Psychometric properties of the symptom check-list-90-R in prison inmates

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ABSTRACT

The aim of this study was to investigate the reliability, construct and criterion validity of the Symptom Check-List-90-R (SCL-90-R) for prison inmates. A sample of 427 adult prisoners was assessed at admission to the penal justice system in the metropolitan region of Santiago de Chile using the SCL-90-R and the mini international neuropsychiatric interview. We tested internal consistency using Cronbach's alpha. We examined construct validity using Principial Components Analysis and Confirmatory Factor Analysis (PCA and CFA) as well as Mokken Scale Analysis. Receiver Operating Characteristic (ROC) analysis was conducted to examine external criterion validity against diagnoses established using structured clinical interviews. The SCL-90-R showed good internal consistency for all subscales ($\alpha = 0.76$–0.89) and excellent consistency for the global scale ($\alpha = 0.97$). PCA yielded a 1-factor structure, which accounted for 70.7% of the total variance. CFA and MSA confirmed the unidimensional structure. ROC analysis indicated useful accuracy of the SCL-90-R to screen for severe mental disorders. Optimal cut-off on the Global Severity Index between severe mental disorders and not having any severe mental disorder was 1.42. In conclusion, the SCL-90-R is a reliable and valid instrument, which may be useful to screen for severe mental disorders at admission to the prison system.

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1. Introduction

Several studies have pointed to high prevalence rates of mental health problems in prison populations worldwide (Lamb and Weinberger, 2001; Fazel and Danesh, 2002; Mir et al., 2015) and in South America (Ponde et al., 2011; Mundt et al., 2013, 2015b; Andreoli et al., 2014). Decreasing psychiatric bed numbers were linked with increasing prison population rates in South America (Mundt et al., 2015a). Prisoners with mental illness are at risk to become victims of other inmates and at risk of suicide (Fazel et al., 2011). The detection of mental disorders in prisoners at admission is essential to initiate adequate treatment and protection. Furthermore, it can contribute to the wellbeing of other prisoners, correctional staff, and the community (Martin et al., 2013).

Most of the screening tools to detect mental health problems in prison inmates were developed especially for correctional facilities without being used or validated in the general populations (Martin et al., 2013). However, instruments that could be used for the same people while imprisoned and while living in the community may have advantages for longitudinal studies and clinically. People with mental disorders living in the community have high rates of incarcerations. Severe mental disorders have shown to predict incarceration in the general population (Greenberg and Rosenheck, 2008). The integration of treatments in correctional institutions and in the community is often still poor. The use of the same screening instrument, which is valid both in community and in prison service, could improve this.

The Symptom Checklist-90-Revised (SCL-90-R) has been translated in 24 languages and is validated in different communities. It may be useful for screening purposes (Derogatis, 1994). The tool was designed to evaluate a broad range of psychological problems and symptoms. It has also been used to measure the outcome of severe mental disorders in clinical or research contexts (Burlingame et al., 2005).

Descriptive statistics such as mean values of psychopathological subscales and indices of the SCL-90 as well as the SCL-90-R

among prisoners have been already established in the UK (Wilson et al., 1985), the USA (Gibbs, 1987; Steadman et al., 1999; Harris et al., 2003; Moser et al., 2004), Germany (von Schönfeld et al., 2006; Dudeck et al., 2009; Obschonka et al., 2010), Spain (Echeburua et al., 2003; Villagra Lanza et al., 2011), and Iran (Sepehrmanesh et al., 2014). Several prison studies examined the criterion validity of the tool with respect to clinical (Wilson et al., 1985; Bulten et al., 2009) and legal (Harris et al., 2003; Taylor et al., 2010) attributes. The criterion validity of the SCL-90-R among severely violent psychiatric inpatients was established in Norway (Bjørkly, 2002). The convergent validity of the SCL-90-R was examined in a British prison sample (Wilson et al., 1985).

Studies assessing the factor structure of the SCL-90-R in samples of prison inmates are lacking. In a review on psychometric properties of the SCL-90-R it was concluded that the dimensionality may vary across different diagnostic and social groups (Cyr et al., 1985). A study of people in crisis with high levels of suicide risk and aggressive behaviors showed that a one-factor model (global psychological distress) may best represent the data (Bonynge, 1993).

The aims of the study were to investigate the reliability of the SCL-90−R, to examine whether the unidimensional structure of the instrument applies to the prison context, to validate the instrument against a structured diagnostic interview in prisoners, and to suggest a threshold score for detecting severe mental disorders in prison inmates.

2. Methods

2.1. Setting and design

We conducted a cross-sectional observational study of consecutively committed prison populations. The sample of 229 male and 198 female prisoners at admission were randomly selected from lists in the three remand prison facilities serving the metropolitan region of Santiago de Chile. The field team consisted of three clinical psychologists trained and supervised by a senior consultant psychiatrist in using the instruments. The assessments including socio-demographic variables, the mini international neuropsychiatric interview (MINI) and application of the SCL-90-R lasted for 45–60 min and were held in separate rooms. In the case of difficulties answering any of the items on the SCL-90-R, participants had the opportunity to immediately consult and resolve this with an assessor. The data were collected between February and September 2013. All the females admitted in the study period were approached for inclusion; every third male on the daily printed admission lists were approached for inclusion. Exclusion criteria for the study were the inability to communicate in the Spanish language and a lack of capacity to provide informed consent. The study was approved by the Ethics Review Board of the University of Chile (Acta de Aprobación 01 from 25.01.2012) and by the Ministry of Justice of the Republic of Chile (reference: Subsecretaria de Justicia 15.03.2012). For details on the sampling and population also see Mundt et al. (2015b).

2.2. Instruments

2.2.1. Symptom checklist 90-Revised (SCL-90-R)

The questionnaire consists of 90 symptom statements that respondents rate on a five-point scale of severity based on their experience in the previous week. The nine subscales of the SCL-90-R are as follows: Somatization, Obsession compulsion, Interpersonal sensitivity, Depression, Anxiety, Hostility, Phobic anxiety, Paranoid ideation, and Psychoticism. There are seven additional items that explore disturbances in appetite and sleep. The Global

Severity Index (GSI), the mean score on the instrument, is a widely used global index of distress.

2.2.2. Mini international neuropsychiatric interview (MINI)

Participants were assessed for the presence of psychiatric disorders using the Spanish version of the MINI 5.0 as 'gold standard'. The MINI was developed by Sheehan et al. (1998) to classify mental disorders according to the fourth version of the DSM-IV. The tool covers a wide range of current and lifetime psychiatric diagnoses including current severe mental disorders, such as major depression, recurrent major depression, major depression with melancholic features, current manic episode, current psychotic disorder, and current psychotic mood disorder.

2.3. Data analysis

Socio-demographic and psychiatric characteristics of the sample were assessed using descriptive statistics. Internal consistency was explored calculating the inter-correlations between the original nine subscales and between the subscales and the GSI. The Cronbach's α coefficient was established for the items and the subscales as well as for the subscales and the GSI. A Cronbach's α between 0.6 and 0.7 is considered an acceptable value. A value between 0.7 and 0.9 is a good value, and a value of 0.9 or higher indicates excellent reliability (Fayers and Machin, 2007).

To examine the theoretical one-dimensional structure of the SCL-90-R regardless of multivariate normal assumption, first Principal Components Analysis (PCA) and then Confirmatory Factor Analysis (CFA) were conducted (Gerbing and Hamilton, 1996; Wang and Du, 2000). As suggested by Kline, the ratio between the sample size and the number of items in a questionnaire should approach 10:1 to indicate an optimal condition for factor analysis. Since our sample included only 427 cases, we examined the factor structure at the subscale-level (Kline, 2011). The sample was split in two subsamples stratified for gender and age. Ten cases were excluded due to missing data on age. To test for the adequacy of factor analysis for both subsamples, we used the Kaiser-Meyer-Olkin measure (should be ≥ 0.5) and the Bartlett test of sphericity. The Mardia's tests of multivariate skewness and kurtosis were used to examine a data deviation from multinormality. A PCA of mean scores from the nine subscales was conducted in the first subsample. To determine the number of factors we used the Kaiser-Guttman eigenvalue ≥ 1 criterion and the Cattell's scree plot. Further, we conducted a CFA with the maximum-likelihood solution in the second subsample. A global fit of our model was examined by different fit indices. The chi-square goodness-of-fit test should ideally be non-significant, or at least have evidence of a chi-square/df ratio between two and five (Tabachnik and Fidell, 2006). The Comparative Fit Index (CFI) should be above 0.95, and the Root Mean Square Error of Approximation (RMSEA) Index should ideally be around 0.05, and not higher than 0.10 for a good model-data fit (Blunch, 2008). The Tucker-Lewis-Index (TLI) should have values as low as 0.90. For the Standardized Root Mean-square Residual (SRMR), a cut-off as low as 0.08 has been suggested (Blunch, 2008). To test the model for hidden factors, the use of modification indices was applied. Mokken Scala Analysis (MSA) with the model of monotone homogeneity was used to subsequently examine the construct validity. The model of monotone homogeneity assumes unidimensionality, monotonicity, and local independence of items within a scale. The fit of the model was evaluated using the Loevinger's scalability H coefficients. H between 0.3 and 0.39 indicates a weak scale, H between 0.4 and 0.49 indicates a moderate scale, and H of 0.5 or higher indicates a strong scale (Meijer and Baneke, 2004). We conducted the MSA using the command line of the mokken package in the R free software for the polytomous SCL item scoring from 0 to 4 (Van