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Comparative psychometric properties of the short versions of the SCL-90-R for patients with substance use disorder

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ABSTRACT

Background: The prevalence of comorbid psychopathological disorders and associated problems is high among patients with substance use disorder (SUD). The Symptom Checklist 90-R (SCL-90-R) is one of the most widely used self-report instruments to assess psychopathology. This study examined the psychometric properties of the SCL-90-R and its short-form versions for patients with SUD. Method: The values of the short versions were calculated a posteriori based on the SCL-90-R scores. Confirmatory factor analysis (CFA) was conducted using the diagonally weighted least squares estimator to assess construct validity. Reliability was assessed via the ordinal alpha coefficient, McDonald's omega coefficient and intraclass correlation coefficient (ICC). Results: The SCL-90-R showed acceptable model fit (χ^2/df = 1.916, CFI = 0.940, TLI = 0.938, RMSEA = 0.035). Among the short versions, the BSI-53, SA-45, SCL-27, HSCL-25, and BSI-18 demonstrated good to excellent fit. The depression scale showed the highest reliability across the versions. Pearson correlations and ICCs revealed strong associations between the SCL-90-R and its short forms, although the agreement declined with shorter versions. Despite the excellent fit of the SCL-6, it had lower reliability. Conclusion: These results provide evidence of the psychometric robustness of short versions of the SCL-90-R and support their use to assess comorbid psychopathology in people with SUD.

1. Introduction

The prevalence of comorbid psychopathological disorders and associated problems is high among patients with substance use disorder (SUD) (Arteaga et al., 2015; Flynn & Brown, 2008; López-Goñi et al., 2014). Several studies have reported a positive relationship between substance abuse and psychopathological disorders, especially for women (Fernández-Montalvo et al., 2019; Fernández-Montalvo et al., 2015) and patients with lifetime traumatic histories (Fernández-Montalvo et al., 2015; Haro et al., 2021). Likewise, a significant relationship has been found between the severity of substance abuse and comorbidity among patients with addiction problems (Landa et al., 2006; López-Goñi et al., 2014). These patients need treatment that addresses both their SUD and their associated comorbid problems.

In this context, it is necessary to use assessment instruments that have good psychometric properties and that are reliable and valid to assess the comorbid symptomatology that is often present for patients who seek treatment in addiction centres. Structured interviews that aim to assess psychopathological disorders are often resource intensive and time consuming (Bergly et al., 2014). Therefore, screening tools are needed that are easy to apply and that help clinicians detect comorbid psychopathological symptomatology that may require specific interventions or may even interfere with therapeutic outcomes.

The Symptom Checklist 90-R (SCL-90-R; Derogatis, 1992) is one of the most widely used self-report instruments in the mental health field to assess psychopathology, both in clinical samples and in the general population. This instrument assesses the subjective symptom burden in patients with psychological problems as a measure for the screening and assessment of psychopathological symptoms. In addition, it has been widely used as a measure of treatment effectiveness (Derogatis & Fitzpatrick, 2004; Fernández-Montalvo et al., 2019). The internal consistency, test–retest reliability and validity of the questionnaire have been demonstrated (Franke, 2002). The SCL-90-R has been shown to be a feasible tool for measuring general distress among patients with SUD.

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However, the SCL-90-R has certain problems that hinder its routine use and reduce its usefulness in research, prevention and therapy (Bados et al., 2005; Davison et al., 1997; Hessel et al., 2001; Müller et al., 2010; Sandin et al., 2008; Vassend & Skrondal, 1999; Zack et al., 1998). These limitations include an extensive number of items, high redundancy of items and high correlation between the nine scales, low discriminant validity, a lack of factorial validity (in the various factorial studies of the questionnaire, structures from 1 to 10 factors have been proposed), an imbalanced number of items in the scales (the scales range from 6 items for Hostility to 13 items for Depression), and cost-effectiveness.

To facilitate a more efficient assessment of symptom burden, several short versions of the SCL-90-R have been developed in recent decades. These abbreviated versions comprise 5 (Strand et al., 2003) to 53 items (Derogatis, 1993) and are derived from the precursor or existing short versions of the SCL-90-R. Research on the short versions of the SCL-90-R has generally shown high correlations with the original version (Müller et al., 2010).

Several studies have shown results that support the reliability and validity of the short versions of the SCL-90-R (Davison et al., 1997; Müller et al., 2010; Prinz et al., 2013). These abbreviated instruments were developed to significantly reduce the length of the questionnaire, avoid overlap between the different scales, minimize correlations between the scales, and support the usefulness and use of the questionnaire (Sandin et al., 2008). However, most previous studies have been conducted with university students (Alvarado et al., 2012; Holgado-Tello et al., 2019; Sandin et al., 2008), the general population (Vizioli & Crespi, 2024) or in the primary care setting (Maruish et al., 1998). To date, no studies have been conducted with patients with SUD. Given the high prevalence of psychopathological symptomatology in these patients, there is a need for brief instruments that allow for the accurate assessment of comorbidities in people with addictions. Therefore, the aim of this study was to evaluate the psychometric properties of the SCL-90-R and its short-form derivatives. Specifically, construct validity, reliability, and the level of agreement between scale scores were assessed in patients with clinical SUD.

2. Method

2.1. Participants

The sample for this investigation included 789 patients who voluntarily sought treatment for SUD from the Proyecto Hombre Navarra Foundation and the ANTOX Association (Spain) between 2010 and 2024. These SUD treatment programmes provide cognitive–behavioural interventions with two different modalities (outpatient and inpatient treatment) aimed at abstinence. These two programmes are financed by public health institutions and serve people older than 18 years throughout the Navarre region.

The sample inclusion criteria were as follows: a) met the DSM-5 diagnostic criteria for alcohol and/or substance use disorders; b) older than 18 years; c) signed informed consent to participate in the study after being properly informed; and d) completed the assessment sessions.

The sample was composed of 632 (80.1 %) men and 157 (19.9 %) women (Table 1). The participants' mean age was 40.7 years (SD = 10.7) for the total sample, 40.3 (SD = 10.5) for men and 42.5 (SD = 11.1) for women. The main substance that motivated treatment was alcohol (44.2 %), followed by cocaine (37.9 %), other substances (12.4 %) and poly-consumption (4.6 %).

2.2. Measures

The SCL-90-R (Derogatis, 1992) is a self-administered questionnaire used for general psychopathological assessment. This questionnaire consists of 90 items and is scored on a five-point Likert scale ranging from 0 (nothing) to 4 (extremely). The questionnaire aims to reflect current symptoms of psychological distress. The Symptom Checklist consists of nine primary symptom dimensions: somatization (12 items), obsession-compulsion (10 items), interpersonal sensitivity (9 items), depression (13 items), anxiety (10 items), hostility (6 items), phobic anxiety (7 items), paranoid ideation (6 items), and psychoticism (10 items). Additionally, this questionnaire offers three global indices that reflect the overall level of severity: The Global Severity Index (GSI), which reflects overall symptom severity; the Positive Symptom Distress Index (PSDI), which indicates symptom intensity; and the Positive Symptom Total (PST), which includes the number of items answered with a score other than 0. In this study, the Spanish version was used (Derogatis, 2002),. The internal consistency ranged from 0.70 to 0.90.

The following short versions were extracted from the SCL-90-R scales: the Brief Symptom Inventory (BSI; Derogatis, 1993) with 53 items and 9 dimensions, the Symptom Assessment-45 Questionnaire

Table 1
Characteristics of the sample: sociodemographic variables, reason for treatment (substance) and type of treatment.

	Total sample N = 789 M (SD)	Men n = 632 M (SD)	Women n = 157 M (SD)	t (df)	p	d
Age	40.7 (10.7)	40.3 (10.5)	42.5 (11.1)	2.3 (781)	0.012	0.21
	***N* (%)**	***n* (%)**	***n* (%)**	**χ^2 (*df*)**	***p***	**Phi/ Cramér's V**
Marital status						
Married/In couple	251 (31.8)	185 (29.3)	66 (42.0)	69.8 (3)	<.001	0.29
Single	389 (49.3)	351 (55.5)	38 (24.2)			
Divorced	138 (17.5)	95 (15.0)	43 (27.4)			
Widower	9 (1.1)	1 (0.1 %)	8 (5.1)			
Education level						
No studies	20 (2.5)	19 (3.0)	1 (0.6)	39.2 (3)	<.001	0.22
Primary	224 (28.4)	181 (28.6)	43 (27.4)			
Secondary	429 (54.4)	363 (57.4)	66 (42.1)			
University	116 (14.7)	69 (10.9)	47 (29.9)			
Employment situation						
Employed	260 (32.9)	208 (32.9)	52 (33.1)	2.9 (2)	0.256	0.06
Unemployed	437 (55.4)	356 (56.3)	81 (51.6)			
Retired	92 (11.6)	68 (10.7)	24 (15.2)			
Reason for treatment (substance)						
Alcohol	353 (44.7)	263 (41.6)	90 (57.3)	14.5 (3)	0.002	0.14
Cocaine	299 (37.9)	257 (40.7)	42 (26.8)			
Poly-consumption	38 (4.8)	29 (4.6)	9 (5,7)			
Others	99 (12.5)	83 (13.1)	16 (10.2)			
Treatment programme						
Outpatient	394 (49.9)	316 (50)	78 (49.7)	0.005 (1)	0.943	0.003
Inpatient	395 (50.1)	316 (50)	79 (50.3)			

(SA-45; Davison et al., 1997) with 45 items and 9 dimensions, the Symptom Checklist-27 (SCL-27; Hardt & Gerbershagen, 2001) with 27 items and 6 dimensions, the Hopkins Symptom Checklist-25 (HSCL-25; Derogatis et al., 1974) with 25 items and 2 dimensions, the Brief Symptoms Inventory-18 (BSI-18; Derogatis, 2000) with 18 items and 3 dimensions, the Symptom Checklist-10R (SCL-10-R; Rosen et al., 2000a, 2000b) with 10 items and 9 dimensions, the Symptom Checklist-K-9 (SCL-K-9; Klaghofer & Brähler, 2001) with 9 items and 9 dimensions, and the Symptom Checklist-6 (SCL-6; Rosen et al., 2000a) with 6 items and 2 dimensions. Information on the dimensions of each version and the SCL-90-R items included in each can be found in Supplement 1.

2.3. Procedure

The assessment of the sample was performed at the beginning of the SUD treatment programmes. Each participant was interviewed face to face in one session by a clinical psychologist trained in the psychopathological assessment of patients with SUD. In this session, data related to sociodemographic characteristics were collected, and the SCL-90-R was administered, as part of a wider assessment protocol with other variables that are not relevant to this study (addiction severity, maladjustment problems, and suicidal behaviours). In this study, the values of the short versions were calculated a posteriori based on the SCL-90-R scores. After the assessment session, the participants continued the standard treatment for SUD. All participants signed informed consent forms prior to the assessment sessions.

The protocol for this study was approved by the ethics committee of the Universidad Publica de Navarra . All participants had been sampled in previous studies and were pooled for this study because they had all been previously assessed with the SCL-90-R. Therefore, different ethics committee codes are presented (PI-006/16, PI-014/21 and PI-012/23).

2.4. Data analysis

To examine the construct validity or factorial structure of the SCL versions (SCL-90-R [9 factors], BSI-53 [9 factors], SA-45 [9 factors], SCL-27 [6 factors], HSCL-25 [2 factors], BSI-18 [3 factors], and SCL-6 [2 factors]), confirmatory factor analysis (CFA) was conducted using the diagonally weighted least squares (DWLS) estimator, which is appropriate for the ordinal nature of the item responses (DiStefano & Morgan, 2014). The SCL-10-R [9 dimensions] and SCL-K-9 [9 dimensions] were excluded from the CFA because each dimension consists of only one item. Model fit was evaluated using several indices: the ratio of the chi-square (χ^2) statistic to degrees of freedom (χ^2/df), with acceptable values of less than or equal to 3; the comparative fit index (CFI) and Tucker–Lewis index (TLI), with values of 0.95 or higher considered indicative of excellent model fit; and the root mean square error of approximation (RMSEA), with thresholds of 0.06 to 0.08 for excellent fit along with a 90 % confidence interval ($CI_{90\%}$). Additionally, the standardized root mean square residual (SRMR) was calculated, with values below 0.08 deemed acceptable (Schreiber et al., 2006). All indices were considered together to provide a comprehensive evaluation of the model's adequacy. Scaled fit indices were reported for all CFA-based analyses except for the SRMR.

Reliability was assessed using Cronbach's alpha, the ordinal alpha, and McDonald's omega (ω_u categorical). These indices were used to provide robust reliability estimates, particularly given the ordinal nature of the data (Flora, 2020). The SCL-10-R and SCL-K-9 were excluded from the analyses of internal consistency reliability because they are composed of only one item in each dimension.

To evaluate the level of agreement between the scores of the scales, Spearman correlations (ρ) were estimated between each subscale of the SCL-90-R and the corresponding subscales of the short-form versions. This approach was used to assess the degree of the linear relationship between the scores of the SCL-90-R and the short-form derivatives to emphasize how consistently the scales rank individuals. A high correlation reflects a strong linear association and stable ranking across versions; however, it does not account for differences in absolute scores (Weir, 2005). For example, two scales can exhibit a high correlation even if their means and variances differ substantially as long as the relative ordering of individuals remains consistent. To address this limitation and evaluate the degree of absolute agreement between the scores of the SCL-90-R and the short-form derivative, the intraclass correlation coefficient (ICC) was used (Feng et al., 2014). A two-way random-effects model was applied to evaluate absolute agreement between the versions of the SCL rather than consistency with a focus on single measurements instead of averaged values across versions. False Discovery Rate correction (Benjamini–Hochberg) was applied to control for multiple correlations.

Analyses were conducted via the R program 4.4.1 (R. Core Team, 2024). The *lavaan* package (Rosseel, 2012), *semTools* (Epskamp, 2015) package and *irr* package (Gamer et al., 2019) were used to conduct CFA, reliability analyses and ICCs, respectively. An R script with data analyses is available at https://github.com/diegoriveraps/scl-shortforms-analysis.

3. Results

3.1. Factorial structure of the SCL versions

The CFA results revealed that the SCL-90-R had an acceptable model fit (χ^2/df = 1.916, CFI = 0.940, TLI = 0.938, RMSEA = 0.035 [.033, 0.036], SRMR = 0.057). Although the RMSEA indicated excellent fit, the CFI and TLI values were slightly below the 0.95 threshold, suggesting a marginally optimal fit.

Among the short versions, the BSI-53 (χ^2/df = 2.249, CFI = 0.956, TLI = 0.943, RMSEA = 0.041), the SA-45 (χ^2/df = 2.213, CFI = 0.958, TLI = 0.954, RMSEA = 0.040), and SCL-27 (χ^2/df = 2.846, CFI = 0.961, TLI = 0.955, RMSEA = 0.050) demonstrated good to excellent fit, with CFI and TLI values close to or above 0.95 and RMSEA values within the acceptable range. The HSCL-25 (χ^2/df = 3.673, CFI = 0.956, TLI = 0.952, RMSEA = 0.060) and the BSI-18 (χ^2/df = 3.230, CFI = 0.974, TLI = 0.970, RMSEA = 0.055) showed slightly higher χ^2/df, but still within adequate limits, particularly given their strong and optimal CFI, TLI, and RMSEA values. Finally, the SCL-6, the shortest version, displayed the best overall fit (χ^2/df = 2.364, CFI = 0.998, TLI = 0.995, RMSEA = 0.043), with excellent values for CFI and TLI and an RMSEA well within the excellent fit range (see Table 2). Item loading on the factors were

Table 2
Confirmatory factor analysis results for the SCL-90-R and the short versions.

SCL Version	Robust X^2 goodness-of-fit			CFI	TLI	RMSEA [$CI_{90\%}$]	SRMR
	X^2	*df*	X^2/df				
SCL-90-R	7414.202	3870	1.916	0.940	0.938	0.035 [0.033, 0.036]	0.057
BSI-53	2879.030	1280	2.249	0.956	0.943	0.041 [0.038, 0.043]	0.049
SA-45	2011.360	909	2.213	0.958	0.954	0.040 [0.038, 0.043]	0.050
SCL-27	879.280	309	2.846	0.961	0.955	0.050 [0.046, 0.053]	0.048
HSCL-25	1006.306	274	3.673	0.956	0.952	0.060 [0.056, 0.064]	0.053
BSI-18	426.375	132	3.230	0.974	0.970	0.055 [0.049, 0.060]	0.045
SCL-6	14.184	6	2.364	0.998	0.995	0.043 [0.013, 0.072]	0.015

statistically significant ($\lambda_j \geq .492$; $p < 0.001$), indicating that the items loaded correctly on the corresponding factors in each version (Supplement 2).

3.2. Reliability of the SCL versions

The reliability coefficients of the different versions of the SCL were estimated via ordinal alpha ($\alpha_{ord.}$) and omega (ω_u), which provide a more robust assessment of internal consistency than traditional Cronbach's alpha. With respect to the reliability results, for the SCL-90-R, the scale with the highest reliability was Depression ($\alpha_{ord.} = 0.93$, ω_u=.90), whereas the scale with the lowest reliability was Paranoid Ideation ($\alpha_{ord.} = 0.84$, ω_u=.80). For the BSI-53, the scale with the highest reliability was Depression ($\alpha_{ord.} = 0.91$, ω_u=.87), whereas the scales with the lowest reliability were Psychoticism ($\alpha_{ord.} = 0.81$, ω_u=.78) and Phobic Anxiety ($\alpha_{ord.} = 0.84$, ω_u=.75). Relative to the SA-45, the Hostility scale showed high reliability ($\alpha_{ord.} = 0.91$, ω_u=.87), and poor values were obtained for Psychoticism ($\alpha_{ord.} = 0.81$, ω_u=.70).

For the SCL-27, the scale with the highest reliability was Somatization ($\alpha_{ord.}$ 0.89, ω_u=.84), whereas the scales with the lowest reliability were Paranoid Ideation and Dysthymic Symptoms ($\alpha_{ord.} = 0.79$, ω_u=.75). For the HSCL-25, the scale with the highest reliability was Depression ($\alpha_{ord.} = 0.93$, ω_u=.91). Similarly, for the BSI-18, the scale with the highest reliability was Depression ($\alpha_{ord.} = 0.91$, ω_u=.87), followed by Anxiety ($\alpha_{ord.} = 0.88$, ω_u=.83). Finally, in the SCL-6, Depression had moderate reliability ($\alpha_{ord.} = 0.78$, ω_u=.73). The scale with the lowest reliability was Anxiety ($\alpha_{ord.} = 0.71$, ω_u=.64) (Table 3).

3.3. Level of agreement between scale scores

The Spearman correlations (ρ) between the dimensions of the SCL-90-R and its shorter versions showed a pattern of decline: completed versions such as the BSI-53 ($\rho = 0.99$ for Hostility and GSI, $\rho = 0.97$ for Phobic Anxiety and Paranoid Ideation) and the SA-45 ($\rho = 0.98$ for GSI, $\rho = 0.97$ for Paranoid Ideation, $\rho = 0.95$ for Interpersonal sensitivity; $\rho = 0.94$ for Anxiety and Phobic anxiety) demonstrated the highest correlations, while shorter versions such as the SCL-10-R and SCL-K-9 demonstrated greater variability (Table 4). Supplement 3 presents descriptive statistics for each dimension score across all versions of the SCL, including the mean, standard deviation, skewness, kurtosis, and results of the Kolmogorov–Smirnov test. The presence of non-normal distributions in several dimensions warranted the use of Spearman's rho to compute correlations between corresponding dimensions across versions.

The SCL-10-R showed moderate to high correlations across dimensions, ranging from $\rho = 0.56$ (Somatization) to $\rho = 0.87$ (Depression), with a strong relationship for the GSI ($\rho = 0.94$). The SCL-K-9 displayed a similar pattern, with correlations from $\rho = 0.56$ (Phobic Anxiety) to $\rho = 0.76$ (Anxiety), and again a high correlation for the GSI ($\rho = 0.93$). These results reflect a progressive decline in dimensional correspondence as the scale becomes shorter (see Table 4).

The level of agreement between the SCL-90-R and its shorter versions by each dimension, as measured by the ICC, followed a pattern of decline similar to the correlations. The BSI-53 and SA-45 demonstrated the highest levels of agreement across most dimensions. For example, the BSI-53 and the SA-45 showed excellent agreement in the Hostility ($ICC_{BSI\text{-}53} = 0.99$) and Paranoid Ideation (ICCs = 0.97) scales, whereas the GSI performed poorly (ICC = 0.68 and 0.67) in both versions. In addition, shorter versions, such as the SCL-10-R and the SCL-K-9, exhibited lower levels of agreement, particularly in dimensions such as Interpersonal Sensitivity (ICCs = 0.54) and Anxiety (ICC = 0.59). These results indicated that longer scales tended to provide higher levels of agreement with the SCL-90-R and captured the construct with greater measurement precision.

Finally, when the overall agreement of all versions together was evaluated, the different versions of the SCL-90-R exhibited varying

Table 3
Cronbach's alpha (α), ordinal alpha ($\alpha_{ord.}$), and McDonald's omega (ω_u) of the SCL-90-R and short versions.

Scales	SCL-90-R				BSI-53				SA-45				SCL-27				HSCL-25				BSI-18				SCL-6			
	α	$\alpha_{ord.}$	ω_u	Items	α	$\alpha_{ord.}$	ω_u	Items	α	$\alpha_{ord.}$	ω_u	Items	α	$\alpha_{ord.}$	ω_u	Items	α	$\alpha_{ord.}$	ω_u	Items	α	$\alpha_{ord.}$	ω_u	Items	α	$\alpha_{ord.}$	ω_u	Items
Somatization	0.88	0.92	0.89	12	0.82	0.89	0.83	7	0.82	0.87	0.83	5	0.83[a]	0.89	0.84	5					0.81	0.87	0.82	6				
Obsession-compulsion	0.86	0.89	0.87	10	0.83	0.86	0.83	6	0.81	0.85	0.81	5																
Interpersonal sensitivity	0.86	0.90	0.87	9	0.79	0.84	0.80	4	0.84	0.88	0.85	5	0.82[b]	0.87	0.83	4												
Depression	0.90	0.93	0.90	13	0.86	0.91	0.87	6	0.86	0.90	0.86	5	0.78[c]	0.87	0.82	4	0.90	0.93	0.91	15	0.86	0.91	0.87	6	0.74	0.78	0.73	2
													0.75[d]	0.79	0.75	4												
Anxiety	0.87	0.92	0.88	10	0.82	0.89	0.84	6	0.79	0.87	0.81	5					0.86	0.91	0.87	10	0.81	0.88	0.83	6	0.63	0.71	0.64	2
Hostility	0.87	0.92	0.88	6	0.84	0.90	0.86	5	0.86	0.91	0.87	5																
Phobic anxiety	0.78	0.89	0.81	7	0.72	0.84	0.75	5	0.76	0.88	0.79	5	0.76[e]	0.86	0.79	5												
Paranoid ideation	0.79	0.84	0.80	6	0.77	0.83	0.79	5	0.77	0.83	0.79	5	0.74[f]	0.79	0.75	4												
Psychoticism	0.83	0.89	0.84	10	0.75	0.81	0.78	5	0.66	0.81	0.70	5													0.71	0.77	0.71	2

Note: [a]Vegetative symptoms; [b]Symptoms of social phobia; [c]Depressive symptoms; [d] Dysthymic symptoms; [e]Agoraphobic symptoms; [f]Symptoms of mistrust.

Table 4
Correlations and absolute agreement of the short versions with the original SCL-90-R.

SCL-90-R	BSI-53		SA-45		SCL-27		HSCL-25		BSI-18		SCL-10-R		SCL-K-9		SCL-6		All versions
	ρ	ICC	ρ	ICC	ρ	ICC	ρ	ICC	ρ	ICC	ρ	ICC	ρ	ICC	ρ	ICC	ICC
Somatization	0.92***	0.93***	0.92***	0.90***	0.83***	0.85***			0.91***	0.92***	0.56***	0.61***	0.67***	0.64***			0.68***
Obsession-compulsion	0.95***	0.95***	0.93***	0.92***	0.83***	0.83***					0.70***	0.62***	0.70***	0.66***			0.69***
Interpersonal sensitivity*	0.93***	0.93***	0.95***	0.95***	0.91***	0.92***					0.72***	0.54***	0.72***	0.54***			0.69***
Depression	0.92***	0.93***	0.92***	0.92***	0.90***	0.91***	0.99***	0.99***	0.92***	0.93***	0.87***	0.80***	0.69***	0.51***	0.87***	0.80***	0.76***
Anxiety	0.96***	0.94***	0.94***	0.92***	0.80***	0.82***	0.96***	0.96***	0.96***	0.94***	0.76***	0.59***	0.76***	0.59***	0.85***	0.80***	0.76***
Hostility	0.99***	0.99***	0.93***	0.96***							0.70***	0.76***	0.70***	0.76***			0.84***
Phobic anxiety	0.97***	0.96***	0.94***	0.96***	0.84***	0.93***					0.59***	0.67***	0.56***	0.55***			0.67***
Paranoid ideation	0.97***	0.97***	0.97***	0.97***	0.97***	0.94***					0.66***	0.65***	0.66***	0.65***			0.76***
Psychoticism	0.95***	0.90***	0.79***	0.80***							0.74***	0.57***	0.73***	0.54***			0.63***
GSI	0.99***	0.68	0.98***	0.67	0.96***	0.39	0.93***	0.89***	0.93***	0.71*	0.94***	0.08	0.93***	0.07			0.25***

Note: $^{*}p < 0.05$; $^{**}p < 0.01$; $^{***}p < 0.001$; ($p < 4.42 \times 10^{-4}$).

levels of agreement in their measurement of psychopathological symptoms. Most symptom dimensions, such as Somatization, Obsession-Compulsion, Interpersonal Sensitivity, Phobic, and Psychoticism, showed moderate agreement (ICC between 0.63 and 0.69). However, several dimensions, including Depression, Anxiety, Hostility, and Paranoid Ideation, demonstrated good agreement (ICC between 0.76 and 0.84).

4. Discussion

In this study, the SCL-90-R and its short-form derivatives were tested in a sample of patients with SUD. The aim was to evaluate the psychometric properties of all of these instruments for use in the clinical setting. The presence of an instrument shorter than the SCL-90-R with good psychometric properties allows clinicians to perform a rapid exploration of patients' psychopathological symptomatology. To this end, the results obtained with the SCL-90-R and the abbreviated forms were compared and specific analyses of the factorial structure, internal consistency and convergent validity were conducted.

One of the main concerns raised about the SCL-90-R is the instability of its structure and the lack of factorial validity. Several factorial studies of questionnaires have proposed structures ranging from 1 to 10 factors (Bados et al., 2005; Hessel et al., 2001; Schmitz et al., 2000; Zack et al., 1998). In this context, some authors highlight the high overlap of items and the high correlation between the nine scales (Bergly et al., 2014; Caparros-Caparrós et al., 2007; Müller et al., 2010; Sandin et al., 2008). However, the results of this study do not support previous criticisms of the SCL-90-R. In contrast, the results of the CFA support the original 9-dimensional structure proposed by the authors of the instrument. All indices used in the CFA via the DWLS estimator (based on the polychoric correlation matrix) were indicative of adequate model fit. Therefore, according to our results, the 9-dimensional structure of the SCL-90-R appeared adequate for assessing psychopathological symptoms.

Similar results were obtained for the abbreviated versions of the SCL-90-R. All factor analysis indices confirmed the factorial structure proposed for each of the short forms and demonstrated good model fit. These results contrast with those reported by Müller et al. (2010), who conducted a study that compared eleven short versions of the SCL-90-R in patients with affective disorders. While these authors concluded that the abbreviated versions presented satisfactory psychometric properties, the factorial structure of most of the versions could not be replicated.

A substantial body of research has assessed the psychometric properties of the 53-item BSI and SA-45. Our results confirm the factorial structure of the 53-item BSI. However, this finding differs from those of previous studies that reported inconsistencies in the proposed 9-factor structure (Bolbeth et al., 2021; Urbán et al., 2014). With respect to the SA-45, which is constructed by equating the number of items in each dimension (5 items in each dimension) according to the results of cluster analytic methods (Davison et al., 1997), several studies have confirmed its factorial structure (Alvarado et al., 2012; Holgado-Tello et al., 2019; Sandin et al., 2008; Slavin-Mulford et al., 2015; Vizioli & Crespi, 2024). The results of the present study also support the 9-factor structure of the SA-45. Finally, regarding the shortest versions (27, 25, 18 and 6 items), our results are in line with the few studies that have been conducted separately with each instrument (Baird & Skariah, 2016; Hardt & Gerbershagen, 2001; Kuhl et al., 2010; Rosen et al., 2000a; Wang et al., 2010) and confirm the factorial structure proposed for each of them.

The results related to reliability show that the internal consistencies of all short versions appeared satisfactory and supported the reliability of all versions (alpha and omega ≥ 0.85 in most of the dimensions). The lowest internal consistency was found for the 6-item scale. This can be explained by the presence of only two items in each of the three dimensions evaluated with this 6-item tool. These results are coherent with the findings of previous studies that find good internal consistency for short scales (Kuhl et al., 2010; Maruish et al., 1998; Müller et al., 2010; Prinz et al., 2013). Consequently, the internal consistency cannot

clearly indicate which short form is preferred in a clinical context.

With respect to the relationships between the scores of the scales, the results revealed that all abbreviated versions correlated strongly with each other. Similar results were previously reported by Prinz et al. (2013) in a comparison of five brief versions and by Müller et al. (2010) in a comparison of 11 short versions of the SCL-90-R. In our study, the highest correlations were found for the versions with more items (45, 27, 25 and 18 items), and the lowest correlations were found for the shortest versions (10, 9 and 6 items). Similar results were obtained by Müller et al. (2010).

The agreement of the GSI revealed an unexpected pattern in the ICC values, which did not decrease consistently with the reduction in the number of items across the different versions of the scale. For example, the HSCL-25 showed one of the highest ICC values (0.89), followed by the BSI-18 (ICC = 0.71). These versions captured the GSI more accurately than other shorter versions, such as the SCL-10-R (ICC = 0.08) and the SCL-K-9 (ICC = 0.07). However, even for the HSCL-25 and the BSI-18, the overall agreement remained moderate, reflecting limitations in their ability to achieve the same level of agreement as the full SCL-90-R. Future studies should examine whether GSI scores are affected by the number of items that compose each dimension in the different versions of the SCL.

The evaluation of the overall agreement of all versions together revealed that most symptom dimensions demonstrated good agreement. This finding suggests that the short-form versions are relatively consistent with the full version in the assessment of these constructs. However, several dimensions showed moderate agreement. Despite a reasonable level of concordance, the short versions may not fully capture the complexity of these symptoms.

This study has several limitations that must be considered. First, all results were obtained with a sample of patients with clinical SUD. Therefore, the results cannot be generalized to other types of patients. It is necessary to replicate this study with other clinical samples. Second, all patients in the sample were from the same region of Spain (Navarre) and therefore belonged to the same sociocultural context. It is necessary to replicate this study in other contexts. Third, this study did not analyse the convergent validity of the dimensions with other well-known instruments that have previously been shown to have good psychometric properties. Finally, as Prinz et al. (2013) noted, the psychometric assessment was based on a dataset in which the values of the short versions were calculated *a posteriori* and might be intercorrelated. If patients had completed the versions separately, the high correlation between the scores of the SCL-90-R and the short versions may have been reduced. Future research should consider these limitations.

Despite these limitations, this study offers a comparative psychometric analysis of the SCL-90-R and the most frequently used short-version derivatives. This is especially relevant for the assessment of comorbidities in the clinical field, especially for patients with SUD, who usually present high rates of comorbid psychological symptoms when seeking treatment. All versions analysed in this paper showed good psychometric properties and high convergent validity with the original SCL-90-R. The versions with more items (90, 53, 45 and 27 items) may be useful for exploring comorbid symptomatology. All of the short versions assess multiple dimensions, and the results indicate their reliability and validity in the clinical setting of addiction. If only the dimensions of anxiety and depression are to be assessed, the shortest versions (i.e., 18 and 25 items) also show a good level of accuracy. Therefore, the main strength of this study is that it provides evidence of the good psychometric properties of abbreviated versions of the SCL-90-R and allows clinicians to accurately assess comorbid psychopathological symptoms in patients with SUD.

Contributors

Javier Fernández-Montalvo, José J. López-Goñi, Alfonso Arteaga, Begoña Haro and Leire Leza designed the protocol and wrote the article. Javier Fernández-Montalvo and José J. López-Goñi conducted the literature search and made the validation and supervision of the research. Alfonso Arteaga, Begoña Haro and Leire Leza carried out the study selection and data abstraction. Diego Rivera conducted the statistical analysis. All authors contributed significantly to the research and have approved the final manuscript.

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CRediT authorship contribution statement

Javier Fernández-Montalvo: Writing – original draft, Supervision, Methodology, Investigation, Conceptualization. **José J. López-Goñi:** Writing – review & editing, Supervision, Investigation. **Alfonso Arteaga:** Writing – review & editing, Supervision, Data curation. **Begoña Haro:** Writing – review & editing, Supervision, Data curation. **Leire Leza:** Writing – review & editing, Investigation, Data curation. **Diego Rivera:** Writing – review & editing, Validation, Methodology, Formal analysis.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.addbeh.2025.108424.

Data availability

Data will be made available on request.

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