



## Psychometric properties of the Brief Symptom Inventory in a sample of recovered Iranian depressed patients

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**ABSTRACT.** The purpose of this instrumental study was to evaluate the Brief Symptom Inventory properties in a sample of recovered depressed patients in Iran. A total of 354 patients were assessed with the Structured Clinical Interview for DSM-IV Disorders (SCID) to ensure that they had fully recovered from their most recent index episode of depression. This sample completed a series of self-report measures, including the Brief Symptom Inventory (BSI). Descriptive statistics for the BSI are presented, and confirmatory factor analysis was used to assess the fit of the hypothesized factor structure. Cronbach alpha coefficients were calculated for the full global severity index and each of its nine subscales to examine the internal reliability of the scale. The fit indexes in the nine factorial model was superior to the unifactorial model, which indicates a match between the proposed nine factorial model and the observed data. Cronbach's alpha was high for the global severity index as well as for each of the subscales. The Brief Symptom Inventory was validated in this sample, and can be employed as a tool in outcome and process research and practice with this population.

**KEYWORDS.** Symptoms. Inventory. Factor analysis. Reliability. Instrumental study.

**RESUMEN.** El propósito de este estudio instrumental fue evaluar las propiedades del *Brief Symptom Inventory* en una muestra de pacientes iraníes depresivos recuperados.

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Un total de 354 pacientes fueron evaluados con la *Structured Clinical Interview for DSM-IV Disorders (SCID)* con el fin de asegurar que se habían recuperado completamente de su episodio más reciente de depresión. La muestra completó una serie de medidas de autoinforme, entre las que se encontraba el *Brief Symptom Inventory (BSI)*. Se realizaron análisis descriptivos del BSI y se empleó análisis factorial confirmatorio para evaluar el ajuste de la estructura factorial hipotetizada. Con el fin de examinar la fiabilidad de consistencia interna se calculó el coeficiente alfa de Cronbach del índice de severidad global y de cada una de las subescalas. El ajuste para el modelo de nueve factores fue superior al de un solo factor, lo que apoya la propuesta de nueve factores. El alfa de Cronbach de la escala total y de cada una de las nueve subescalas fue elevado. El *Brief Symptom Inventory* fue validado en esta muestra, pudiendo ser empleado en esta población como herramienta útil en la investigación y en la práctica.

**PALABRAS CLAVE.** Síntomas. Inventario. Análisis factorial. Fiabilidad. Estudio instrumental.

The Brief Symptom Inventory (BSI) is the short version of the SCL-90-R (Derogatis, 1975), and a screening tool for psychological disturbance. The Brief Symptom Inventory is a convenient multidimensional measure which covers nine symptom dimensions: *Somatization (SOM)*, *Obsessive-Compulsive (O-C)*, *Interpersonal Sensitivity (I-S)*, *Depression (DEP)*, *Anxiety (ANX)*, *Hostility (HOS)*, *Phobic anxiety (PHOB)*, *Paranoid ideation (PAR)*, and *Psychoticism (PSY)*. It also include three global indexes: the Positive Symptom Total (PST) which reflects the number of symptoms endorsed in a pathological direction without regard to intensity, the Positive Symptom Distress Index (PSDI) which is the severity of symptoms, and the Global Severity Index (GSI), which is a score computed as a combination of the number of endorsed symptoms and their severity. As correlations among similar symptom dimensions on the SCL-90 and the Brief Symptom Inventory range from .92 to .99, the Brief Symptom Inventory can be used in place of the SCL-90 for rapid assessment purposes, as it can be completed in 8-12 minutes. The items on the BSI define a broad spectrum of physical and psychological symptoms which may have occurred in the preceding seven day period (Derogatis and Melisaratos, 1983). Each item is rated on a 5- point scale of distress from 0 (*Not at all*) to 4 (*Extremely*).

Although the BSI was designed to measure psychiatric symptoms, the factor structure obtained by a number of studies has shown variations with respect to the original form. Derogatis (1983) proposed nine factors and stated that although there were certain minor differences between the empirical factor structure and the hypothesized dimensional structure, there was more agreement than disagreement between the two. However, factor structures of five factors (Johnson, Murphy, and Dimond, 1996), six factors (Daoud and Abojedi, 2010; Hayes, 1997; Ruipérez, Ibañez, Lorente, Moro, and Ortet, 2001), eight factors (Kellett, Beail, Newman, and Hawes, 2004), and one single factor of general distress (Endermann, 2005; Piersma, Reaume, and Boes, 1994) have also been reported. Variations in the observed factor structure have been attributed to differences in the factor analysis procedure and also to the use of different samples

(*e.g.*, college students, psychiatric in-patients, and the elderly). Thus, the proposed factor structure of the Brief Symptom Inventory requires further research (Hayes, 1997; Ruipérez *et al.*, 2001).

The Brief Symptom Inventory has been translated into several languages and for different cultures including Italian (De Leo, Frisoni, Rozzini, and Trabucchi, 1993), British (Francis, Rajan, and Turner, 1990), Hindi (Watson and Sinha, 1999), and Spanish (Galdón *et al.*, 2008; Pereda, Forns, and Peró 2007) and other cultures (Asner-Self, Schreiber, and Marotta, 2006). As shown in Table 1 (Pereda *et al.*, 2007), studies from several countries show good internal consistency for the nine BSI dimensions, ranging from .71 on the Psychoticism dimension (PSY) to .85 on Depression (DEP) (Derogatis and Melisaratos, 1983; Derogatis and Spencer, 1982). This result is supported by several other studies (Aragón Ramírez, Bragado Álvarez, and Carrasco Galán, 2000; Aroian, Patsdaughter, Levin, and Gianan, 1995; Broday and Mason, 1991; Canetti, Shalev, and Kaplan De-Nour, 1994; Endermann, 2005; Gilbar and Ben-Zur, 2002; Hayes, 1997; Kellett, Beail, Newman, and Frankish, 2003; Watson and Sinha, 1999). The internal consistency for the three global indices has been also calculated (GSI: .90; PSDI: .87; PSTS: .80), and they show good reliability over time, especially for the GSI (Cochran and Hale, 1985; Derogatis and Melisaratos, 1983; Derogatis and Spencer, 1982). Other studies have also shown excellent reliability coefficients on the GSI (Aragón Ramírez *et al.*, 2000; Aroian *et al.*, 1995; Blanchard *et al.*, 2006; Canetti *et al.*, 1994; Caparrós-Caparrós, Villar-Hoz, Juan-Ferrer, and Viñas-Poch, 2007; Gilbar and Ben-Zur, 2002; Johnson *et al.*, 1996; Kohls and Walach, 2008; Ruipérez *et al.*, 2001; Watson and Sinha, 1999). Test-retest reliability for the nine symptom dimensions ranges from .68 (*Somatization*) to .91 (*Phobic anxiety*), and for the three Global Indices from .87 (PSDI) to .90 (GSI) (Durá *et al.*, 2006; Long, Harring, Brekke, Test, and Greenberg, 2007; Recklitis *et al.*, 2006).

**TABLE 1.** Internal consistency for the BSI (adapted from Pereda *et al.*, 2007).

Citation	Sample characteristics				Internal consistency	GSI
	Nationality	Population	N	Mean age		
Derogatis and Spencer (1982)	American	Adults non-patient	719	46 ± 14.7	.71 (PSY) to .85 (DEP)	.90
Broday and Mason (1991)	American	Counseling Center clients	343	24	.70 (PSY) to .88 (DEP)	-
Johnson <i>et al.</i> (1996)	American	Bereaved parents	260	?	.63 (IS) to .83 (ANX)	.97
Hayes (1997)	American	Counseling Center clients	2,078	23.2 ± 6.2	.66 (PHO) to .86 (DEP)	-
Aragón <i>et al.</i> (2000)	Spanish	Parents of children attending a Counseling Center	743	40.5	.87 (PHO) to .96 (SOM)	.98
Kellett <i>et al.</i> (2003)	British	Adults with mild intellectual disabilities	200	36.11 ± 10.5	.63 (PSY) to .78 (O-C)	-
Endermann (2005)	German	Patients with epilepsy and mild intellectual disabilities	91	39.5 ± 14.5	.64 (PHOB) to .79 (ANX & PAR)	.96
Gilbar and Ben-Zur (2002)	Israeli	Adults non-patients	510	45.6 ± 8.61	.71 (PSY) to .83 (SOM)	.96
Canetti <i>et al.</i> (1994)	Israeli	High School students	840	16.77 ± .99	.66 (PSY) to .83(DEP)	.95

**TABLE 1.** Internal consistency for the BSI (adapted from Pereda *et al.*, 2007). (Cont.).

Citation	Sample characteristics			Internal consistency	GSI	
	Nationality	Population	N			
Watson and Sinha (1999)	Indian	Undergraduate students	199	19.6 ± 2.32	.59 (PAR) to .73 (SOM & DEP)	.95
	Canadian	Undergraduate students	347	20.08 ± 1.41	.70 (PSY) to .86 (DEP)	.95
Aroian <i>et al.</i> (1995)	Polish	Adults non-patient	25	43.9 ± 15.2	.48 (PSY) to .91 (ANX)	.96
	Filipino	Adults non-patient	29	37.4 ± 11.2	.57 (PSY) to .88 (HOS)	.96
	Irish	Adults non-patient	25	33.9 ± 9.6	.85 (PSY) to .97 (PHO)	.99

Correlations among the Brief Symptom Inventory and the Wiggins content scales and the Tryon cluster scores from the MMPI range from .30 to .72 with the most relevant score correlations averaging above .50 (Conoley and Kramer, 1989; Derogatis, Rickles, and Rock, 1976, in Derogatis, 1993). Factor analysis results confirmed the a priori construction of the symptom dimensions. In addition, correlations among the scales of the Brief Symptom Inventory and SCL-R-90 have ranged from .92 to .99 (Derogatis, 1993).

The purpose of the present study was to extend the psychometric evidence related to the Brief Symptom Inventory, through an examination of its dimensional structure in an Iranian adaptation (Montero and León, 2007; Ramos-Álvarez, Moreno-Fernández, Valdés-Conroy, and Catena, 2008). The sample employed was that of a large group of patients who had recovered from Major Depressive Disorder. The nine-factor structure proposed by Derogatis and Melisaratos (1983; Derogatis and Spencer, 1982) was tested with a confirmatory factor analysis (CFA), and was then contrasted with the unidimensional factor structure that has been proposed by others (Aragón Ramírez *et al.*, 2000; Boulet and Boss, 1991; Piersma *et al.*, 1994). In addition, the internal reliability of the Iranian version of the BSI is reported here.

## Method

### Participants

Data were obtained from a sample of recovered depressed patients who participated in a randomized clinical trial that compared two different relapse prevention treatments to each other and Treatment As Usual (TAU) (Dobson and Mohammadkhani, 2007b). A total of 354 (67 males, 287 females) patients participated in the study, assessed through the Structured Clinical Interview for DSM-IV Disorders (SCID) to ensure that they had fully recovered from their most recent index episode of depression, participated in that trial, and formed the current sample. They were on average 39.1 years old, with an average of 2.19 previous episodes of depression. Most patients were either married (50.8%) or single (41.0%). Most were either university students or unemployed (60.7%), and had either completed high school (35.6%) or at least some post-secondary education (51.1%). For the sake of the trial, recovery was defined as the absence of a diagnosable

major depressive disorder, for at least two weeks. Thus, the length of time since the most recent index episode varied somewhat (with an average of 6.92 months since last episode), as did the number or remaining symptoms (an average of 3.17 depression symptoms) the participants were experiencing. The SCID-I had been translated into the Persian language (Farsi) and all interviews except two were reconfirmed by a second interviewer.

### *Instruments*

Brief Symptom Inventory (BSI; Derogatis, 1993) is intended as a screening tool for detecting clinical symptoms as indicators of emotional distress, and consists of a self-rated questionnaire with 53 items that are answered on a 5-point Likert-type scale (0-4), which range from *Not at all* to *Extremely*. Symptoms are assigned to nine subscales, which represent domains of psychopathology: *Somatization*, *Obsessive-Compulsive*, *Interpersonal sensitivity*, *Depression*, *Anxiety*, *Anger-Hostility*, *Phobic anxiety*, *Paranoid ideation*, and *Psychoticism*. Dobson and Mohammadkhani (2007a) reported high correlation among the BSI depression scale and Beck Depression Inventory-II.

### *Procedure*

Because the Iranian translation of the Brief Symptom Inventory has not been previously conducted, forward and backward translation was done by two clinical psychologists who were fluent in both the English and Persian languages. Language equivalence was ensured through discussion and reconsideration of language, in the event of any mismatches in translation. A decision was also made to modify the third person pronoun in the original BSI to a more informal form, in keeping with sample of our study. The final correspondence between the original inventory and the Iranian translation was assessed by an independent clinical psychologist, who agreed with the content of the items in the Iranian version.

Consent for the study was obtained from Directors of the University of Social Welfare and Rehabilitation Sciences. The objectives of the study was explained to potential participants, and they provided informed consent. The time set given for the Brief Symptom Inventory was «the past month including today», since it was administered as part of a comprehensive battery of questionnaires with this period of reference.

### *Data analysis*

Correlations among the BSI scales were computed, as were Cronbach alpha coefficients for the full global severity index and each of its nine subscales to examine the internal reliability of the scale. In the second part of the analysis, confirmatory factor analysis was used to assess the fit of the hypothesized factor structure to the data. LISREL version 8.54 (Jöreskog and Sörbom, 2003) was used for confirmatory factor analysis, as was SPSS version 16.0 for other analysis.

## Results

### *Descriptive statistics*

Descriptive statistics for the total sample, as well as for each gender separately, are presented in Table 2. Differences between the males and females were evaluated with a series of one-way ANOVAs; none of differences between males and females was significant a  $p < .05$ .

**TABLE 2.** Means (*M*) and standard deviations (*SD*) by gender for the Iranian version of the BSI.

<i>Scale</i>	<i>Total (N = 354)</i>		<i>Male (n = 67)</i>		<i>Female (n = 287)</i>	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Somatization	1.34	.94	1.23	1.02	1.37	.92
Obsessive-Compulsive	1.70	.85	1.63	.84	1.72	.85
Interpersonal Sensitivity	1.53	.96	1.35	.92	1.57	.97
Depression	1.83	1.01	1.67	.87	1.86	1.04
Anxiety	1.42	.91	1.38	.93	1.43	.90
Hostility	1.18	.84	1.25	.89	1.16	.83
Phobic Anxiety	.90	.78	1.04	.88	.86	.75
Paranoia	1.52	.92	1.49	.90	1.53	.93
Psychoticism	1.37	.84	1.33	.75	1.38	.86
Global Severity Index	1.32	.70	1.28	.71	1.33	.69

### *Correlations among Brief Symptom Inventory scales*

Correlations of the Brief Symptom Inventory scales are presented in Table 3. Correlations among the BSI subscales were moderate to high, and all were significant at  $p < .01$ . The highest correlations were found between the global severity index and all nine subscales, as all correlation were greater than .80.

**TABLE 3.** Correlations among the nine subscales of the BSI.

<i>Scales</i>	<i>SOM</i>	<i>O-C</i>	<i>I-S</i>	<i>DEP</i>	<i>ANX</i>	<i>HOS</i>	<i>PHOB</i>	<i>PAR</i>	<i>PSY</i>
SOM	-								
O-C	.64	-							
I-S	.55	.65	-						
DEP	.55	.68	.76	-					
ANX	.70	.72	.71	.72	-				
HOS	.62	.65	.71	.69	.75	-			
PHOB	.60	.60	.62	.52	.72	.62	-		
PAR	.63	.68	.72	.65	.72	.70	.66	-	
PSY	.63	.74	.73	.72	.72	.69	.68	.74	-
GSI	.80	.84	.84	.83	.90	.84	.78	.85	.86

*Note.* SOM: Somatization; O-C: Obsessive-Compulsive; I-S: Interpersonal Sensitivity; DEP: Depression; ANX: Anxiety; HOS: Hostility; PHOB: Phobic Anxiety; PAR: Paranoia; PSY: Psychoticism; GSI: Global Severity Index.

### *Internal consistency*

Cronbach's alpha for the global severity index was high ( $\alpha = .96$ ). Each of the subscales showed similarly high internal reliabilities: *Somatization* ( $\alpha = .87$ ), *Obsessive-Compulsive* ( $\alpha = .79$ ), *Interpersonal Sensitivity* ( $\alpha = .78$ ), *Depression* ( $\alpha = .87$ ), *Anxiety* ( $\alpha = .84$ ), *Hostility* ( $\alpha = .79$ ), *Phobic anxiety* ( $\alpha = .75$ ), *Paranoid ideation* ( $\alpha = .80$ ), and *Psychoticism* ( $\alpha = .71$ ).

### *Construct validity: Confirmatory factor analysis*

A confirmatory factor analysis was conducted, to assess how well the predicted interrelationships among the BSI scales matched the interrelationships between the observed interrelationships (Meyers, Gamst, and Guarino, 2006). Specifically, the nine subscales of the Brief Symptom Inventory (BSI) were treated as indicator variables and matched to two hypothetical models, which either included all nine factors or a model in which a single underlying factor was assumed (Derogatis and Melisaratos, 1983). The models were evaluated with LISREL version 8.54, and by a series of fit measures, as described below.

Results of all eight fit indexes support the proposed nine factorial model. The  $\chi^2$  statistic is an absolute fit index which tests the difference between the predicted and the observed relationships (correlations/covariance). Because a close fit between the two sets of relationships was predicted, a non-significant  $\chi^2$  was sought. The  $\chi^2$  test is sensitive to sample size increases, and with larger samples power increases, and the  $\chi^2$  can be statistically significant even when the model fits the data reasonably well. With a sample more than 200, the  $\chi^2$  statistic will usually be statistically significant, even when there are trivial differences between the model and the data. Because of this consideration, the model with the lower  $\chi^2$  value is considered to be the preferred model (Meyers *et al.*, 2006). In the current study, the  $\chi^2$  value for the nine factor model was 3,358.92 ( $df = 1,091$ ,  $N = 354$ ),  $p < .01$ , as compared to 4,942.84 ( $df = 1,127$ ,  $N = 354$ ),  $p < .01$  for the unifactorial model.

The Root Mean Square Error of Approximation (RMSEA) is the average of the residuals between the observed correlation/covariance from the sample and the expected model estimated from the population. Conceptually, the goal is to reduce the divergence between the sample and expected models, so values closer to zero indicate a good-fitting model. Loehlin (2004) proposed that an RMSEA of less than .08 indicates good fit, whereas .08 to .1 indicates a moderate fit, and greater than .1 indicates poor fit. The RMSEA was 0.077 for the 9-factor model, which indicated a good fit, but .098 for the one-factor model, which indicated moderate fit (Loehlin, 2004).

The Comparative Fit Index (CFI), Normed Fit Index (NFI), Relative Fit Index (RFI), and the Incremental Fit Index (IFI) are measures of the relative fit between the hypothesized model with a null or nonsignificant model. Values that equal or exceed .95 for the CFI, and values of at least .90 for the NFI, RFI and IFI indicate a good fit of model (Meyers *et al.*, 2006). In the current sample, the fit indices for the nine factor model were .97, .95, .95, and .97 for the CFI, NFI, RFI and IFI, respectively, which indicated an excellent fit of the model. The same fit indices were similar, but somewhat lower for the one factor model (.95, .94, .93, and .95, respectively).

Finally, the Adjusted Goodness of Fit Index (AGFI), and Parsimony Goodness of Fit Index (PGFI) were evaluated. These fit measures can be used to compare models with different number of parameters, to determine the effect of additional parameters to the model. Parsimonious fit measures are recommended to compare competing models, and the model with the higher fit index is generally deemed to be superior to the other (Meyers *et al.*, 2006). The AGFI and PGFI were .69 and .64 in the current sample for the nine factor solution, as opposed to .60 and .59, respectively, in the unifactorial model. In summary, for almost all of the above indices of model fit, the current data favored the nine factor model over the unifactorial model.

### Discussion

This study evaluated the psychometric properties of the Brief Symptom Inventory in a sample of patients in Iran who had recovered from major depressive disorder. The reliability and validity of the BSI were examined through a series of statistical analyses. A confirmatory factor analysis was conducted in order to confirm the factor structure of the BSI, and to compare a 9-factor and unifactorial model of the inventory. This is the first article to report the factorial structure and internal consistency of the BSI in this population.

The results revealed that the means of the BSI factors were roughly comparable to those seen in other studies and with participants from other cultures (Derogatis, 1975, 1992; Derogatis and Melisaratos, 1983; Derogatis and Spencer, 1982; Pereda *et al.*, 2007). None of the differences on any BSI scale was significant between female and male participants. The reliability coefficients obtained were also consistently high, ranging between .71 (for the *Psychoticism* scale), to .87 (for *Somatization* and *Depression*) to .96 for the Global Severity Index. These values correspond closely to the values reported in the manual (Derogatis and Spencer, 1982) and other research (Margolese, Negrete, Tempier, and Gill, 2006; Meachen, Hanks, Millis, and Rapport, 2008).

Confirmatory factor analysis was employed to evaluate the adequacy of the nine-factor and unifactorial models of the BSI, which have been proposed in previous work. The goodness of fit indices that were examined showed the adequacy of the original nine factor structure hypothesized by the authors, in contrast to the unidimensional structure suggested by others (Boulet and Boss, 1991; Piersma *et al.*, 1994). This result indicates that whereas the Global Severity Index is reliable, the nine specific dimensions of the BSI can also be considered independently from each other, as all scales were internally reliable, and the factor structure was validated. This result implies that the BSI can be administered in clinical settings to evaluate the psychopathological states of clients and patients. As has been suggested by the originators of the scale (Derogatis and Melisaratos, 1983), these results therefore also support the use of the BSI as a multidimensional assessment instrument, which is more efficient than the use of several unidimensional measures.

Overall, the current study contributes to other studies that suggest the reliability, validity and utility of the brief symptom inventory with MDD patients. Further, given the use of a sample in Iran, these results imply that the BSI can be considered for use



in other studies with Farsi-speaking samples. The present study confirmed the original nine factor structure presented by the authors (Derogatis and Melisaratos, 1983), which implies that the Brief Symptom Inventory can be used in outcome or process research to differentiate and evaluate the nine symptom dimensions covered within the BSI. Overall, the results support the use of the BSI as a clinically appropriate instrument, which could be considered for use in both practice and research settings. Although the BSI was developed before the current DSM manual, and so its dimensions do not correspond exactly to the DSM, many of the BSI dimensions are of common clinical interest.

Although the current study provides an initial evaluation of the BSI in an Iranian sample, additional research with different samples is needed to document the validity and utility of this scale and its internal structure. Research with a currently distressed sample would help to evaluate the scale's specificity for different clinical conditions. Research that examines the test-retest reliability of the BSI would help to evaluate its sensitivity to change. Studies that simultaneously employ the BSI and other measures of psychopathology would also be profitable, to evaluate the concurrent validity of the BSI. This initial validation of the scale thus serves as an important first step in the scale's further evaluation.

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