Page et al., J Foren Psy 2018, 3:3
DOI: 10.4172/2475-319X.1000144

Journal of Forensic Psychology
ISSN: 2475-319X

Research Article Open Access

The Measurement of Substance Use in Forensic Schizophrenia Spectrum Disorders-Initial Validation of a New Scale

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Abstract

Background: Mainstream substance abuse assessment schemes do not grasp the specific consequences of substance abuse (SA) in a) schizophrenia in patients and b) forensic settings. In the current study, we present the initial validation stages of a new scale measuring substance abuse and its consequences specifically for schizophrenia spectrum disorders (SZ) in forensic settings.

Methods: This observer-rated scale was elaborated through clinical observations in a medium-secure forensic unit for SZ. This 52-item scale measures antecedents, quantitative aspects of the SA, immediate effects, reasons for use, insight, cessation attitudes, transgressions (e.g. smuggling or extortion) and consequences through all-available indications. This scale was tested in three groups of forensic patients with SZ (n=112).

Results: We found good internal consistency and interrater agreement estimates, good agreement between our scale and diagnoses of SA, moderate to strong relations with clinical functioning, risk estimates and psychopathy. Prevalences reported through this new scale are congruent with international literature. Differential patterns of scores based on substance(s) being used were observed.

Conclusions: This new scale appeared to grasp for the clinical variety of SA in forensic schizophrenia inpatients in psychometrically sound way. The instrument appeared to be user-friendly enough not to require specific training or long uptake.

Keywords: Schizophrenia; Forensic; Substance use; Cannabis; Stimulants; Psychosis

Introduction

The assessment of substance abuse (SA) has generated a considerable body of literature and a wide array of measures have been devised. However, when it comes to measuring SA in schizophrenic subjects in forensic psychiatric settings, it gets more complicated. Interaction between schizophrenia spectrum disorders (SZ) and SA has been widely investigated [1]. A generally high prevalence of SA in SZ has been reported 50% to 86% [2-4]. Several explanations have been advanced: SA creates a vulnerability for SZ, self-medication for SZ subjects, reward deficiency circuits, etc [1,2].

Clinically, it is generally accepted that SA might alleviate symptoms in the short term, but worsen the overall course of SZ. The precise pattern of the benefits and harm depends on the substances being used. For example, cocaine alleviates negative symptoms after recent use [5] but is associated with more physical health diagnoses, more frequent mental health admissions, and housing instability [4,6]. Cannabis alleviates anxious symptoms in the short term, but worsen (positive, thought disturbance and hostility) SZ symptoms afterwards, and creates a bidirectional association between the likelihood of SA and symptom severity in the long run [7]. Beside effects on symptoms, cannabis use was associated with higher rates of psychotic relapse [8], and appeared to consolidate transient psychoses into SZ [4,6]. In general, SA in SZ has also been associated with non-compliance [9] and higher rates of readmissions [10].

In forensic context, the assessment of SA is especially important given its precipitating effect for violence [11,12]. The complex intertwinement between SZ, SA and violence outreaches the scope of this article, but differentiating the pathways to violence is crucial. Summarily stated: some forensic patients have a longstanding history of antisocial behavior where SA and SZ came after the onset of violence so called "early starters" [13]. Oppositely, "late starters" have SZ (and SA) prior to violence. SA might also lead indirectly to criminogenic environments, which in turns augments the likelihood of violence which is closer to "early starters" [11]. SA might directly exacerbate delusions or hostility, diminish the effectiveness of medication, and lead to violence (which is likelier for "late starters"). Therefore, an assessment of SA in forensic SZ should record antecedents in order to differentiate pathways to violence. Antecedents are closely linked to behavioral and lifestyle psychopathic traits [14,15].

Monitoring and assessing SA in forensic schizophrenic subjects has specific implications that would not be measured in substance-focused questionnaires. These include breaking hospital rules by smuggling substances, trafficking, jeopardizing treatment progression, augment violence, etc. In Belgium, as in many other countries, forensic patients are often on conditional release when they enter care and when they are rehabilitated in community settings. This conditional release can be revoked if SA is detected, or if SA ushers an infringement release conditions (e.g. violence, skipping probation, etc.).

Aim and formal hypotheses

Our aim is to create a reliable and valid scale assessing substance use in forensic schizophrenia spectrum patients. Our new scale should accurately identify SA in SZ patients, and patients identified as such

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Received July 18, 2018; **Accepted** July 31, 2018; **Published** August 13, 2018

Citation: Page LD, Boursoit R, Titeca P (2018) The Measurement of Substance Use in Forensic Schizophrenia Spectrum Disorders-Initial Validation of a New Scale. J Foren Psy 3: 144. doi: 10.4172/2475-319X.1000144

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would show the following characteristics (based on international literature):

a) Higher symptoms scores and less functional and cognitive capabilities,

b) Higher actuarial and dynamic risk estimates, and less protective factors,

c) Higher psychopathy scores, especially behavioral and lifestyle aspects of psychopathy, and

d) Higher rates of institutional violence.

Methods

Participants

Three units of the medium-secure forensic hospital specialized in treating forensic schizophreniform patients contributed to this study. Description of the three samples and diagnostic information (as formulated by the treating psychiatrist based upon the DSM-IV-TR [16] are presented in Table 1. Applicable ethical guidelines concerning data collection and privacy were duly observed. This research was approved by the ethics supervisors of the hospital.

Literature search strategy: We searched the following electronic databases; Scopus, PubMed, Web of Science and Cochrane Central Register of Controlled Trials (CENTRAL). The search of the key terms was performed using the OR and AND functions and database-specific filters were used where these are available. The searches were conducted between April and May 2017. The key terms used in the search were: "Psycho-educational intervention" OR "Psycho-education" AND "anxiety disorders" AND "adults". Additional searches included AND "specific phobia", "social anxiety disorder (social phobia)", "panic disorder", "agoraphobia" and "generalized anxiety disorder". The reference lists of included articles were screened manually to identify additional studies associated with the aim of the review. Due to the small sample size, the year of publication defined in the protocol was extended from 2000 to 2017. All included articles were written in English.

Measures and data collection

Scale for SA in SZ in forensic hospital: This study emerged from the rehabilitative ward group 1, described in Table 2. About 180 items were formulated based on clinical discussions, expert interviews, file study, staff observations and literature study. These were classified in twelve subscales based on content. Instead of embarking in non-clinical fact-finding, we asked raters to rate patients according to all available information on a three point Likert scale (0 "No indication", 1 "Moderate indications", 2 "Strong indications"). After several iterations of basic scale analyses (dropping redundant items, never endorsed items), we arrived at 52 items, with 8 categories (Table 2). The total score was obtained by summing all scales except the scales pertaining to past SA and cessation. Only nursing personnel completed this scale (except for a few psychologists in group 1). Nursing personnel could not choose which patient they rated to augment stringency of "available information" criterion.

Group 2 and 3 were included at a later stage in data collection. Nursing staffs of group 2 and 3 were asked to complete our new scale twice, blindly, at the same moment, without any specific training or instructions as to assess reliability and ecological validity outside the rehabilitative ward (Group 1).

Concurrent psychometric data: Because the rehabilitative unit has a routine outcome monitoring program, we have concurrent data regarding clinical functioning, risk assessment and psychopathy for group 1 (and some individuals of the other groups). Unless otherwise specified, we will use the averaged total score of the following instruments (all collected during their stay).

Clinical functioning was measured by the PANSS Positive, Negative and General Symptoms scales [17]. Functional capabilities were assessed by the Functional Remission of General Schizophrenia (FROGS) [18] and cognitive functioning by the Screen for Cognitive Impairment in Psychiatry (SCIP) [19].

Risk for violence was estimated using the HCR-20(-V3) [20], the Short Term Assessment of Risk and Treatability (START) [21] and the Violence Risk Appraisal Guide (VRAG) [22]. Actuarial risk for violence was measured by the VRAG and the Historical scale of the HCR-20. Dynamic risk for violence was measured by the HCR-20 Clinical and Risk scales, and by the START Vulnerability and Risk scales. Protective factors were assessed by the SAProF [23] Internal, Motivational and External scales, and by the START Resources scale. Psychopathy was assessed by the Psychopathy Checklist-Revised (PCL-R) Factor 1 and factor 2 scales (Hare, 1991).

Institutional behavior: Nursing staffs are required to continuously record the occurrence of 15 aggressive or otherwise offensive behaviors (e.g. violence, threatening attitudes, sexual disinhibition, etc.). The total count and weighted score of recorded behaviors 10 and 20 days after assessment were collected for this study.

Statistical analyses

Reliability was assessed for all SA patients and for each group separately using Chronbach's alpha and Intra-Class Coefficients (ICC). Only SA patients were subjected to ICC analyses to prevent positively inflating results because non-SA patients would consistently obtain a majority of "0". Chronbach's alpha values >.70 were considered acceptable [24]. ICC values were interpreted as follows: >.50 moderate, >.70 good, >.90 excellent [25]. We used Receiver Operating Curve analysis to set a cut-off for the total score. This allows to set a cut-off

Group		N	Age (mean, SD)	Primary Axis I	SUB	Axis II	GAF (mean, SD)
1	Rehabilitative ward[1]	55	37.63, 10.72	SzPar[3] 51%	55%	40%	36, 12
2	Psychiatric Intensive Care Unit[1]	27	32.48, 12.07	SzPar[3] 55%	67%	41%	20, 6
3	Long stay[2]	30	36.65, 10.56	SzPar[3] 60%	4	23%	31, 10
Total		112	35.80, 11.59	SzPar 56%	58%	36%	30, 12

1: All male, 2: 17% female, 3: SzPar=Schizophrenia, Paranoid Type. Other diagnose include schizo-affective disorder, disorganized or undifferentiated schizophrenia, 4) could not be recorded for the whole sample

Table 1: Sample description and DSM-IV-TR diagnostic information

Subscale	No of items	Examples
Antecedents	5	Has the patient been hospitalized for SUB before. Has the patient been arrested for substance related offense.
Quantities[1,2]	5	Patients appears to use substances nearly every day/several times a week/several times a month. Staff considers SUB slightly/moderately/strongly problematic.
Immediate effects[1,2]	10	Becomes aggressive, impulsive or violent when he has used. Becomes paranoid, hallucinated, or delusional when he has used. Becomes emotionally labile when he has used.
Reasons for use[1,2]	9	Uses drugs for relaxing, feeling good, … Uses drugs to escape affects, distancing himself, … Attempts to self-medicate through SUB
Lack of Insight[1,2]	5	Has no regret concerning his SUB. Does not understand SUB triggers. Underestimates the effect on his mental state.
Cessation[1]	4	Shows withdrawal symptoms. Has attempted to quit.
SUB related transgressions[1,2]	5	Has smuggled substances into the hospital. Has racketed other patients to get his drugs.
Consequences of drug use[1,2]	9	Has had health issues due to his SUB. Has been rejected by family or friends due to his SUB. Has been denied permissions due to his SUB.

1: In the last six months, or since admission admitted if admitted less than 6 months ago. 2: Scale included in total score. The questionnaire is available upon request (in French only at this stage).

Table 2: Subscales description and item content.

based on the presence of DSM-IV-TR SA diagnosis with information regarding specificity and sensitivity [26]. Concurrent validity was examined using analyses of variance using the presence a SA based on the cut-off as an independent variable. Eta squared effect sizes (η^2) were used and interpreted as follows >.01 small, >.059 moderate, et >.143 large effect [27]. We used Pearson correlation to find linear relations between the subscales of our new instrument and the concurrent psychometric data. Correlations were interpreted as follows: >.10 small, >.30 moderate, and >.50 large [27].

Results

Reliability

Cronbach's α internal consistency estimates for the total group the subscales ranged from .70 (reasons for use) to .88 (Consequences). Average Chronbach's α for each group were .78, .79 and .84 respectively. The lowest Chronbach's α was for "Reasons for use" in the third group (.69).

ICC values were also good (.67 [Antecedents]-.84 [Quantity]) except for the Transgression scale (.23). There are no significant differences in Chronbach's α or ICC between groups. This indicated that the instrument was user-friendly enough and did not require training or a long uptake.

ROC analysis

The ROC analysis for the total score as to the presence of a DSM-IV(-TR) SA diagnosis indicated an Area Under the Curve of .96, which means a good agreement between both variables. Optimal balance between sensitivity (.91) and Specificity (.94) was found at raw score of 6 on the total score.

Concurrent validity

Clinical functioning: Substance abuse patients had higher positive symptom scores (PANSS: $F(1,73)=5.33$, $p=0.02$, $\eta^2=.07$), less functional capabilities (FROGS: $F(1,54)=5.48$, $p=.02$, $\eta^2=.09$), and more cognitive impairments (SCIP: $F(1,47)=6.79$, $p=.01$, $\eta^2=.12$). We did not find differences in negative or general SZ symptoms in SA patients. We found moderate negative associations between functional capabilities and many SA subscales, and a few small negative correlations with cognitive capabilities. Although effect size range from moderate to strong for difference between SA and no SA patients, patterns of linear relations (correlations) between SA and clinical functioning are feeble.

Risk estimates: Patients classified as substance abuser by our scale obtained higher actuarial and dynamic risk for violence estimates (VRAG: $F(1,44)=9.08$, $p<.01$, $\eta^2=.21$; HCR-20-H: $F(1,41)=4.69$, $p=.04$, $\eta^2=.11$; HCR-20-R: $F(1,41)=4.15$, $p=.05$, $\eta^2=.10$; START-V: $F(1,71)=6.60$, $p=.01$, $\eta^2=.09$; START-R: $F(1,71)=12.48$, $p<.01$, $\eta^2=.17$) and lower internal and motivational protective factors (SAProF-I: $F(1,45)=11.93$, $p<.01$, $\eta^2=.26$; SAProF-M: $F(1,45)=7.29$, $p=01$, $\eta^2=.16$). We found numerous moderate to large correlations between our SA scale and risk assessment tools (Table 3). Although there we only small linear associations between SA scores and clinical functioning (cfr 3.3.1), we did find high correlations between SA scores and all variant of risk assessments.

Psychopathy: Patients with classified as substance abuse patients with the derived cutoff obtained higher scores on PCL-R factor 2 ($F(1,47)=x$, $p<.01$, $\eta^2=.17$). No difference for factor 1 was observed. All SA subscales, except Cessation, correlated moderately to strongly with PCL-R factor 2 (r ranging from .30 [Insight] to .57 [Transgression]).

Institutional behavior: We did not find significant differences in institutional behavior if analyses were not separated by group. We found significantly more aggressive behavior after 20 days in group 1 ($F(1,42)=8.44$, $p<.01$, $\eta^2=.22$), but this finding did not generalize to the others groups. The same was true for correlations: 6 of the 8 subscales correlated moderately to strongly with aggressive behavior 20 days after assessment (r ranging from .38 [Consequences] to .53 [Insight]). ANOVA results and correlations in other groups were either null or inconsistent.

Substance abuse profiles in Sz

According to our new scale, cannabis was the most prominent substance used (54%), followed by alcohol (38%), and cocaine (16%). Polysubstance use was reported in 38% of patients. Those prevalences are

	VRAG Total	HCR-20 Histor.	HCR-20 Clinical	HCR-20 Risk	START Vulner.	START Risk	START Resourc.	SAProF Intern.	SAProF Motiv.	SAProF Extern.
n	46	43	43	43	72	72	72	47	47	47
Antecedents	.55**	0.29	-0.06	-0.01	0	0.22	-0.04	-0.19	0.04	0.06
Quantities	.51**	0.26	.37*	.30*	.28*	.43**	-.23*	-.48**	-.43**	-0.21
Immediate effects	.38**	0.07	.41**	.40**	.34**	.45**	-.25*	-.39**	-.35*	-0.01
Reasons for use	.42**	0.24	.37*	.33*	.25*	.48**	-0.16	-.35*	-.39**	-0.14
Lack of Insight	0.23	0.25	.41**	.34*	.31**	.42**	-0.21	-.43**	-.46**	-0.14
Cessation	0.15	-0.12	-0.08	-0.15	0.2	.34**	-0.19	0.03	0.03	0.2
Transgressions	.49**	.32*	.38*	.48**	.29*	.38**	-.25*	-.42**	-.40**	-.30*
Consequences	.43**	.32*	.36*	.32*	.32**	.51**	-.28*	-.42**	-.48**	-0.19
Total	.49**	.30*	.45**	.42**	.33**	.52**	-.25*	-.49**	-.48**	-0.19

*p<.05, **p<.01.

Table 3: Correlations between SUB and risk for violence estimates

in line with international literature. Perhaps noteworthy, psychogenic polydipsia was reported in 4% of our sample.

Although the current sample might be too small, we attempted a MANOVA in search for distinct patterns of influence of substance used on subscale scores. Results indicated main effects of alcohol ($F(6,103)=8.21$, $p<.01$, Wilks' Λ $=.68$, $\eta^2=.32$) and cannabis ($F(6,103)=6.412$, $p<.01$, Wilks' Λ $=.73$, $\eta^2=.27$) on the subscales included in the Total Score. Interaction effects cannabis and alcohol were also significant ($F(6,103)=2.88$, $p=.01$, Wilks' Λ $=.86$, $\eta^2=.14$). For example, both mains effects and an interaction effect of Alcohol and Cannabis were observed on 'Reasons for use' (Figure 1). Overall MANOVA results indicated that a) alcohol seemed to be seen slightly more problematic than cannabis use; b) distinct profiles of SA patients exist within the SZ population.

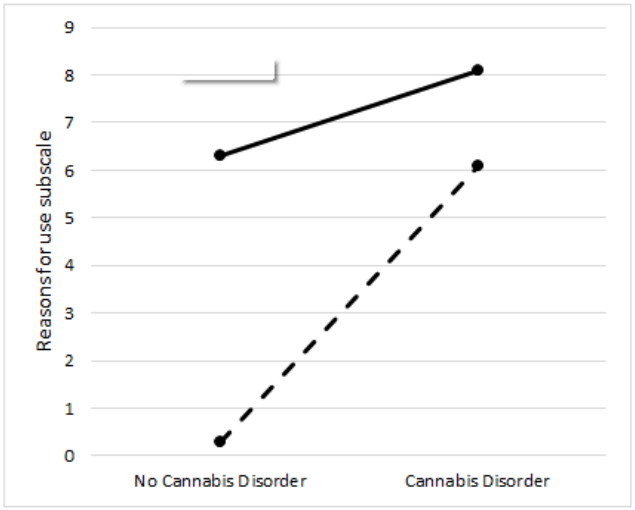

Figure 1: Main effects of alcohol and cannabis on the 'Reasons for use' subscale, as well as an interaction effect. Continuous line=alcohol abuse patients. Dashed line=no alcohol abuse

Discussion

In this study, we presented the initial validation analyses of a new SA measure for forensic SZ patients. Its subscales had good overall internal consistency and inter-rater reliability (except for the Transgression subscale), even when completed by nursing staff without training or preparation. Preliminary concurrent validity analyses confirmed most of our hypotheses. Patients identified as substance abuse patients through our new scale obtained higher positive SZ symptoms scores, less functional and cognitive capabilities, less protective factors for violence, more static and dynamic risk factors for violence, higher psychopathic lifestyle. Associations between our new scale and institutional violence appeared to be ambiguous (cfr. herein under).

The prevalences collected through our new assessment tool were congruent with international literature. Cannabis was the number one, followed by alcohol and cocaine. Lastly, and perhaps statistically marginal, is the recording of 4% of our total sample with polydipsia (excessive drinking, or "self-induced water intoxication"), which is congruent with Dundas et al. review [28]. Although clinically relevant, it is unlikely that polydipsia fosters the same patterns of violence as cannabis or alcohol.

Associations between our measure and institutional behavior were inconsistent across groups. It was hypothesized that difference in completion of the institutional behavior report might have influenced results. One group seemed to underreport institutional behavior. Standardizing procedures to measure institutional behavior across groups appeared to be necessary in order to produce relevant results. The ability of our scale to (linearly) predict aggressive or offensive behavior remains a crucial criterion to be assessed.

Beside its specific design for forensic schizophrenic populations, our new scale has the main advantage of allowing nuances by not focusing on quantitative aspects. An alcohol abuse might be problematic because of its enduring nature and its consequences, thus warranting a SA diagnosis. But an occasional cannabis abuse might be even more problematic if it induces threatening delusions and reactive violence. Given the life-time nature of SA diagnoses in (forensic) SZ populations, it is perhaps wiser to measure individual differences in consequences of SA and aim for harm reduction rather than complete abstinence.

Future perspective

Reworking several subscales (e.g. Transgression and Antecedents) will be necessary to achieve acceptable reliability and internal consistency. Future analyses should explore SA profiles more in depth.

Our current sample did not allow for an in-depth study of SA profiles according to the qualitative nature of the SA. Future studies should also include variables such as medication, treatment compliance and age of onset of both SA and SZ.

Limitations

The lack of women in our samples might have biased scale construction and concurrent validity analyses. Gender differences in SA in SZ have been reported [29,30].

SA related behavior, especially smuggling, are obviously difficult to record but clinically and legally relevant. Therefore, staffs might have had a blind spot for ingenious substance abuse patients or "successful" dealers, who might not have been detected in our sample.

Conclusions

Our new scale for the assessment of SA in forensic SZ patients shows promising results in terms of internal consistency, inter-rater reliability, and concurrent validity. The instrument appeared to be user-friendly enough not to require specific training or long uptake.

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