Dual Diagnosis Screening Interview to Identify Psychiatric Comorbidity in Substance Users: Development and Validation of a Brief Instrument

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Abstract

Aim: The objective of this study was to develop and validate a brief tool, the Dual Diagnosis Screening Instrument (DDSI), to screen psychiatric disorders in substance users in treatment and nontreatment-seeking samples. *Methods:* A total of 827 substance users (66.5% male, mean age 28.6 ± 9.9 years) recruited in treatment (in- and outpatient) and nontreatment (substance user volunteers in university research studies) settings were assessed by trained interviewers using the DDSI and the Psychiatric Research Interview for Substance and Mental Disorders (PRISM) as the criterion standard. Both instruments were administered blind to the results of the other. Disorders obtained with the DDSI were compared to lifetime diagnoses obtained with the PRISM. Sensitivity, specificity, negative, and positive predictive values were estimated. Also test-retest reliability of the DDSI was assessed. *Results:* The DDSI showed a high sensitivity (≥80%) for identifying lifetime depression, mania, psychosis, panic, social phobia, and specific phobia disorders. Specificity was ≥82% for those diagnoses. Test-retest κ showed excellent agreement (range 81–95%). The mean duration of the DDSI administration was 16.8 ± 2.5 min. *Conclusion:* The DDSI is a valid and easy-to-administer screening tool to detect possible psychiatric comorbidity among substance users.

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Introduction

To identify psychiatric comorbidity among individuals with substance use disorders (SUDs) is an area of great clinical and public health interest. Drug users with other psychiatric comorbid disorders have more emergency admissions, higher prevalence of suicide, medical conditions (e.g. HIV and HCV infection) and social problems than those who have only SUDs or other psychiatric diagnoses [1]. Moreover, the treatment of SUD patients with comorbid psychiatric disorders is considered more complex and with poorer prognosis [2]. Thus, the correct detection of other psychiatric conditions among substance users is crucial to adequately manage these patients.

Among others (e.g. Semi-Structured Assessment for Drug Dependence and Alcoholism (SSADDA) [3]), the Psychiatric Research Interview for Substance and Mental Disorders (PRISM) is an interview specifically designed to evaluate psychiatric comorbidity among substance us-

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ers that has shown good psychometric properties in terms of validity [4] and reliability [5, 6]. Although the PRISM could be considered as a gold standard to evaluate psychiatric comorbidity among substance users, its use is primarily meant for research purposes. Its administration in routine practice in community health facilities is often not feasible, due to its length and the need of a trained professional to administer it. Furthermore, in the context of new scenarios, beside traditional out- and inpatient facilities, where substance users are managed, there is a need of valid screening instruments to detect co-occurring psychiatric disorders among people with SUDs [7].

At present different screening instruments for psychiatric diagnoses are available, but few have been developed and validated to evaluate psychiatric comorbidities among subjects with SUDs. The Mini-International Neuropsychiatric Interview (MINI) and its short version [8] the Primary Care Evaluation of Mental Disorders (PRIME-MD) [9], and the SDDS-PC [10] have not been validated in substance-abusing populations. Moreover, the performance of the Psychiatric Diagnostic Screening Questionnaire (PDSQ) [11] was assessed among a sample of 1,000 psychiatric outpatients but only 13% of them had a SUD, mostly alcohol-use disorders. Later the PDSQ was validated in different samples of substance users with controversial results [12–14]. The Boston Consortium of Services for Families in Recovery (BCSFR) instrument [15] was tested only in female substance abusers and was found to be a useful screening instrument for detecting posttraumatic stress disorder (PTSD) in women beginning treatment, but not for detecting other mental illnesses. The Patient Health Questionnaire (PHQ) [16] has only been validated for depression in substance users [17]. Others like the Mental Health Screening Form (MHSF-III) have limited validation [18] or have been validated in prison substance-abuse treatment programs, as the Co-Occurring Disorders Screening Instruments (CODSI-MD and CODSI-SMD) [19].

In such a context, we decided to study the validity of the screening section of the World Health Organization's Composite International Diagnostic Interview (S-CIDI). This instrument was used in the European Study on Epidemiology of Mental Disorders (ESEMeD), which is part of the World Mental Health (WMH) study [20]. A positive response to any of the screening questions leads to the completion of the CIDI section for the specific disorder prompted by that question. The S-CIDI was first developed in English and underwent a rigorous process of adaptation in order to obtain conceptually and cross-culturally comparable versions in different languages, in-

Table 1. Correspondence between PRISM diagnoses and DDSI disorders

PRISM	DDSI
Depression Induced depression	Depression
Dysthymia	Dysthymia
Manic episode Bipolar I disorder Hypomanic episode	Mania
Schizophrenia Schizophreniform disorder Schizoaffective disorder Delusional disorder Brief psychotic disorder Psychotic disorder not otherwise specified Induced psychosis	Psychosis
Panic disorder with/without agoraphobia	Panic disorder
Agoraphobia	Agoraphobia
Simple phobia	Simple phobia
Social phobia	Social phobia
Generalized anxiety disorder	Generalized anxiety disorder
Posttraumatic stress disorder	Posttraumatic stress disorder

Attention deficit hyperactivity
    disorder
	Attention deficit hyperactivity
	    disorder

cluding Spanish. In a preliminary study, we assessed the validity of the Spanish version of the S-CIDI for detecting lifetime psychiatric disorders in substance abusers, using the DSM-IV-TR diagnoses obtained by the PRISM (table 1) as the criterion standard. The sensitivity of the S-CIDI interview ranged from 50% (psychosis) to 100% (depression, panic disorder, and simple phobia) and the specificity ranged from 11% (depression) to 74% (psychosis) [21]. Such poor results did not support the use of S-CIDI as a screening instrument to detect psychiatric disorders among substance users. To improve the psychometric properties of S-CIDI, a number of modifications were introduced, leading to the development of the Dual Diagnosis Screening Instrument (DDSI) presented in this paper.

The purpose of the present study was to develop and determine the validity of the DDSI to detect lifetime psychiatric disorders among a wide range of substance users,

both in treatment (in- and outpatients) and nontreatment settings (substance user volunteers in university research studies), compared with DSM-IV-TR diagnoses assessed by the PRISM as the criterion standard.

Methods

The study was approved by the Ethical Committee of Clinical Research of the Institution (No. 2005/2148/I). All subjects who participated signed their informed consent to participate after receiving oral and written information about the study.

Participants

A total of 827 substance users subsequently recruited for other research projects coordinated by our group were studied from January 2006 to October 2010. Inclusion criteria for our purposes were age of ≥18 years and accepting to participate. Subjects included in the study were recruited for participation in different research projects in the drug-abuse field. These projects were developed either in outpatient treatment settings (community drug-abuse treatment centers, specific programs such as PTSD and attention deficit and hyperactivity disorder (ADHD) clinics), inpatient treatment settings (hospital detoxification units and dual diagnosis units) and nontreatment settings (substance user volunteers in university research studies) [22–26].

The sample size was estimated taking into account a desired sensitivity of 85% (±5%) and prevalence rates of psychiatric comorbidity in the Spanish substance user population which range from 43 to 67% [27]. Subjects were excluded from the study if they could not read or understand Spanish, had severe cognitive impairment, or any medical disorder that would interfere with the administration of the research instruments.

Instruments
Spanish PRISM

Substance use and nonsubstance-use disorders were diagnosed according to DSM-IV-TR criteria using the Spanish version of PRISM [4]. The PRISM is a semistructured interview that assesses the following disorders: (1) SUDs: substance abuse and dependence for alcohol, cannabis, hallucinogens, licit and illicit opiates, and stimulants; (2) primary mood disorders, including major depression, manic episode (and bipolar I disorder), psychotic mood disorders, hypomanic episode (and bipolar II disorder), dysthymia, and cyclothymic disorders; (3) primary anxiety disorders, including panic, simple phobia, social phobia, agoraphobia, obsessive-compulsive disorder, generalized anxiety disorder, and PTSD; (4) primary psychotic disorders, including schizophrenia, schizoaffective disorder, and psychotic disorder not otherwise specified; (5) eating disorders, including anorexia, bulimia, and binge-eating disorders; (6) substance induced disorders, including major depression, mania, dysthymia, psychosis, panic disorder and generalized anxiety disorder, and (7) personality disorders including antisocial and borderline disorders. Furthermore, to assess the presence of ADHD, a new PRISM section with good psychometric properties was developed [28]. The PRISM was designed to provide clear guidelines for differentiating between the expected effects of intoxication and withdrawal, substance-induced disorders, and primary disorders. Interviewers received an intensive training course of approximately 60 h, of which 20 h were on-site.

Development of the DSSI

The DDSI was developed from an adaptation of the S-CIDI. The original interview S-CIDI was progressively modified by introducing, removing and changing some questions and the subsequent adaptation of diagnostic algorithms. Changes were conducted to tighten the assessment criteria while attempting to maintain its brevity and quick administration. These modifications reached a consensus in periodical multidisciplinary meetings, where the preliminary results were evaluated taking into account DSM-IV-TR criteria and the expertise of the group members. Subsequent versions (S-CIDI-Tox v1 to S-CIDI-Tox v4 and DDSI) were administered in succession during the 5-year duration of the study. For example, to achieve better results for psychosis detection, the S-CIDI section was modified by splitting questions to collect more specific information, i.e. taking into account symptoms under influence of substances and without its influence. In the case of depression, in the S-CIDI, subjects were asked whether they had ever experienced a period of several days with at least one of the following symptoms: 'feeling of sadness', 'discouragement', or 'loss of interest'. One affirmative answer in any of these items implied a positive screening result. In the same preliminary study, the results for depression showed 100% sensitivity but only 11% specificity with the S-CIDI. To improve these results, this section was modified by: (1) increasing the duration criteria of the three symptoms of the original questions (the symptom had to last at least 2 weeks), (2) asking always the three initial questions ('feeling of sadness', 'discouragement', or 'loss of interest'), and (3) adding questions referring to major depression symptoms. Namely, symptoms not directly related to pharmacological effects of any drug or associated lifestyle such as described in section A of the diagnostic criteria of DSM-IV-TR: 'feeling tired or lack energy', 'difficulty concentrating', 'loss of self-confidence/sense of futility', and 'thoughts of death'.

As a result of these progressive changes during the development of the instrument, the number of subjects tested for the different conditions with the corresponding section in the final version of the instrument were not the same (psychosis and social phobia n = 827, mania n = 636, depression and panic n = 632, simple phobia n = 434). Still, some conditions need to undergo further assessments to be validated: dysthymia, agoraphobia and generalized anxiety disorder. In the case of ADHD and PTSD (n = 56 and 61, respectively) preliminary results are provided. Table 1 illustrates the correspondence between DDSI-screened disorders and diagnoses obtained by the PRISM. The time framework was lifetime.

The DDSI is a structured screening interview, hence all the questions are asked by verbatim reading. This ensures that different professionals working in nonspecialized settings and community health facilities (e.g. nurses, social workers, etc.) can administer the interview with a high level of standardization. The DDSI was administered by professionals (psychologists and nurses) who previously received a standard training that lasted about 2 h. The PRISM was administered by trained psychologists.

Procedure

After signing informed consent, consensus was reached about day, time and site to carry out the DDSI and the PRISM interviews (in this order). Each instrument (the DDSI and the PRISM) was ad-

Table 2. Sociodemographic data of the sample (n = 827) divided by groups

	Treatment settings		Nontreatment settings	p value*
	inpatients, % n = 172	outpatients, % n = 196	research volunteers, % n = 459	
Age (±SD)	38.9±9.9	32.3±9.2	23.1±3.6	<0.001
Men	118 (68.6)	125 (63.8)	307 (66.9)	0.559
Marital status				<0.001
Single	85 (49.4)	58 (29.6)	430 (93.7)	
Married/couple	54 (31.4)	71 (36.2)	22 (4.8)	
Divorced	33 (19.2)	67 (34.2)	7 (1.5)	
Education, years (±SD)	10.1±1	11.48±1.2	14.8±1.3	<0.001
Arrested	40 (23.3)	50 (25.5)	34 (7.4)	<0.001
Work				<0.001
Working	44 (25.6)	60 (30.6)	184 (40.1)	
Unemployed	70 (40.7)	87 (44.4)	74 (16.1)	
Studying	8 (4.6)	5 (2.6)	195 (42.5)	
Disability/retired/sick leave	50 (29.1)	44 (22.5)	6 (1.3)	

* p values correspond to ANOVA and χ^2 test, depending on whether the variables compared were quantitative or qualitative.

ministered in person by trained independent research interviewers blind to the results of the other. All interviewers received the same training and adhered to the same protocol regarding contacting the subjects and administration of the interviews. The interval between the administrations of both instruments ranged from 0 to 5 days.

Statistical Analyses

Results obtained through DDSI were compared with those obtained through PRISM. The sensitivity, specificity, positive and negative predictive values for each DDSI disorder were calculated. Diagnoses with a prevalence lower than 10 cases according to PRISM were not analyzed.

The DDSI test-retest reliability was assessed in a sample of 30 outpatients, not included in the validation study, who were evaluated twice by the same interviewer in a 15-day interval. The Cohen's κ coefficient of agreement for dichotomous variables were calculated and interpreted under standard criteria [29]: ≥0.75 indicates excellent reliability, 0.40–0.74 fair to good reliability, and ≤0.39 poor reliability.

Results

Participants

A total of 827 subjects (66.5% male) with a mean age of 28.6 years (SD 9.9) were assessed. On average, subjects had 13 (SD 3.3) years of education; over one third were working (34.8%), 27.9% were unemployed, and the rest were studying, receiving temporary/permanent disability pensions or were retired. More than two thirds (69.3%) were single, 17.8% were married or cohabiting, and 12.9% were separated, divorced or widowed. 15% had been imprisoned at least once in their lives. The sociodemographic characteristics of the sample according to recruitment sites are shown in table 2, and lifetime psychiatric and substance-use diagnoses, according to DSM-IV-TR criteria obtained by PRISM, are reported in table 3.

DDSI Instrument

The final version of the DDSI has been computerized and has a total of 63 items that screen the following disorders: panic disorder (3 items), generalized anxiety disorder (3 items), specific phobia (7 items), social phobia (2 items), agoraphobia (2 items), depression (7 items), dysthymia (2 items), mania (5 items), psychosis (24 items), ADHD (6 items), and PTSD (2 items). In each group of questions there are skips that can reduce the interview to 28 items.

At the end of the administration the program generates a PDF file (Adobe® Acrobat® X) with identification data and DDSI disorders. All data entered remain stored in an Excel spreadsheet (Microsoft®) to facilitate data management. The instrument is available both in Spanish and in English after being translated from Spanish by a bilingual research translator (whose native language was Spanish) and back-translated by one experienced bilingual research translator (whose native language was English). The DDSI

Table 3. Lifetime PRISM diagnoses by recruitment sites

| | Treatment settings | | | | Nontreatment settings | | Total | |
| | inpatients | | outpatients | | research volunteers | | | |
	n cases/% (95% CI)	n assessed	n cases/% (95% CI)	n assessed	n cases/% (95% CI)	n assessed	% (95% CI)	n assessed
Depression	65/37.8 (30.9–45.2)	172	37/31.1 (23.5–39.9)	119	57/16.7 (13.1–21.0)	341	25.2 (21.9–28.7)	632
Mania	8/4.65 (2.4–8.9)	172	3/2.5 (0.9–7.1)	119	2/0.6 (0.02–2.1)	341	2.1 (1.2–3.5)	632
Panic	11/6.4 (3.6–11.1)	172	7/5.9 (2.9–11.6)	119	2/0.6 (0.02–2.1)	341	3.2 (2.1–4.8)	632
Social phobia	8/4.65 (2.4–8.9)	172	5/2.5 (0.1–5.8)	196	0	459	1.6 (0.9–2.7)	827
Simple phobia	6/7.1 (3.3–14.7)	84	3/3.8 (0.1–10.7)	78	2/0.74 (0.02–2.6)	272	2.5 (1.4–4.5)	434
Psychosis	38/22.1 (16.5–28.9)	172	19/9.7 (6.3–14.6)	196	8/1.74 (0.89–3.4)	459	7.9 (6.2–9.9)	827
ADHD	–	–	9/37.5 (21.2–57.3)	24	6/18.75 (8.9–35.3)	32	26.8 (17–39.6)	56
PTSD	–	–	14/41.2 (26.4–57.8)	34	0	27	23.0 (14.2–34.9)	61
Alcohol	98/57 (49.5–64.1)	172	102/52.0 (45.1–58.9)	196	109/23.7 (20.1–27.8)	459	37.4 (34.2–40.7)	827
Cannabis	62/36.1 (29.2–43.4)	172	49/25 (19.5–31.5)	196	195/42.5 (38.0–47.0)	459	37.0 (33.8–40.3)	827
Cocaine	85/49.4 (42.0–56.8)	172	88/44.9 (38.1–51.9)	196	95/20.70 (17.2–24.6)	459	32.4 (29.3–35.7)	827
Opioids (heroin, methadone)	35/20.35 (15.0–27)	172	89/45.4 (38.6–52.4)	196	15/3.3 (2.0–5.3)	459	16.8 (14.4–19.5)	827
Hallucinogens	5/2.91 (1.2–6.6)	172	16/8.2 (5.1–12.8)	196	16/3.5 (2.2–5.6)	459	4.5 (3.3–6.1)	827
Sedatives	36/20.9 (15.5–27.6)	172	30/15.3 (10.9–21.0)	196	4/0.9 (0.3–2.2)	459	8.5 (6.7–10.6)	827
Stimulants	14/8.1 (4.9–13.2)	172	20/10.2 (6.7–15.2)	196	26/5.7 (3.9–8.2)	459	7.2 (5.7–9.2)	827

Table 4. Psychometric properties of the DDSI

Disorder (n)	TN	FN	FP	TP	Sensitivity	Specificity	Positive predictive value	Negative predictive value	Prevalence rate, %	DDSI test-retest (n = 30)
Depression (632)	386	28	87	131	0.82 (0.76–0.88)	0.82 (0.78–0.85)	0.6 (0.54–0.67)	0.93 (0.91–0.96)	25.2	0.92
Psychosis (827)	702	13	60	52	0.80 (0.7–0.9)	0.92 (0.9–0.94)	0.46 (0.37–0.56)	0.98 (0.97–0.99)	7.9	0.95
Panic (632)	562	4	50	16	0.80 (0.62–0.98)	0.92 (0.90–0.94)	0.24 (0.14–0.35)	0.99 (0.99–1)	3.2	0.81
Mania (636)	583	2	40	11	0.85 (0.65–1)	0.94 (0.92–0.96)	0.22 (0.1–0.33)	1 (0.99–1)	2.1	–
Social phobia (827)	732	1	82	12	0.92 (0.78–1)	0.9 (0.88–0.92)	0.13 (0.06–0.2)	1	1.6	0.91
Simple phobia (434)	410	1	11	12	0.92 (0.74–1)	0.97 (0.96–0.99)	0.48 (0.26–0.69)	1 (0.99–1)	2.5	0.92
ADHD (56)	35	2	6	13	0.87 (0.69–1)	0.85 (0.75–0.96)	0.68 (0.48–0.89)	0.95 (0.87–1)	26.8	–
PTSD (61)	38	2	9	12	0.86 (0.67–1)	0.81 (0.7–92)	0.57 (0.36–0.78)	0.95 (0.88–1)	23.0	–

TN = True negative (PRISM–/DDSI–); FN = false negative (PRISM+/DDSI–); TP = true positive (PRISM+/DDSI+); FP = false positive (PRISM+/DDSI+).

is available on the website ecdd.fimim.cat. Furthermore, Italian and German versions were achieved for the Reduce Project, http://www.thereduceproject.imim.es/index.html, and are also available on ecdd.fimim.cat (registration required).

The average time for the administration was 16.8 ± 2.5 min for DDSI and 133.8 ± 31.7 min for PRISM.

Psychometric Properties of the DDSI

The psychometric properties of the DDSI are shown in table 4. Sensitivity ranged from 0.80 in panic and psychosis to 0.92 in social phobia. For 7 of the 8 disorders studied, the DDSI specificity was 0.82 or higher. Also positive and negative predictive values are shown in table 4. For most frequent diagnoses (depression and psy-

chosis) we also analyzed the psychometric properties by gender, obtaining similar results in both cases (data not shown).

Discussion

The DDSI was found to be a valid screening interview for the detection of the most frequent and severe psychiatric disorders among substance users: depression, mania, psychosis, panic, social phobia, and specific phobia disorders. For other disorders like ADHD and PTSD, a larger sample is needed to confirm the good psychometric properties indicated by preliminary results.

DDSI proved good versatility, since it can be administered to subjects using different kinds of substances as well as in a wide range of settings. This differentiates it from other screening instruments that focus on mostly one substance of abuse or only one psychiatric disorder or are limited to specific settings.

For all disorders with a sufficient sample size, the DDSI demonstrated excellent psychometric properties, with a sensitivity and a specificity of 80% or higher. Negative predictive values were excellent for all diagnoses, however only some of the positive predictive values were found to be satisfactory, such as depression and psychosis. We think it is important to highlight that, when positive predictive values were lower, most of the subjects did present symptoms without fulfilling the criteria to achieve a diagnosis by PRISM. This may be explained by the fact that subthreshold psychopathology may accompany SUDs [30], even though, as other researchers suggested, these symptoms might correspond to the clinical picture of the addiction disease itself [31]. In any case, if we do not only consider categorical diagnoses but also move to a subdiagnostic level, subthreshold psychopathology may reveal symptoms that could need clinical management. Further research in this area is needed.

The DDSI provides lifetime disorders. Although this may be cumbersome for immediate clinical attention, it provides a more complete picture that can alert about disorders that subjects might suffer during the drug treatment process (i.e. after detoxification…). This information will be useful for clinicians working in nonspecialized centers managing patients over the course of these chronic disorders. In contrast, current diagnoses (i.e. last 30 days) can be very influenced by recent events (i.e. drug withdrawal). Although it might be considered as a limitation, since the majority of mental disorders (i.e. depression, panic) tend to be recurrent, the knowledge of a previous episode provides relevant information for clinical management.

The strengths of the study were the large sample size, the inclusion of treatment (in- and outpatient) and non-treatment-seeking (substance user volunteers in university research studies) samples, the wide range of substances of abuse included (heroin, cocaine, ecstasy, cannabis, alcohol…), the focus on the most prevalent comorbid psychiatric diagnoses in substance users (mood, anxiety and psychotic disorders), and the use of DSM-IV psychiatric diagnoses obtained with the criterion standard (PRISM). Also, the brevity of administration and standardization for training and the availability of a computerized version make DDSI a very useful tool.

Nevertheless, several limitations need to be considered. Specific analysis of nicotine dependence was not conducted, even though most subjects of the sample were tobacco users. Less frequent diagnoses such as dysthymia, agoraphobia and generalized anxiety disorder could not be evaluated due to the very small number of subjects meeting PRISM criteria for them. The instrument does not assess personality disorders which are frequent among subjects with SUD [32] and entail a worse SUD prognosis [33]. As this was an important issue, we explored the psychometric properties of the S-CIDI personality module for antisocial and borderline personality disorders according DSM-IV through the PRISM. Due to the poor results obtained and considering the relevant changes in personality disorders conceptualization suggested in the forthcoming DSM5 criteria, we decided to wait for the new criteria before developing a new module for personality disorders in DDSI. Also, the DDSI does not differentiate between primary and substance-induced diagnoses. We tried to include some questions to detect this differentiation, but in our opinion they unnecessarily enlarged both the length of the instrument and its training. In fact, this is a screening instrument and, in any case, a further assessment should be ensured for subjects screening positive. Furthermore, both primary and induced diagnoses could be coincident in the same subject [34], and are equally relevant for prognosis [35]. Finally, no inter-rater reliability was analyzed, as test-retest was conducted by the same interviewer providing assessment of the stability of this screening instrument.

The DDSI is a valid screening interview to detect psychiatric comorbidity among subjects with SUD. Its psychometric properties, together with the brevity of training and administration, make the DDSI a suitable instru-

ment for dual diagnosis screening both in specialized care settings and community health facilities. If the screening with DDSI is positive, the result suggests administering a structured interview or referral to a psychiatrist to confirm the diagnosis. Adequate screening for psychiatric disorders in drug users will facilitate its early identification and the implementation of the appropriate treatment, improving the prognosis of both substance use and other psychiatric disorders.

Appendix

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