R; (2) factor analysis with principal component analysis to assess the internal structure of BSRS; (3) one-way analysis with Duncan's multiple range test to compare the dimensional scores of the BSRS between different patient groups; and (4) discriminant functional analysis for measurement of predictive validity.

RESULTS

Reliability of BSRS

Using alternate forms of a test to estimate reliability coefficients is one common method in psychometrics. Although the BSRS and the SCL-90-R are not strictly "alternate forms" of the same test, they do represent two tests measuring the same

symptom constructs. The very high correlations between the BSRS and SCL-90-R for all the symptom dimensions and the three global indices derived from different settings shown in Table 1 demonstrate that they measure essentially the same symptom constructs. The split-half reliability coefficients based on the GSI scores were 0.96 for the 600 first-visit psychiatric outpatients, 0.97 for the 319 psychiatric outpatients under treatment, 0.97 for the 317 first-time visitors of the Family Medicine Clinic and 0.98 for the 100 surgical outpatients with breast cancer. The results of the test-retest performed two weeks apart by 144 first-year junior high students showed that the reliabilities were satisfactory for each dimension and for the three indices. As shown in Table 2, the test-retest reliability coefficients ranged from 0.73 to 0.91 with the coefficients for the dimensions of hostility and psychoticism falling below 0.80.

Intrinsic validity of BSRS

The correlation matrix analyzed in the factor analysis was 50 x 50. Seven interpretable factors, derived from a normal varimax rotation of the principal components [20], accounted for 61.0% of the total variance in the matrix. The factor loadings greater than 0.35 are displayed in Table 3. The results show that the BSRS has a good internal structure.

Other than factor analysis, two other kinds of

validity were tested. As Table 4 shows, the individuals with a positive psychiatric diagnosis had significantly higher scores for the ten symptom dimensions and the three global indices. These patients included first-visit outpatients of the Psychiatric Clinic and Family Medicine Clinic and medical inpatients of nonpsychiatric departments. To differ-

Table 2. Test-Retest Reliability Coefficients for the Ten Primary Symptom Dimensions and the Three Global Indices of the Brief Symptom Rating Scale (BSRS)

Symptom dimension	No. of items	Test-retest (n=144)
Somatization	5	0.83
Obsession	6	0.82
Interpersonal sensitivity	4	0.81
Depression	7	0.84
Anxiety	7	0.85
Hostility	4	0.73
Phobic anxiety	5	0.83
Paranoid ideation	4	0.80
Psychoticism	4	0.77
Additional	4	0.76
GSI		0.91
PSDI		0.81
PST		0.89

Abbreviations see Table 1.

Table 1. Score Distribution of Brief Symptom Rating Scale (BSRS) in Different Populations and Correlations of the Symptom Dimensions between BSRS and SCL-90-R

BSRS dimensions	New psychiatric outpatients (n=600)		Psychiatric outpatients in treatment (n=319)		Family medicine outpatients (n=317)		Surgical outpatients with breast cancer (n=100)	
	Mean±SD	r	Mean±SD	r	Mean±SD	r	Mean±SD	r
Somatization	1.08± 0.81	0.92	0.84± 0.80	0.94	0.84± 0.67	0.91	0.98 ± 0.64	0.93
Obsession	1.55± 0.88	0.97	1.14± 0.85	0.97	0.80± 0.68	0.96	0.70 ± 0.64	0.95
Sensitivity	1.21± 0.93	0.95	0.92± 0.82	0.95	0.57± 0.64	0.94	0.56 ± 0.71	0.96
Depression	1.39± 0.93	0.96	0.98± 0.85	0.96	0.58± 0.67	0.95	0.58 ± 0.65	0.97
Anxiety	1.41± 0.96	0.97	0.87± 0.82	0.97	0.53± 0.65	0.97	0.50 ± 0.65	0.97
Hostility	1.12± 0.83	0.97	0.83± 0.75	0.96	0.65± 0.61	0.97	0.57 ± 0.61	0.98
Phobia	0.88± 0.82	0.97	0.59± 0.47	0.97	0.37± 0.51	0.95	0.35 ± 0.45	0.97
Paranoid	0.81± 0.81	0.95	0.58± 0.70	0.95	0.40± 0.55	0.95	0.27 ± 0.50	0.96
Psychoticism	0.99± 0.78	0.80	0.73± 0.72	0.82	0.54± 0.51	0.78	0.46 ± 0.55	0.71
Additional	1.22± 0.08	0.85	0.77± 0.73	0.87	0.60± 0.63	0.88	0.59 ± 0.65	0.95
PST	30.73±10.73	0.97	25.00±12.86	0.98	21.33±11.11	0.98	20.08 ±11.08	0.98
GSI	1.08± 0.61	0.97	0.85± 0.63	0.98	0.65± 0.46	0.98	0.60 ± 0.48	0.99
PSDI	1.79± 0.23	0.95	1.54± 0.5	0.98	1.49± 0.40	0.94	1.37 ± 0.37	0.98

PST= total number of positive symptoms; GSI= general severity index; PSDI= positive symptom distress index.

Table 3. Orthogonal Varimax Loadings for 7 Factors Derived from a Principal Components Analysis of 50 Items of the BSRS

Item/Symptom dimension	Loading	Item/Symptom dimension	Loading
I. Anxiety-Depression		**IV. Phobic Anxiety**	
7 Thoughts of ending your life (D)	0.55	6 Feeling afraid in open spaces or on the streets (PH)	0.66
12 Blaming yourself for things (D)	-	11 Feeling afraid to go out of your house alone (PH)	0.71
14 Feeling lonely (D)	0.61	26 Having to avoid certain things, places, or activity because they frighten you (PH)	0.37
15 Feeling blue (D)	0.67		
16 Feeling no interest in things (D)	0.69		
28 Feeling hopeless about the future (D)	0.69	38 Feeling uneasy in crowds, such as when shopping or at a movie (PH)	0.51
44 Feeling of worthlessness (D)	0.59	40 Feeling nervous when you are left alone (PH)	0.66
1 Nervousness or shakiness inside (A)	0.54	39 Spells of terror or panic (A)	0.56
17 Feeling fearful (A)	0.49	17 Feeling fearful (A)	0.55
31 Feeling tense or keyed up (A)	0.52		
39 Spells of terror or panic (A)	0.43	**V. Somatization**	
43 Feeling so restless that you couldn't sit still (A)	0.51	5 Pains in your heart or chest (SO)	0.53
45 Feeling that something bad is going to happen to you (A)	0.48	20 Soreness of your muscles (SO)	0.68
49 Thoughts and images of a frightening nature (A)	-	25 Trouble getting your breath (SO)	0.58
42 Feeling lonely even when you are with people (PS)	0.56	27 Numbness or tingling in parts of your body (SO)	0.74
		30 Feeling weak in parts of your body (SO)	0.61
II. Sensitivity-Paranoid			
18 Feeling others do not understand you or are unsympathetic (S)	0.44	48 Something serious is wrong with body (PS)	0.59
19 Feeling inferior to others (S)	0.42	22 Trouble falling asleep (AD)	0.36
33 Feeling uneasy when people are watching or talking about you (S)	0.63	32 Thought of death or dying (AD)	0.35
37 Feeling very self-conscious with others (S)	0.67	**VI. Psychoticism-Additional**	
8 Feeling that most people cannot be trusted (PA)	0.45	47 Idea that you should be punished for your sins (PS)	0.74
21 Feeling that you are watched or talked about by others (PA)	0.66	34 Having thoughts that are not your own (PS)	0.39
41 Others not giving you proper credit for your achievements (PA)	0.60	32 Thought of death or dying (AD)	0.41
46 Feeling that people will take advantage of you if you let them (PA)	0.53	50 Feelings of guilt (AD)	0.69
		7 Thought of ending your life (D)	0.40
		49 Thoughts and images of a frightening nature (A)	0.52
III. Obsession		45 Feeling that something bad is going to happen to you (A)	0.36
2 Repeated unpleasant thoughts that won't leave your mind (O)	0.48		
3 Worried about sloppiness or carelessness (O)	0.63	**VII. Hostility**	
13 Feeling blocked in getting things done (O)	0.47	4 Feeling easily annoyed or irritated (H)	0.37
23 Having to check and double-check what you do (O)	0.58	10 Temper outbursts that you cannot control (H)	0.56
24 Difficulty making decisions (O)	0.58	35 Having urges to beat, injure, or harm someone (H)	0.67
29 Trouble concentrating (O)	0.52	36 Having urges to break or smash things (H)	0.65
12 Blaming yourself for things (D)	0.64	8 Feeling that most people cannot be trusted (PA)	0.41

Abbreviations: A=anxiety, AD=additional, D=depression; H=hostility, O=obsession, PA=paranoid, PH=phobia, PS=psychoticism, S=sensitivity, SO=somatization.

entiate more accurately between patients diagnosed as having psychiatric disorders and those who did not, the authors utilized the 10 dimensional symptom scores obtained from the pooled 1,638 subjects for the canonical discriminant analysis. Only one canonical discriminant function, which was statistically significant, was extracted from the ten dimensional symptom scores. The structure function coefficients and the standardized and unstandardized function coefficients are listed in Table 5. As

shown in Table 6, the rate of accurate classification for psychiatric and nonpsychiatric cases was 75.8% with a sensitivity of 66.7% and a specificity of 86.7%.

DISCUSSION

The title of the Brief Symptom Rating Scale purposely contains no word specific to emotion or physical condition, in an effort to avoid patient re-

Table 4. Comparisons of BSRS Scores in Different Psychiatric Diagnostic Groups (Positive or Negative Diagnosis) from Different Patient Populations

Symptom dimension	New psychiatric outpatients (n=600) Mean±SD	Family medicine		Medical inpatients	
		Positive (n=133) Mean±SD	Negative (n=184) Mean±SD	Positive (n=153) Mean±SD	Negative (n=568) Mean±SD
Somatization	1.08±0.81 (A)	1.11±0.62 (A)	0.62±0.42 (B)	1.16±0.86 (A)	0.72±0.69 (B)
Obsession	1.55±0.88 (A)	1.00±0.60 (B)	0.55±0.45 (C, D)	0.73±0.73 (C)	0.40±0.49 (D)
Sensitivity	1.21±0.93 (A)	0.67±0.61 (B)	0.34±0.44 (C)	0.72±1.00 (B)	0.31±0.54 (C)
Depression	1.39±0.93 (A)	0.90±0.60 (C)	0.38±0.41 (D)	1.02±0.87 (B)	0.40±0.47 (D)
Anxiety	1.41±0.96 (A)	0.85±0.65 (B)	0.30±0.37 (C)	1.00±0.75 (B)	0.48±0.57 (C)
Hostility	1.12±0.83 (A)	0.71±0.57 (B)	0.35±0.38 (C)	0.76±0.94 (B)	0.29±0.42 (C)
Phobia	0.88±0.82 (A)	0.47±0.51 (B)	0.21±0.33 . (C)	0.48±0.66 (B)	0.20±0.34 (C)
Paranoid	0.81±0.81 (A)	0.53±0.58 (B)	0.33±0.41 ·(C)	0.33±0.58 (C)	0.18±0.40 (D)
Psychoticism	0.99±0.78 (A)	0.56±0.51 (B)	0.23±0.32 (C)	0.52±0.68 (B)	0.18±0.35 (C)
Additional	1.22±0.8 (A)	0.87±0.60 (C)	0.40±0.39 (E) .	0.93±0.81 (B)	0.49±0.54 (D)
GSI	1.16±0.61 (A)	0.80±0.48 (B)	0.39±0.32 (C)	0.78±0.55 (B)	0.38±0.34 (C)

* The capital letters in the parentheses indicate the grouping by Duncan's multiple range test at $p<0.05$ for each symptom dimension in different patient populations. The same letter means that there is no statistically significant difference between the values of the mean for each dimension variable.

Table 5. The Main Values in Canonical Discriminant Analysis in Terms of the 10 Dimension Scores of BSRS toward Psychiatric Diagnosis in 1,638 Subjects

Dimensions	Structure function coefficients	Standardized function coefficients*	Unstandardized function coefficients**
Somatization	0.473	-0.095	-0.124
Obsession	0.903	0.543	0.616
Sensitivity	0.736	-0.020	-0.023
Depression	0.883	0.284	0.330
Anxiety	0.900	0.450	0.512
Hostility	0.782	0.314	0.411
Phobia	0.709	-0.008	-0.123
Paranoid	0.618	-0.218	-0.324
Psychoticism	0.671	-0.170	-0.247
Additional	0.749	0.178	0.235

* Standardized canonical discriminant function:
L= -0.095 × Som +0.543 × Obs 0.020 × Sens +0.284 × Dep +0.450 × Anx +0.314 × Host -0.08 × Phob -0.218 × Para -0.170 × Psychot +0.178 × Add.
** Unstandardized canonical discriminant function:
L= -0.123-0.124 × Som +0.161 × Obs-0.023 × Sens +0.330 × Dep +0.512 × Anx +0.411 × Host -0.012 × Phob -0.324 × Para -0.247 × Psychot +0.235 × Add.

sistance. The BSRS is rated the same way as the SCL-90-R. Clinically, it takes only about 5 to 10 minutes to complete. Test-retest reliability was examined in junior high students and not in a patient population for two reasons: (1) To test the readability of the BSRS for use with individuals with a six-year education; and (2) the BSRS reguires completion based on the condition over the previous week, and psychiatric symptoms of a patient population with neurotic disorders can be quite changeable over the course of illness, making interpretation of test-retest results more difficult for such patients. The value of the reliability coefficient of test-retest for the dimension of hostility was the lowest. This is understandable since the symptoms of the hostility dimension are usually rather situation-determined.

The results of the factor analysis demonstrated seven main interpretable factors. Two hypothesized dimensions merged into other primary dimensions: Factor I included dimensions of anxiety and depression; Factor II, dimensions of interpersonal sensitivity and paranoid ideation; and Factor VI, psychoticism and additional items. This can be ac-

Table 6. The Psychiatrist's Diagnosis Versus Scale Diagnosis According to
Discriminant Analysis

Psychiatrist's diagnosis	Diagnosis by discriminant analysis*					
	Positive		Negative		Total	
	No.	(%)	No.	(%)	No.	(%)
Positive**	591	(66.7)	295	(33.3)	886	(100)
Negative***	102	(13.3)	650	(86.7)	752	(100)
Total	693	(42.3)	945	(57.7)	1638	(100)

    *   By unstandardized canonical function.
        Total hit: (591+650)/1638= 75.8%
   **   Mean on canonical function: 0.630.
  ***   Mean on canonical function: -0.741.

counted for by the characteristics of our subjects, in whom coexistence of anxiety and depression is very common because anxiety symptoms are primarily manifestations of a depressive syndrome, and patients with anxiety disorders having a chronic course frequently develop reactive depression symptoms.

In addition, our subjects were all diagnosed as nonpsychotic disorders, so that the symptom contents of interpersonal sensitivity and paranoid ideation are centered upon the interpersonal aspects and are quite similar in meaning. For our subjects, Factor VI indicates the severity of alienation of individuals from the norms and contains more diffuse symptoms from different dimensions; some of the foreign reports on factor analysis of SCL-90 items have had similar findings.

Besides, the results of factor analysis are also rather dependent on the characteristics of the selected population. For example, several research reports have indicated that the SCL-90 has a poor construct validity for acute psychotics based on factor analysis [21-23]. One important reason for this is due to the disorganized cognitive functions which can interfere with the accuracy of self-reported results. Further, Kass et al [24] found poor concordance between patients' self-report scores and clinicians' ratings by the SCL-90 analogue. They demonstrated that patients with diagnoses of schizophrenia, alcoholism and personality disorders tended to underreport their symptoms because of paranoia or fearfulness.

The sample subjects were all diagnosed by senior physicians. Thus, the inter-rater reliability is thought to be good, but needs verification. As displayed in Table 4, GSI scores were significantly different in the different psychiatric diagnostic groups. This indicates that the BSRS had good

validity in terms of group separation based on the GSI score. The values of the GSI scores were very close and showed some overlapping for each diagnostic group, so the authors used 10 primary dimensional scores for discriminant analysis to differentiate the psychiatric from the nonpsychiatric cases. To achieve a more homogeneous group with a wider range of severity in psychopathology and in age distribution, the authors grouped all three populations together to perform discriminant analysis, and found the rate of accurate classification (75.8%) was still satisfactory.

The sensitivity of the BSRS in detecting psychiatric cases was not as good as the specificity, because individuals with a diagnosis of a psychophysiological disorder (PPD) present more prominent somatic symptoms, rather than severe emotional symptoms such as anxiety, hostility or depression. The profile of symptom scores for subjects with PPD may be similar to those of medical patients with physical disease, but without psychiatric diagnosis. However, the symptom profile of patients with PPD is also heterogeneous, based on the chronicity of their morbidity course; for example, patients with a longer course tended to have more severe emotional symptoms because of reactions to the PPD symptoms. Other possible causes of lower sensitivity in detection of psychiatric cases, as suggested by Kass et al [24], may include underreporting of mental and overreporting of physical symptoms for "medically ill" inpatients. It is expected that making every effort to ensure the confidentiality of scores and informing patients of these efforts can improve case screening.

Before we published this article, the BSRS was preliminarily applied in the primary screening of psychiatric and nonpsychiatric patients in a primary care unit [4], in a follow-up study on the psycho-

logical adjustment of patients with myocardial infarction [7], and in the assessment of emotional disturbances in junior high school students [25, 26]. The data on the use of the BSRS so far available have shown a satisfactorily high reliability and clinical applicability.

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