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Validity of the BPRS, the BDI and the BAI in dual diagnosis patients

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Abstract

Aim: The psychometric properties of the Brief Psychiatric Rating Scale, the Beck Anxiety Inventory (BAI), and the Beck Depression Inventory (BDI) were tested in a sample of 134 patients with a substance use disorder and a non-substance related psychiatric disorder in a special inpatient dual diagnosis treatment unit.
Methods: Subjects were assessed at baseline. At discharge on average 6 months post-intake, 78% of patients were re-assessed using the same instruments. All instruments were tested in (1) their ability to discriminate patients with different diagnoses at baseline and follow-up using comparison of area under the curves, and (2) their temporal stability. Moderator regression was used to test whether thought disorder at baseline had any effect on the test–retest rank-order stability of other instruments.
Findings: The BPRS Thought Disorder scale was able to discriminate between patients with and without schizophrenia spectrum diagnoses, and the BDI was able to discriminate between patients with and without mood disorders and schizoaffective disorders at intake to treatment, and each instrument was significantly better than the other at discriminating relevant diagnostic groups. Discriminant correlations between the BDI and the BAI were high and statistically significant. Moderator regression analyses showed no indication that any of the scales were less stable at higher levels of thought disorder.
Conclusions: It is concluded that dual diagnosis patients can be reliably assessed for symptoms using the BDI and some subscales of the BPRS.

Keywords: Psychopathology; Schizophrenia; Dual diagnosis; Diagnostic validity; Inpatient; BPRS; BDI; Depression; Substance abuse

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1. Introduction

Clinical and epidemiologic studies have shown a high co-occurrence of substance use disorders and other psychiatric disorders, with important consequences from health and social perspective, and for treatment. The aetiology of such co-morbidity is unclear, but the accumulation of multiple risk factors related to mental illness, including emotional instability, may increase the risk of substance use disorder (Mueser, Drake, & Wallach, 1998).

Patients with schizophrenia (Krystal et al., 2006), depression (Grant et al., 2004), and some anxiety disorders (Grant et al., 2004) are at an increased risk of substance use disorders. Patients with psychotic illness and substance abuse are more difficult to retain in outpatient treatment than patients with psychotic illness alone (Fuciec, Mohr, & Garin, 2003), and more likely to be non-compliant with pharmacotherapy (Elbogen et al., 2005).

However, the reliable and valid assessment of psychiatric problems in patients with substance abuse may be problematic, mainly because the acute or chronic effects of substance abuse can mimic symptoms of other mental disorders, making difficult to differentiate psychiatric symptoms that are effects of acute or chronic substance use or withdrawal, of those that represent an independent disorder. Therefore, it is necessary that assessment of psychiatric symptoms is conducted with scales that are validated with this population. In this report, we examine the concurrent validity of several instruments used to assess psychopathology in a sample of patients with substance dependence or abuse and serious co-morbid psychiatric symptoms.

For instance, the acute stress associated with seeking treatment may temporarily exacerbate depressive symptoms (Elbogen et al., 2005); use of psycho-stimulants or hallucinogens may induce symptoms that are similar to symptoms of psychosis, and serious dependence on cannabis may produce a state of withdrawal that may appear similar to withdrawal in schizophrenia spectrum disorders (Schuckit, 2006).

The Brief Psychiatric Rating Scale is a brief interviewer-administered instrument designed to assess the symptoms of schizophrenia (Overall & Gorham, 1988). Based on the BPRS, it is possible to estimate a full-scale score. Based on factor analyses, 5 subscales have been derived: Thought Disorder (TD), Withdrawal (W), Anxiety/Depression (AD), Hostility (H) and Activity (A) (Hedlund & Vieweg, 1980). The Thought Disorder factor is related to positive symptoms of schizophrenia (grandiosity, hallucinations, unusual thought content and conceptual disorganisation) the Withdrawal Factor is related to negative symptoms (disorientation, blunted affect, emotional withdrawal and motor retardation), the Anxiety Depression Factor (somatic concerns, anxiety, guilt and depression), the Hostility Factor (hostility, suspicion and uncooperativeness) and the Activity Factor (tension, excitement mannerisms and posturing). On the BPRS full scale, patients with schizophrenia scoring 32 or more are considered ”mildly ill”, patients scoring 44 or more are considered “moderately ill”, patients scoring 52 are considered markedly ill, and patients scoring over 68 are considered “severely ill” (Leucht et al., 2005).

The TD, W, H and A scales should differ from symptoms of depression or anxiety, and therefore should discriminate patients with schizophrenia from patients with non-schizophrenia spectrum disorder. Also, as the full-scale BPRS is believed to be a measure of the overall severity of schizophrenia, it should be able to discriminate patients with schizophrenia from patients without schizophrenia. Other subscales of the BPRS, such as the AD scale, should be higher, rather than lower, in patients with anxiety or depression, relative to patients with schizophrenia. The justification for this assertion was that although some patients with schizophrenia suffer from symptoms of anxiety or depression, patients with anxiety or depression diagnoses should have these symptoms consistently.

We expected patients with schizophrenia to function more poorly than patients with other disorders, due to the very serious adverse consequences of schizophrenia on the quality of life (Thornicroft et al., 2004). This was measured with the Global Assessment of Functioning scale (APA, 2000).

The Beck Depression Inventory (BDI) is a 21-item self-report inventory designed to assess the severity of current depression (Beck, Steer, & Garbin, 1988), and the Beck Anxiety Inventory is a 21-item self-report inventory designed to assess the severity of current anxiety (Steer & Ranieri, 1993). Both are instruments that have been extensively studied in both clinical and non-clinical samples. There is some indication that the Beck Depression Inventory is valid in substance abusers (Hesse, 2006). The Beck Anxiety Inventory is used somewhat less in research than the Beck Depression Inventory, but has been used in several studies of patients with substance abuse (Husband et al., 1996; Sumnall, Wagstaff, & Cole, 2004). However, to our knowledge, no study has assessed whether the Beck Depression Inventory can discriminate patients with co-morbid mood disorders and substance dependence from patients with substance dependence and other co-morbid psychiatric conditions, or whether the Beck Anxiety Inventory can discriminate patients with co-morbid anxiety disorders from patients with other co-morbidities. Further, self-report inventories could potentially be problematic in patients with psychotic disorders. Patients with residual psychotic symptoms might be unable to fully understand or rate self-report items. To our knowledge, no studies have assessed this question.

2. Methods

2.1. Setting

The cohort studied were consecutive admissions to an inpatient psychiatric unit, “Fjordhuset” and the St. Hans Hospital in Roskilde, Denmark in the period from April 10th 2004 to February 2nd 2006. The unit is an inpatient treatment unit providing cognitive milieu therapy for patients with substance dependence and psychiatric illness. The unit is staffed with psychiatrists, psychologists, nurses and assistants, and is situated in Roskilde, close to Copenhagen. Patients are typically referred to the unit when they have a chronic substance dependence and psychiatric illness requiring extended inpatient treatment. In general patients who are acutely psychotic are first admitted to their local psychiatric inpatient unit and then referred to extended inpatient treatment at the unit, once they have been stabilised.

2.2. Inclusion and exclusion criteria

Inclusion to the study required the presence of at least one diagnosis of substance use disorder (and ICD-10 (WHO, 1993) diagnosis of F10–F19.99), and at least one additional psychiatric diagnosis of schizophrenia spectrum or mood disorder (F20–F39.99). Participants should also be willing to participate in the treatment, be fluent in Danish, complete questionnaires, and give informed consent. Patients that had organic brain damage or were involuntarily admitted to the unit were excluded from the study.

2.3. Assessment

2.3.1. Psychiatric diagnoses

Subjects were assessed at admission to the unit by a psychiatrist. Diagnoses were made according to the International Classification of Diseases and coded in the patients’ medical files (WHO, 1993). The unit

psychiatrists had access to the reports and files from previous admissions and/or contact with psychiatric services.

2.3.2. Self-report inventories

Patients completed the Beck Depression Inventory (BDI) (Beck et al., 1988) and the Beck Anxiety Inventory (BAI) (Beck & Steer, 1991).

2.3.3. Psychiatric rating scales

Patients were rated with the Brief Psychiatric Rating Scale (BPRS) (Overall & Gorham, 1988) by independent psychiatrists at baseline and follow-up. Prior to assessment of patients, each of the psychiatrists conducting the BPRS ratings received training in the rating, and rated a video of a patient. These psychiatrists were not involved in the diagnosis or treatment of patients. The BPRS is a psychiatric rating scale that is completed during an interview with the patient.

Additionally, patients were rated using the Global Assessment of Functioning (GAF) scale (APA, 2000). The Global Assessment of Functioning was rated using the split version, with both a symptom and a functioning component (Pedersen, Hagtvet, & Karterud, 2007).

2.4. Hypotheses

The following hypotheses were stated:

- Patients with schizophrenia spectrum diagnoses (F20–F29.99) were expected to score higher on the BPRS full scale, the Thought Disorder scale, the Hostility scale, and the Activity scale. While all subscales of the BPRS are used to assess schizophrenics, we deemed it unlikely that the remaining subscales (the Withdrawal scale, the Anxiety/Depression scale), would discriminate schizophrenic patients from patients with other diagnoses, in particular mood and anxiety disorders.
- Patients with schizophrenia spectrum diagnoses (F20–F29.99) were expected to score lower on the GAF and GAS scales.
- Patients with mood disorders (F30–F39.99) or schizoaffective disorders of depressive type (F25.1) were expected to score higher on the BDI scale.
- Patients with mood disorders (F30–F39.99) or schizoaffective disorders of depressive type (F25.1) were expected to score higher on the BPRS AD scale.
- Scales would be stable with regard to rank-order over the course of treatment.
- Temporal stability for all scales would be reduced in subjects scoring higher on the TD scale, owing to difficulty in assessing other psychopathology in patients with more positive symptoms.

We intended to perform similar analyses for anxiety and manic states, but due to the near-absence of these disorders in the material, we decided to drop them.

2.5. Statistical analyses

The Area Under the Curve (AUC) is a prevalence-independent and cut-score-independent measure of the degree to which a scale can discriminate between populations that has recently been recommended in the clinical psychology literature (Hsu, 2002). Given distributions of scores for a disordered and a non-

disordered population, the AUC reflects the probability that a randomly selected person from one population will have a scale score that exceeds that of a randomly selected person from the other population. The AUC can achieve values between 0 and 1.0. For a scale that does not discriminate at all between a disordered and a non-disordered population, the AUC is 0.50. As the area increases, the discrimination between the two populations increases as well.

Moderator regression was used to assess whether scales were less stable for patients with higher thought disorder severity. In moderator regression, the proposed predictor (in this case, the baseline value of a scale) and the proposed moderator (in this case, either abstinence status at discharge or the TD scale at baseline) are entered in the first step into the regression equation for the dependent variable (in this case, the respective scale at follow-up). In the second step, the interaction between the two is entered (i.e. the interaction between baseline scale and TD or abstinence status). If the interaction is significant in the second step, it would indicate that the relationship between the predictor and dependent variable varies over levels of the moderator variable (Tellegen, 1988). The analyses were conducted on SPSS for Windows, 11.5.1 (SPSS, 2002).

The purpose of the moderator regressions was to test whether thought disorder at baseline influenced the rank-order stability (measured as the test–retest correlation) of measures.

3. Results

3.1. Sample description

Of all 165 patients consecutively admitted in the period, 19 could not be included, either because they refused consent, or were unable to participate due to cognitive problems, or language problems. Two participants had missing data, leaving a sample of 144 patients for the convergent validity analysis.

The cohort consisted of 66% males, and the mean age of patients was 40.8 years (SD = 9.8, range: 20–65). The non-substance psychiatric diagnoses were 65% schizophrenia and related disorders (F20.9–F29.9), 24% mood disorders (F32.0–F39.9), 10% bipolar (F30.0–F32.9). Only 7.6% had an anxiety (F40–F50) diagnosis.

Diagnoses for more than one class of substances were given to 76% (mean number of substance use diagnoses: 1.9, range: 0–4). The most common diagnosis was alcohol (65%), cannabis (36%), opioids (20%), and poly-substance dependence (19%). A total of 97% received 1 non-substance related psychiatric diagnosis, and 15% received 2 or 3 diagnoses.

Data on all the BPRS and the GAF and GAS were available on 101 patients at both intake and discharge, and BAI and BDI were available on 85 at both intake and discharge. The mean baseline value on the BPRS was 25.8, corresponding to being borderline—mildly ill for schizophrenic patients (Leucht et al., 2005), with a range from 7 to 64. The mean score on the GAF was 39.5 and for GAS was 38.1. The mean scores for the BDI was 23.8 and the BAI was 20.8, corresponding to respectively moderate depression and moderate anxiety.

3.2. Discrimination between diagnostic groups

The results of the area under the ROC curve analyses are shown in Table 1.

Patients with schizophrenia spectrum disorders (e.g., schizophrenia, schizotypal disorder, schizoaffective disorder) could be discriminated by elevated TD, HS and full-scale BPRS, and GAF and GAS from other patients. No differences were found for self-report scales, or the remaining BPRS scales.

For mood disorders, patients with diagnoses scored significantly higher on the BDI, the BPRS AD scale, and significantly lower on the BPRS TD, HS and A scales. No scales discriminated between

Table 1
Instruments' ability to discriminate between cases and controls at baseline

Test result variable(s)	Mean DX−	Mean DX+	Area under the curve	Std. error[a]	Asymptotic significance[b]
Schizophrenia spectrum: F20–F29.99	*N=51*	*N=93*			
BDI	26.1	22.6	0.40	0.05	0.057
BAI	20.5	21.4	0.52	0.05	0.632
GAS	43.5	37.0	**0.71**	0.05	0.000
GAF	40.5	36.5	**0.65**	0.05	0.004
BP	21.7	28.3	**0.66**	0.04	0.001
TD	2.1	5.4	**0.72**	0.04	0.000
W	4.8	5.8	0.56	0.05	0.171
AD	10.8	9.8	0.43	0.05	0.166
HS	1.8	4.1	**0.71**	0.05	0.000
A	2.2	3.2	0.60	0.05	0.059
Mood: F31.99–F39.99 and F25.10	*N=111*	*N=34*			
BDI	22.4	28.5	**0.65**	0.05	0.007
BAI	20.8	22.0	0.52	0.06	0.788
GAS	38.1	43.3	**0.32**	0.05	0.003
GAF	37.5	39.5	0.40	0.06	0.098
BP	26.6	23.9	0.44	0.05	0.245
TD	4.9	2.3	**0.32**	0.05	0.001
W	5.2	6.1	0.58	0.06	0.166
AD	9.7	11.5	**0.64**	0.05	0.014
HS	3.7	2.1	**0.36**	0.05	0.013
A	3.2	1.9	**0.35**	0.05	0.007

Notes: BDI: Beck Depression Inventory. BAI: Beck Anxiety Inventory. BP: BPRS full scale. TD: Thought Disorder. W: Withdrawal. AD: Anxiety/Depression. HS: Hostility. A: Activity. a Under the non-parametric assumption. b Null hypothesis: true area=0.5. Area Under the Curve values theoretically believed to discriminate between groups are underlined, AUC values significant at $p<0.01$ are in boldface. Mean DX+: Mean value of patients given the diagnosis. Mean DX−: Mean value of patients without diagnosis.

patients with vs. without anxiety. However, although the BAI has previously been found to discriminate well between patients with vs. without anxiety disorder (Kabacoff et al., 1997), the BAI correlates highly with measures of depression, and are often elevated in patients with depression (Steer & Ranieri, 1993),

Table 2
Pearson inter-correlations of instruments from baseline to follow-up

Follow-up	BDI	BAI	BP	TD	W	AD	HS	A
Baseline								
BDI	*0.49*	**0.42**	0.19	0.06	0.13	**0.27**	0.08	0.03
BAI	**0.49**	*0.67*	**0.29**	0.13	0.14	**0.34**	0.23	0.11
BP	**0.31**	**0.41**	*0.53*	**0.47**	**0.40**	**0.29**	**0.27**	0.19
TD	0.03	0.04	**0.39**	*0.57*	0.18	0.02	0.19	0.23
W	0.24	0.24	**0.43**	0.17	*0.56*	**0.29**	**0.31**	−0.01
AD	**0.38**	**0.41**	**0.26**	0.21	0.18	*0.28*	0.04	0.03
HS	0.14	**0.31**	**0.37**	**0.35**	0.26	0.17	*0.22*	0.16
A	0.23	**0.35**	**0.22**	0.23	0.02	0.16	0.05	*0.26*

Notes: Test–retest correlations are italicized. Correlations that are statistically significant at $p<0.01$ are in boldface.

Table 3
Moderator regression

Thought disorder			
	Beta	T	Sig.
BDI	0.27	1.19	0.237
BAI	**0.56**	**2.99**	**0.004**
W	−0.21	−1.10	0.275
AD	0.17	0.45	0.652
HS	0.05	0.20	0.840
A	**0.65**	**2.96**	**0.004**

Note: Coefficients that are statistically significant at $p<0.01$ are in boldface.

and the AD scale explicitly measures both anxiety and depression. Thus, the failure of the BAI and the AD scale to discriminate between anxious patients and other patients, could be an artefact of the presence of patients with mood disorders in the sample. Therefore, we repeated the above analyses, excluding patients with mood disorders. This did not change the results, and neither the AD scale nor the BAI discriminated anxious patients from non-anxious (results not shown).

3.3. Rank-order stability

A total of 101 patients (78% of the patients who had agreed to participate in the study) completed the BDI and the BAI, were administered the BPRS at discharge. The test–retest correlations from intake to discharge are shown in Table 2. The Pearson correlations are reported. We also analyzed the non-parametric Spearman correlations, but as the results did not differ, we decided to report the Pearson correlations. BDI, BAI, BP, TD, and W were all significantly correlated over the observation period. AD, HS and A were not strongly correlated. For those scales where the correlations were moderate ($r>0.4$), we calculated discriminant correlations, i.e., correlations between the same scale measured at different points in time, and correlations between unrelated constructs. The number of discriminant correlations for each scale was 25. For TD and W there were no discriminant correlations that were higher than the test–retest correlations. For the BDI there were 3 discriminant violations, corresponding to 12% of possible. For the BAI, there was one discriminant violation. All discriminant violations for the BDI and the BAI were between the BDI and the BAI.

3.4. The influence of thought disorder on temporal stability

We assessed the influence of thought disorder on the temporal stability of other scales. The results of the moderator regression analyses are shown in Table 3.

Thought disorder had an influence on the temporal stability of the BAI and the A scale of the BPRS. In both cases, patients with higher thought disorder tended to show higher stability on the BAI and the A scale.

4. Discussion

The main finding from this study was that the BPRS TD scale and full scale, and the Beck Depression Inventory were able to discriminate between relevant clinical groups. Also, TD, W BDI and BAI were

substantially correlated over the course of the study, and these correlations generally exceeded discriminant correlations. Thus, in spite of substantial co-morbidity in this sample, including symptoms that are likely to be substance-induced, some scales of the BPRS and the BDI clearly measure reliable symptoms with indication of discriminant validity.

None of the hypotheses concerning the negative influence of thought disorder on the temporal stability of scales were supported. In contrast, two scales, the BAI and the BPRS-A scale, were more correlated at higher levels of thought disorder. Since our stated hypothesis was not supported in this respect, we can conclude, that symptoms are measured with no less reliability in severely ill psychotic patients, compared with less ill patients.

Thus, several of the BPRS scales and the BDI passed tests as both reliable and valid measures of psychopathology. However, the withdrawal scale could not discriminate the patient group with schizophrenia from other patients. This may indicate that patients with co-morbid other psychopathology and substance use disorder are more difficult to discriminate from patients with co-morbid substance use disorder and schizophrenia with regard to negative symptoms. However, it may also indicate that the BPRS W scale is not an optimal measure of negative symptoms in schizophrenia.

A strength of the study is the use of independent raters of psychopathology against diagnoses made based on a clinical intake interview. However, a limitation of the study was that no semi-structured interview was used in the diagnosis of psychopathology. The impact of this limitation is to make the discriminant validity findings of this study a lower bound of the actual discriminant validity of the instruments used. It is likely that the low prevalence of anxiety and bipolar disorders observed in this cohort would have been much higher, had a structured assessment of diagnoses been used. When a structured interview is used for the diagnosis of mental disorders, co-morbidity of anxiety disorders in substance abusers is sometimes much higher than what we observed in this study (Verthein et al., 2005).

Another limitation is that the study did not include patients that were very acutely psychotic, with 75% of patients with F2X diagnoses scoring below 36, corresponding to only being “mildly–moderately ill” for schizophrenia (Leucht et al., 2005). This limitation may impact the findings in two ways: first, it may reduce the observed differences between schizophrenic and non-schizophrenic patients on relevant indicators, such as the TD, W and HS scale. Secondly, it may reduce the impact of thought disorder on the stability of other scales. Had there been more acutely psychotic patients in the sample, we would probably have found some limitations in the long-term stability of measures at extreme levels of thought disturbance.

In conclusion the measures BPRS full scale, Thought Disorders factor and BDI could be reliably used in a dual diagnosis sample. The hypothesis regarding the use of the BAI and its ability to discriminate between patient with and without anxiety disorders was not supported, although the low base rate of patients with anxiety disorders may have confounded this analysis. Whilst these results are promising further studies with larger samples of dual diagnosis patients need to be conducted to determine the reliability and validity of these and other instruments within this diagnostic group.

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References

APA. (2000). *Diagnostic and statistical manual of mental disorders. Text revision* (4th ed.). Washington D. C.: American Psychiatric Association.

Beck, A. T., & Steer, R. A. (1991). Relationship between the Beck Anxiety Inventory and the Hamilton Anxiety Rating Scale with anxious outpatients. *Journal of Anxiety Disorders*, *5*, 213−223.

Beck, A. T., Steer, R. A., & Garbin, M. G. (1988). Psychometric properties of the Beck Depression Inventory: Twenty-five years of evaluation. *Clinical Psychology Review*, *8*, 77−100.

Elbogen, E. B., Swanson, J. W., Swartz, M. S., & Van Dorn, R. (2005). Medication nonadherence and substance abuse in psychotic disorders: impact of depressive symptoms and social stability. *Journal of Nervous and Mental Disease*, *193*(10), 673−679.

Fuciec, M., Mohr, S., & Garin, C. (2003). Factors and motives associated with drop-out in an ambulatory service for patients with psychotic disorders. *European Psychiatry*, *18*(4), 193−195.

Grant, B. F., Stinson, F. S., Hasin, D. S., Dawson, D. A., Chou, S. P., Dufour, M. C., et al. (2004). Prevalence and co-occurrence of substance use disorders and independent mood and anxiety disorders results from the National Epidemiologic Survey on Alcohol and Related Conditions. *Archives of General Psychiatry*, *61*(8), 807−816.

Hedlund, J. L., & Vieweg, B. W. (1980). The Brief Psychiatric Rating Scale (BPRS): A comprehensive review. *Journal of Operational Psychiatry*, *11*, 48−65.

Hesse, M. (2006). The Beck Depression Inventory in patients undergoing opiate agonist maintenance treatment. *British Journal of Clinical Psychology*, *45*(Pt 3), 417−425.

Hsu, L. M. (2002). Diagnostic validity statistics and the MCMI–III. *Psychological Assessment*, *14*(4), 410−422.

Husband, S. D., Marlowe, D. B., Lamb, R. J., Iguchi, M. Y., Bux, D. A., Kirby, K. C., et al. (1996). Decline in self-reported dysphoria after treatment entry in inner-city cocaine addicts. *Journal of Consulting and Clinical Psychology*, *64*(1), 221−224.

Kabacoff, R. I., Segal, D. L., Hersen, M., & Van Hasselt, V. B. (1997). Psychometric properties and diagnostic utility of the Beck Anxiety Inventory and the State-Trait Anxiety Inventory with older adult psychiatric outpatients. *Journal of Anxiety Disorders*, *11*(1), 33−47.

Krystal, J. H., D'Souza, D. C., Gallinat, J., Driesen, N., & Abi-Dargham, A. (2006). The vulnerability to alcohol and substance abuse in individuals diagnosed with schizophrenia. *Neurotoxicology Research*, *10*(3–4), 235−252.

Leucht, S., Kane, J. M., Kissling, W., Hamann, J., Etschel, E., & Engel, R. (2005). Clinical implications of Brief Psychiatric Rating Scale scores. *British Journal of Psychiatry*, *187*, 366−371.

Mueser, K. T., Drake, R. E., & Wallach, M. A. (1998). Dual diagnosis a review of etiological theories. *Addictive Behaviors*, *23*(6), 717−734.

Overall, J. E., & Gorham, D. R. (1988). The brief psychiatric rating scale: Recent developments in ascertainment and scaling. *Psychopharmacological Bulletin*, *24*, 97−99.

Pedersen, G., Hagtvet, K. A., & Karterud, S. (2007). Generalizability studies of the global assessment of functioning-split version. *Comprehensive Psychiatry*, *48*(1), 88−94.

Schuckit, M. A. (2006). Comorbidity between substance use disorders and psychiatric conditions. *Addiction*, *101*(Suppl. 1), 76−88.

SPSS. (2002). *SPSS for Windows.* Chicago: SPSS Inc.

Steer, R. A., & Ranieri, W. F. (1993). Further evidence for the validity of the Beck Anxiety Inventory with psychiatric outpatients. *Journal of Anxiety Disorders*, *7*, 195−205.

Sumnall, H. R., Wagstaff, G. F., & Cole, J. C. (2004). Self-reported psychopathology in polydrug users. *Journal of Psychopharmacology*, *18*(1), 75−82.

Tellegen, A. (1988). The analysis of consistency in personality assessment. *Journal of Personality*, *56*, 621−663.

Thornicroft, G., Tansella, M., Becker, T., Knapp, M., Leese, M., Schene, A., et al. (2004). The personal impact of schizophrenia in Europe. *Schizophrenia Research*, *69*(2–3), 125−132.

Verthein, U., Degkwitz, P., Haasen, C., & Krausz, M. (2005). Significance of comorbidity for the long-term course of opiate dependence. *European Addiction Research*, *11*(1), 15−21.

WHO. (1993). *The ICD-10 classification of mental and behavioural disorders: Diagnostic criteria for research* (10 ed.). Geneva: World Health Organization.