TESTING PSYCHOMETRIC PROPERTIES OF THE THAI SOCIAL DYSFUNCTION RATING SCALE (TSDRS) IN SCHIZOPHRENIC AND METHAMPHETAMINE ABUSE PATIENTS

Ek-uma Imkome, Jintana Yunibhand*, Waraporn Chaiyawat

Faculty of Nursing, Chulalongkorn University, Bangkok, 10330, Thailand

ABSTRACT:

Background: Measuring patient outcomes and early detection is important to prevent severe social dysfunction in schizophrenic and methamphetamine abuse patients. Psychometric properties testing of the Thai Social Dysfunction Rating Scale (TSDRS) has not yet been applied.

Method: Factor analysis was carried out on data collected from 313 schizophrenic and methamphetamine abuse patients who met the inclusion criteria, and who were recruited using multi-stage sampling from eight setting of psychiatric and substance disorder service care in Thailand during April to May, 2015. The method of extraction was principal components analysis. Parallel Analysis with Monte Carlo Simulations (PAMC) was used to determine the factor's number to retain in a factor analysis.

Results: A 14-item TSDRS was applied to 313 participants. Communalities in each factor ranged from .54 to .79 that were retained. The Kaiser-Meyer-Olkin measure of sampling adequacy = .93 and Bartlett's test was X^2 = 2867, df = 91, p<0.001. Cronbach's alpha and test retest reliability was .93, .96 respectively. Confirmatory factor analysis indicated that all items have fit with the empirical data (X^2 = 26.544; df = 32; X^2/df = .83; CFI = 1.00; NFI = 0.99; GFI = .96; PGFI =.40; IFI = 1.02; RMR = .15; and RMSEA = .00). Factor structures showed that items were accepted. Factor loading ranged from .57 to .86 were practically significant. Two factors, explaining 66.2% of the total variance, were identified. Factors 1 explained 56.3% and factor 2 explained 9.9% of the variance.

Conclusion: The TSDRS demonstrated acceptable psychometric properties and practical measurements for health care providers to assess social dysfunction in schizophrenic and methamphetamine abuse patients.

Keywords: Social dysfunction, Schizophrenia, Methamphetamines, Factors analysis, Thai Social Dysfunction Rating Scale

INTRODUCTION

By using methamphetamines, schizophrenic patients may increase social dysfunction by up to 80% [1-3]. Measuring patient outcomes and early detection are important for preventing severe social dysfunction.

Social dysfunction, a hallmark of schizophrenia, is seen during the prodromal phase of the disease. It often worsens immediately after the first episode, and persists into late life. Current psychopharmacological treatments can decrease the severity of psychotic symptoms, while social dysfunction typically persists [4-6].

Recently, hypotheses have been proposed to explain the characteristics and impact of social functioning in schizophrenia. They indicate to the difficulty of performing daily activities, substance abuse, relapses, hospitalizations, lack of social skills, inability to communicate, unexpressed emotions, misunderstand interpersonal boundaries, and poor coping skill. These have all been reported as important factors affecting prognosis [7].

The Diagnostic and Statistical Manual of

* *Correspondence to: Jintana Yunibhand*
  E-mail: jintana.y@chula.ac.th

Mental Disorders (5th ed.; DSM–5) [8] significantly adjusted the definition of schizophrenia, to confirm that social dysfunction plays a significant role in schizophrenia.

Since schizophrenic and methamphetamine abuse patients experience social dysfunction, detecting the malady and offering advice about performing daily activities and the social skills needed to live independently in the community is often left to healthcare providers. Promoting social function is a global issue for the healthcare provider. One possible help would be psychometrics properties testing of the Thai Social Dysfunction Rating Scale (TSDRS). Therefore, this study aims to test the psychometric properties of TSDRS in schizophrenic and methamphetamine abuse patients.

METHODS

Design and participants

This cross-sectional study was approved by the Ethics Review Committee for Research Involving Human Research Participants, Health Science Group, Chulalongkorn University (COA.No. 053/2558). At the beginning of the visit, the risk and benefits of participation were explained to potential participants. Written consent was obtained directly from participants before data collection. Participation was voluntary, and anonymity and confidentiality of participation were guaranteed.

Schizophrenic and methamphetamine abuse patients that attended an inpatient unit of 8 settings of psychiatric and substance misuse services in Thailand were invited to participate in this study. Using a multi-stage sampling method, step to recruit the participants is as follows) there are four regions in Thailand: Central, Northern, North-Eastern, and Southern regions (Regional Data Exchange System (RDES), 2008). The criteria for the probability hospital/institute were: a) Government hospital; b) Tertiary care hospital; c) has psychiatric and substance abuse services; ii) Based on the health care services in Thailand, three military hospital, eleven psychiatric hospitals, and seven drug dependence treatment centers in Thailand were random sampling based on Thai type of hospital justification. Whereas, there were 4, 1, 2, and 1 hospital/institute that meet the criteria in Central, Northern, North-Eastern, and Southern regions, respectively. iii) The participants were recruited from eight settings. The list of participants was obtained from the psychiatrist or psychiatric nurse of the selected hospital. The participants were

selected by purposive sampling technique based on the inclusion criteria were as follows: 1) Aged between 19-60 years due to adolescent was not population group and aging has direct effect on cognition and several diseases. Therefore, we limit the age; 2) Principle diagnosis of schizophrenia and evidence of methamphetamine misuse; 3) A Brief Psychotic Rating Scale score less than 36; 4) Admission as an inpatient case; 5) Able to communicate in Thai; 6) Willing to participate in this study. Participants were excluded if they had any of the following criteria1) had major medical complications such as hypotension, seizure, and tremors; 2) After admission, they were physically unstable and developed severe psychiatry symptoms such as delusion and hallucination.

Sample size

The hypothesized model of current study contained 10 observed variables and 10% of the total sample size was added to take into account from drop outs. Thus, a total number of samples were 220. However, the rule of number of cases per variable was a ratio of 20:1, the reliability of factor analysis dependent on sample size should be more than 300 cases, and to increase the power of the study [9-11].Therefore, 313 participants were recruited

Expert validity

Seven panel experts included two psychiatrists, three nursing instructors, one psychologist, and one psychiatric nurse who was an advanced practice nurse, were invited to evaluate content validity of TSDRS with a 4-point Likert scale for relevance of content, clarity of items, and comprehensiveness of measure. Evaluation scores indicated that an item: (a) was inappropriate and should be deleted; (b) could be retained but required substantial revision; (c) could be retained but should be revised modesty; and (d) was appropriate and did not require modification. The content validity index was 1.00.

Psychometric Testing

Instrument: The social and occupational functioning (SOFS) [12] was translated into Thai language by back translation technique based on Brislin's translation model. Ratings were based on patient behavior during the previous month. The two main components covered:

(a) The ability to look after oneself and maintain daily activities

(b) The instrumental and social skills to manage oneself and live in the community.

Each item was rated on a 5-point Likert scale (1 = no impairment, 2 = mild impairment, 3 = moderate impairment, 4 = severe impairment, and 5 = extreme

Table 1 Correlation matrix of SOFS items among 313 participants

	SOFE1	SOFS2	SOFS3	SOFS4	SOFS5	SOFS6	SOFS7	SOFS8	SOFS9	SOFS10	SOFS11	SOFS12	SOFS13	SOFS14
SOFE1	1.000													
SOFS2	.669	1.000												
SOFS3	.590	.739	1.000											
SOFS4	.559	.588	.572	1.000										
SOFS5	.482	.458	.538	.694	1.000									
SOFS6	.485	.517	.597	.617	.688	1.000								
SOFS7	.528	.511	.503	.600	.718	.701	1.000							
SOFS8	.409	.363	.429	.483	.572	.517	.595	1.000						
SOFS9	.384	.461	.534	.455	.502	.578	.535	.524	1.000					
SOFS10	.413	.415	.424	.515	.611	.535	.657	.590	.645	1.000				
SOFS11	.437	.446	.475	.504	.558	.508	.579	.477	.590	.676	1.000			
SOFS12	.375	.349	.429	.485	.502	.471	.441	.475	.468	.486	.529	1.000		
SOFS13	.390	.459	.472	.533	.517	.533	.515	.408	.494	.513	.593	.571	1.000	
SOFS14	.366	.443	.498	.468	.534	.449	.576	.521	.526	.530	.503	.634	.553	1.000

Determinant = 8.391×10^{-5}

Table 2 The distribution and Exploratory Factor Analysis of the 14 items SOFS (n = 313)

Items	Mean ± SD	Item factor loading
Factor 1: the ability to look after oneself and maintain daily activities		
1. Bathing and grooming	1.29±.694	.802
2. Clothing and dressing	1.31±.662	.865
3. Eating and diet	1.32±.749	.788
4. Neatness and maintenance activities	1.52±.781	.636
Factor 2: the instrumental and social skills to manage oneself and live in the community		
5. Conversational skills	1.69±.926	.667
6. Social appropriateness/politeness	1.61±.886	.577
7. Social engagement	1.74±.946	.675
8. Money management	2.01±1.113	.698
9. Orientation/mobility	1.62±.951	.692
10. Instrumental social skills	1.75±.937	.795
11. Recreation/leisure	1.59±.906	.733
12. Work	1.85±1.095	.722
13. Respect for property	1.55±.862	.663
14. Independence/responsibility	1.78±1.024	.725

impairment). Higher scores indicated greater impairment in social functioning. Total scores ranged from 1 to 70.

Translation procedure for translated instruments

According to Brislin's translation model, SOFS was first translated into the Thai language by two instructors with expertise in English. TSDRS was back-translated into English by two native Thai freelance translators. The back-translated English version of the instruments was compared with original versions for consistency in meaning by two instructors with expertise in English. Content validity and cultural accuracy of items were then examined byte panel of experts. The authors compared the original language version with the translation by conducting checks with translators and advisors. The final version of the instruments was accepted as accurately reflecting the meaning of each item. Expert degrees of agreement were calculated for the content validity index of items (I-CVI) and the scale–level content validity index. The universal agreement calculation method was (S-CVI/UA).

Data collection: The data set was collected from April to May, 2015. Residents from eight study sites who met study criteria were recruited as potential participants. Three hundred and thirteen participants were asked to complete the questionnaire.

Data analysis: We examined the correlation matrix of each domain independently and combined them to ascertain the appropriateness of factor analysis. The KMO test and Bartlett test of Sphericity were used to establish the adequacy of the item correlation matrix, upon which factor analysis is based. Data were analyzed using IBM SPSS Statistics for Windows, version 22 (IBM Corp., Armonk, N.Y., USA). Exploratory factor analysis (EFA) was conducted, with principal components analysis (PCA) as the method of factor extraction. Parallel Analysis with Monte Carlo Simulations (PAMC) was used to confirm the number of factors to be extracted by comparing the 95th percentile values of the eigenvalues computed from PAMC with those obtained from EFA. Reliability and combined use measures for internal consistency (Cronbach's alpha) were evaluated. Responses were analysis for each item. Confirmatory factor analysis (CFA) for validity assessment was conducted using Analysis of Moment Structure (AMOS) version 22.

RESULTS

Participants: Participants were 313 schizophrenic and methamphetamine abuse patients. The mean age was 31.45 years (SD = 7.83, range = 19 to 58). They were predominantly male (87.9%), single (66.1%), and had completed secondary and high schools (55.0%). Some 89(28.4%) were employed. About two-thirds (65.8%) had no financial problems.

Preliminary analysis

Item analysis: All 14 items were retained because values and total correlation of the items were between .30 and .70.

Reliability: Analysis showed that the correlation coefficient ranged from 0.34 to 0.739 the determinant for the correlation matrix was $8.391 \times 10^{-5} (> 0.00001)$ (Table 1). The KMO measure of an adequate sampling was 0.928 and Barlett's test for sphericity was $X^2 = 2867.335$, df = 91, p<0.001.

Internal consistency showed that Cronbach's alpha was .96. When construct reliability = .99 and .97, Cronbach'salpha = .93, Corrected Item-Total Correlation ranged from .6 to .77, and test retest = .96.

Validity: Content validity of scale items was assessed by seven experts; CVI was 1.00. After performing EFA for 14 items, the factor loading and mean (SD) of each item was as shown in Table 2.

Factor analysis: The factors structure of TSDRS was analyzed by using EFA through the basic components of method and varimax rotation. Scree plot and initial solutions showed two factors with an eigenvalue above 1 (Figure 1). Rotation sums of squared loadings showed two factors that met the cut-off criterion (extraction method). The PCA extraction method was used for extract factors and found the factor loading range to be from .57 to .86. PAMC was confirming the 2 factors extraction of EFA (Table 3, Figure 2).

In CFA procedure, path coefficients were determined by quantifying how well that item ''loaded'' onto the corresponding factor. The loading was represented as standardized estimates. Additionally, fit indices obtained the degree to which the factor structure explained the data. The fit statistics reported covers a) the predictive fit chi-square, b) the Tucker-Lewis Index (TLI), c) the comparative fit index (CFI), and d) the Mean Square Error of Approximation (RMSEA).

The first model tested two-factor model which accounted for the constructs of self-care behavior and social performance. However, this model of the 14-item scale did not seem to be a good fit. The results of the goodness-of-fit indices were $X^2 = 386.413$; p < 0.001; $X^2/df = 5.08$; TLI = .84; CFI = .89; and RMSEA = .11. In an attempt to advance the model, we dropped items number 4 and 6, which had
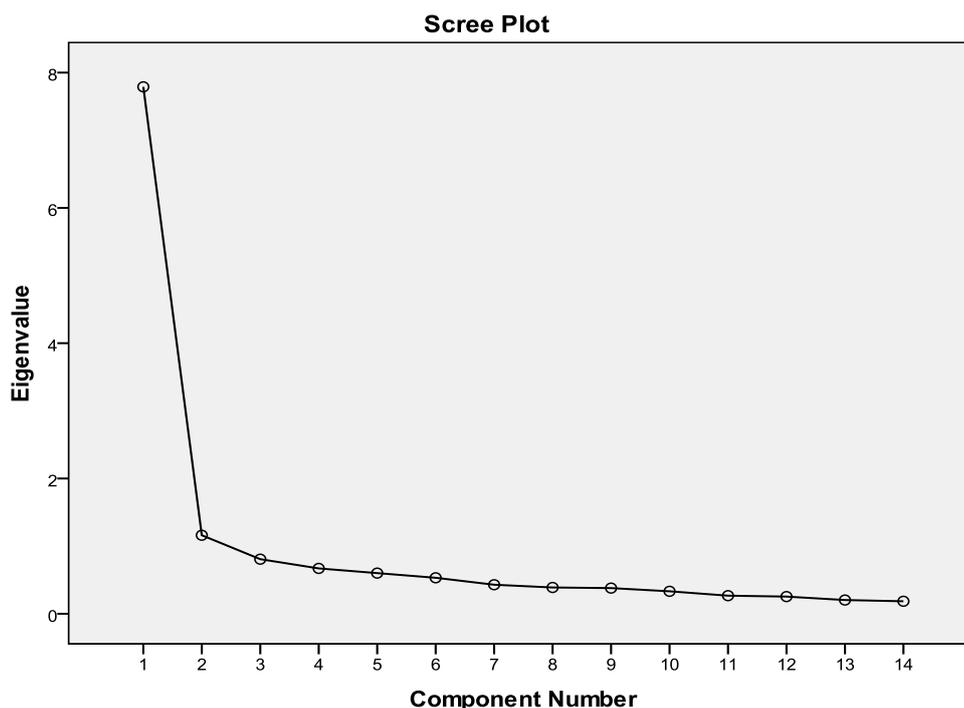
Figure 1 The scree plot of TSDRS

Table 3 Raw Data Eigenvalues, Mean, Percentile Random Data Eigenvalues of TSDRS by Monte Carlo Stimulations (n = 313)

Root	Raw data	Means	Percentile
1.000000	7.797555	1.367702	1.453023
2.000000	1.160895	1.283611	1.345628
3.000000	.807866	1.214627	1.264360
4.000000	.668611	1.158240	1.203964
5.000000	.595587	1.106972	1.147546
6.000000	.532277	1.056562	1.093909
7.000000	.427269	1.011240	1.046802
8.000000	.389166	.966598	1.001456
9.000000	.379379	.922342	.954717
10.000000	.332432	.878815	.916860
11.000000	.267500	.833062	.872878
12.000000	.253468	.786155	.825622
13.000000	.203183	.737666	.781125
14.000000	.184812	.676408	.729131

a low loading. The latent variable, Self-care behavior, explained only 4.77% of the variance of item 4 (''Neatness and maintenance activities''). This item seems to reflect a motivation of personal to perform activities daily living rather than self-care behavior. The two-factor model of the 12 items was a good fit for the data. The results of the goodness-of-fit indices were X^2 = 26.544; df = 32; X^2/df = .83; CFI = 1.00; NFI = 0.99; GFI = .96; PGFI =.40; IFI = 1.02; RMR = .15; and RMSEA = .00 (Figure 3). The Cronbach's alpha value of the firs factor was .85 and the second factor was .90.

Factor structures showed that all items were accepted. The first included three items related to self-care. ; These were labeled "self-care behavior." The second included eight variables related to social engagement and management, labeled "social performance". Three items (items 1-3) were loaded on the first factor and eight items (items 4-11) were loaded on the second factor, ranging from .64 to .87. Two factors, explained 66.22% of the total variance, were identified. Communalities in each factor ranged from .54 to .79. Factors 1 explained 56.3% and factor 2 explained 9.92% of the variance.
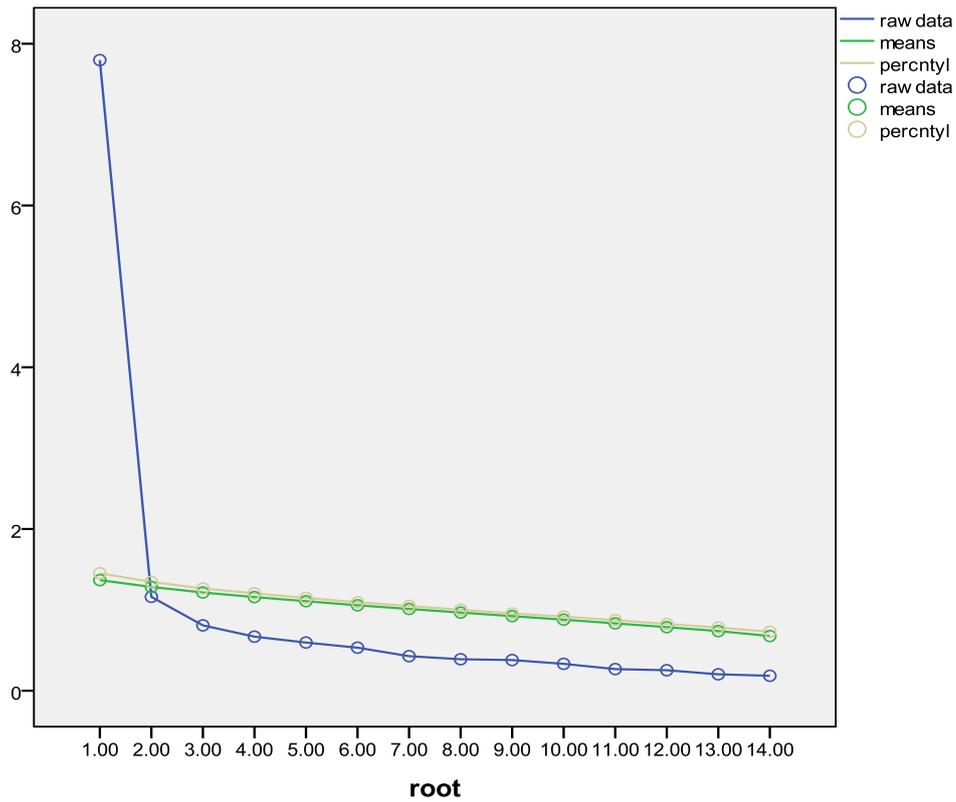
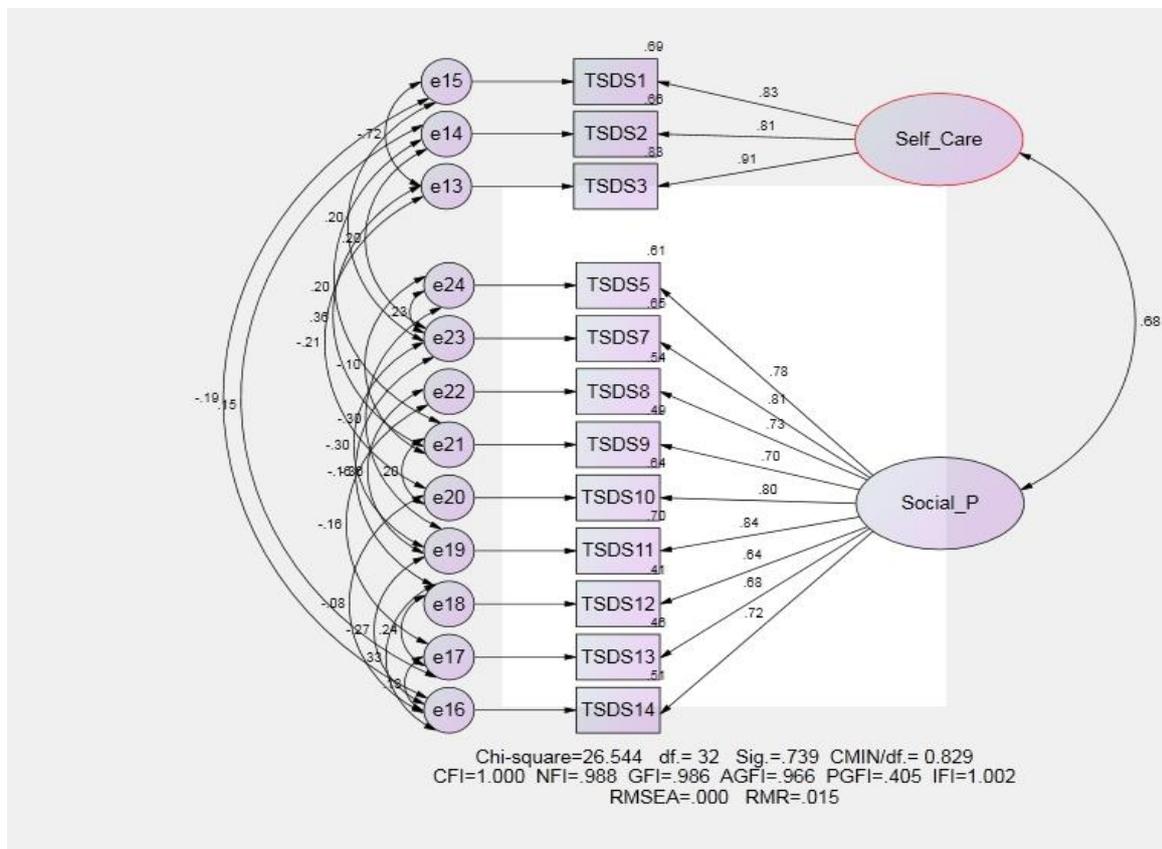**Figure 2** Scree plots of TSDRS by Monte Carlo Stimulations

Figure 3 Second-order confirmatory factor analysis of TSDRS

DISCUSSION

Analysis produced a two-factor structure accounting for 66.22% of total variance. Each of two factors identified had high internal consistency as assessed by Cronbach's alpha coefficient. All items had acceptable post-extraction communalities.

Preliminary analysis showed that the correlation coefficient ranged from .34 to .73.the Pearson correlation coefficient indicating significance value for each correlation and the determinant of this matrix was greater than .00001. Thus, multicollinearity was excluded. The KMO measure of sampling adequacy = .92. Values above .9 fell into the range of superb. This strongly suggested that factor analysis was appropriate for the data. Barlett's measure tested the null hypothesis that the original correlation matrix was an identity matrix with p<0.001, indicated that properties of the correlation matrix justified factor analysis being carried out and factor analysis was appropriate [10, 11].

Many extraction rules and approaches were used, [11] including: Kaiser's criteria, the Scree test, the cumulative percent of variance extracted, and parallel analysis (Eigenvalue Monte Carlo Simulation) [13-17]. Multiple approaches should be used in factor extraction. The result of analysis showed two factors of TSDRS.

Inspecting the Scree plot and eigenvalues produced a departure from linearity coinciding with a two-factor result. The Screetest shown that data should be analyzed for two factors (Figure 1, Figure 2, Table3).

There was high factor loading on clothing and dressing items in this analysis. Psychometric findings provided support for 12 items of TSDRS. Bartlett's test provided additional support of validity. Two tests in a two-week period and high internal consistency demonstrated that TSDRS is an instrument of stability.

CONCLUSIONS

TSDRS was found to provide sound psychometric properties and practical measurements for health care providers assessing social dysfunction in schizophrenic and methamphetamine abuse patients.

CONFLICTS OF INTEREST

None.

REFERENCES

1. Sadock B, Ruiz P, Sadock V. Kaplan &Sadock's synopsis of psychiatry: behavioral sciences/clinical psychiatry. Philadelphia: Wolters Kluwer; 2015.

2. Westermeyer J. Comorbid schizophrenia and substance abuse: a review of epidemiology and course. Am J Addict. 2006 Sep-Oct; 15(5): 345-55. doi: 10.1080/10550490600860114

3. Mohr WK. Psychiatric-mental health nursing: evidence-based concepts, skills, and practices. Philadelphia:Lippincott Williams & Wilkins; 2013.

4. Robinson DG, Woerner MG, McMeniman M, Mendelowitz A, Bilder RM. Symptomatic and functional recovery from a first episode of schizophrenia or schizoaffective disorder. Am J Psychiatry. 2004 Mar; 161(3): 473-9. doi: 10.1176/appi.ajp.161.3.473

5. Bellack AS, Green MF, Cook JA, Fenton W, Harvey PD, Heaton RK, et al. Assessment of community functioning in people with schizophrenia and other severe mental illnesses: a white paper based on an NIMH-sponsored workshop. Schizophr Bull. 2007 May; 33(3): 805-22. doi: 10.1093/schbul/sbl035

6. Yager JA, Ehmann TS. Untangling social function and social cognition: a review of concepts and measurement. Psychiatry. 2006 Spring; 69(1): 47-68. doi: 10.1521/psyc.2006.69.1.47

7. Granholm E, McQuaid JR, McClure FS, Auslander LA, Perivoliotis D, Pedrelli P, et al. A randomized, controlled trial of cognitive behavioral social skills training for middle-aged and older outpatients with chronic schizophrenia. Am J Psychiatry. 2005 Mar; 162(3): 520-9. doi: 10.1176/appi.ajp.162.3.520

8. Diagnostic and statistical manual of mental disorders: DSM-5™. 5thed. Arlington, VA American Psychiatric Publishing; 2013.

9. Field A. Discovering statistics using IBM SPSS statistics: and sex and drugs and rock 'n' roll. (4thed.). London: SAGE; 2013.

10. Tabachnick BG, Fidell LS. Using multivariate statistics. Boston: Pearson Education.; 2007.

11. Hair JF, Black WC, Babin BJ, Anderson RE, Tatham RL. Multivariate data analysis. 6thed. Upper Saddle River, NJ: Prentice-Hall International; 2010.

12. Saraswat N, Rao K, Subbakrishna DK, Gangadhar BN. The Social Occupational Functioning Scale (SOFS): a brief measure of functional status in persons with schizophrenia. Schizophr Res. 2006 Jan; 81(2-3): 301-9. doi: 10.1016/j.schres.2005.09.008

13. Kaiser HF. The Application of Electronic Computers to Factor Analysis. Educational and Psychological Measurement. 1960 Apr, 1960; 20(1): 141-51. doi: 10.1177/001316446002000116

14. Cattell RB. The screen test for the number of factors. Multivariate Behavioral Research. 1966; 1(2):245-76.

15. Horn JL. A rationale and test for the number of factors in factor analysis. Psychometrika. 1965 Jun; 30: 179-85.

16. O'Connor BP. SPSS and SAS programs for determining the number of components using parallel analysis and velicer's MAP test. Behav Res Methods InstrumComput. 2000 Aug; 32(3): 396-402.

17. Lorenzo-Seva U, Ferrando PJ. FACTOR: a computer program to fit the exploratory factor analysis model. Behav Res Methods. 2006 Feb; 38(1): 88-91.