



Short communication

## Predictors of stimulant abuse treatment outcomes in severely mentally ill outpatients

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### ARTICLE INFO

#### Article history:

Received 2 September 2012  
Received in revised form 17 October 2012  
Accepted 21 November 2012  
Available online 27 December 2012

#### Keywords:

Contingency management  
Treatment outcomes  
Predictors  
Mental illness  
Co-occurring disorders

### ABSTRACT

**Background:** Severe mental illness is often exclusionary criteria for studies examining factors that influence addiction treatment outcome. Therefore, little is known about predictors of treatment response of individuals receiving psychosocial treatments for addictions who suffer from co-occurring severe mental illness.

**Methods:** The impact of demographic, substance abuse severity, psychiatric severity, and service utilization variables on in-treatment performance (i.e., longest duration of abstinence) in a 12-week contingency management (CM) intervention for stimulant abuse in 96 severely mentally ill adults was investigated. A 4-step linear regression was used to identify independent predictors of in-treatment abstinence.

**Results:** This model accounted for 37.4% of variance in the longest duration of abstinence outcome. Lower levels of stimulant use (i.e., stimulant-negative urine test) and psychiatric severity (i.e., lower levels of psychiatric distress), as well as higher rates of outpatient treatment utilization at study entry were independently associated with longer duration of drug abstinence.

**Conclusion:** These data suggest that individuals with low levels of stimulant use and psychiatric severity, as well as those actively engaged in services are most likely to succeed in a typical CM intervention. For others, modifications to CM interventions, such as increasing the value of reinforcement or adding CM to evidence based psychiatric interventions may improve treatment outcomes.

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### 1. Introduction

The co-occurrence of substance use disorders (SUD) and severe mental illness (i.e., schizophrenia, schizoaffective, bipolar, and re-occurring major depressive disorders) is a pervasive problem, complicating the treatment of both conditions (Bellack et al., 2006; Bennett et al., 2001; Dixon, 1999; Drake and Mueser, 2001). Approximately 50% of adults with these severe mental illnesses suffer from a substance use disorder (Regier et al., 1990). Compared to individuals with either condition alone, patients with co-occurring disorders have a variety of poorer outcomes (Dixon, 1999) including lower rates of treatment adherence (Bennett et al., 2001), increased psychotic symptoms (RachBeisel et al., 1999), higher rates of inpa-

tient psychiatric care (Haywood et al., 1995), incarceration (Abram and Teplin, 1991), and more frequent use of acute medical care (Bartels et al., 1993).

Despite the development of evidence-based co-occurring disorders interventions, including individual (Baker et al., 2006; Barrowclough et al., 2010), group (Weiss et al., 2009), case management based (Drake et al., 1998), behavioral (Petty, 2005), and comprehensive (Bellack et al., 2006; Drake et al., 2001) treatments, only 8% of adults with co-occurring disorder receive treatment for both conditions (Watkins et al., 2001).

In non-severely mental ill populations, lower substance use severity (Knight et al., 2001; Reiber et al., 2002), negative urine-drug test at intake (Hillhouse et al., 2007), current employment, and lack of injection drug use (Roll et al., 2005) are associated with positive response to addictions treatment. However, little is known about variables that predict addictions treatment outcomes in persons with co-occurring disorders.

Brown et al. (2011) examined predictors of initial engagement to a behavioral substance abuse treatment for adults with co-occurring disorders. Male participants and those with a schizophrenia spectrum diagnosis were less likely to finish

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intake procedures. Participants with recent arrests or current drug dependence were less likely to persist with treatment beyond two weeks. Other research suggests psychiatric disorders impact addictions treatment outcomes differentially by gender: men with anti-social personality disorder, or major depressive disorder had worse drug use outcomes than men with other psychiatric disorders, women with phobic disorders had better addictions outcomes than women with other psychiatric disorders (Compton et al., 2003).

Further data are needed to better understand how patient characteristics predict addictions treatment performance in adults with co-occurring disorders. Understanding predictors of treatment outcomes will help better tailor interventions to match patient needs, by allowing us to target patients with the highest likelihood of success, and by helping us identify patients who may be at risk of treatment failure and adapting interventions to meet their needs (Bradizza et al., 2006). Toward that end, the current study identified independent demographic, substance use, psychiatric, and service use predictors of in-treatment abstinence during a 12-week contingency management (CM) intervention targeting psycho-stimulants and other drugs in a sample of adults with co-occurring disorders. We hypothesized that female gender, employment, lack of criminal history, lower levels of pretreatment psychiatric and substance use severity, and greater adherence to other treatments would be independently associated with positive treatment response, as defined by longest duration of psycho-stimulant abstinence. We further hypothesized that variables unique to the study (lower levels of pretreatment psychiatric severity and greater adherence to other treatments) would be independently associated with positive treatment response, accounting for predictors that have previously been associated with positive treatment response.

## 2. Materials and methods

### 2.1. Participants

Data from 96 participants assigned to the CM condition in a randomized, controlled trial of CM for stimulant use in severely mentally ill adults (McDonnell et al., *in press*) were analyzed for the current study. Participants were recruited from a large urban community mental health and addiction treatment agency (CMHC) in Seattle, Washington where medication management, case management and intensive outpatient group and individual substance abuse services were available. Treatment status and services utilized by participants depended on the individual participants' needs and available funding. All participants met Mini International Neuropsychiatric Interview (MINI; Sheehan et al., 1998) criteria for current methamphetamine, amphetamine, or cocaine dependence, and for a schizophrenia-spectrum disorder ( $n=38$ , 39.6%), bipolar disorder ( $n=30$ , 31.3%), or recurrent major depressive disorder ( $n=28$ , 29.2%). Other inclusion criteria were self-reported stimulant use during the previous thirty days, and age 18–65 years. Exclusion criteria included: dementia, organic brain disorder, and psychiatric, medical or other condition that precluded safe study participation.

Participants were 50% ( $n=48$ ) non-White, and had a median age of 43.5 (SD=9.31) years. All participants provided signed informed consent. Study procedures were approved by the University of Washington's Institutional Review Board.

### 2.2. Instrumentation and procedures

Independent measures were assessed at intake interview and included demographics (age, gender, and ethnicity), criminal history (arrests in the last 30 days), current employment, and addiction severity (self-reported days of stimulant drug use, injection drug use in the last 30 days, and drug composite score), from the Addiction Severity Index-Lite 5th edition (ASI-Lite; McLellan et al., 1992). Urine drug tests measured stimulant (i.e., cocaine, methamphetamine, and amphetamine), as well as, marijuana and opioid use were conducted at the intake interview using onsite immunoassays (Integrated E-Z Split Key Cup, Innovacon, Inc., San Diego, CA). Cut-off for positive tests were D-amphetamine = 1000 ng/mL (amphetamine), D-methamphetamine = 1000 ng/mL (methamphetamine), benzoylcegonine = 300 ng/mL (cocaine), morphine = 2000 ng/mL (opiates), and THC-COOH = 500 ng/mL (tetrahydrocannabinol; THC). Psychiatric symptoms at intake were measured using the global severity score from the Brief Symptom Inventory (BSI; Derogatis and Melisaratos, 1983) and the total composite score from the Positive and Negative Symptom Scale (PANSS; Kay et al., 1987). Psychiatric diagnosis was also assessed using the MINI Neuropsychiatric Interview and recoded

**Table 1**

Results of linear regression model used to predict longest duration of abstinence.

	Adjusted <i>B</i>	(SE)	<i>p</i> -Value
<b>Demographics</b>			
Female gender	−0.01	(2.36)	0.899
Age	0.10	(0.12)	0.311
Minority status	−0.01	(2.19)	0.963
<b>Drug use severity</b>			
Stimulant positive urine test	−0.36	(2.50)	<b>0.002</b>
Addiction Severity Lite drug composite scale score	0.03	(12.18)	0.784
<b>Psychiatric symptom severity</b>			
Positive and negative syndrome scale composite score	−0.07	(1.51)	0.530
Brief symptom inventory global severity score	−0.35	(1.68)	<b>0.003</b>
Schizophrenia-spectrum disorder	0.07	(2.47)	0.527
<b>Outpatient service utilization</b>			
Number of mental health visits	0.42	(0.62)	<b>0.001</b>
Number of substance use treatment visits	−0.11	(0.75)	0.360

Note: Statistical significance set at  $p < 0.05$ .

The bold values are the significance levels.

into schizophrenia spectrum versus mood disorder to allow for comparison of these diagnostic categories. Service utilization during the week prior to study entry was obtained via self-report using the Self-Report Service Utilization (SRSU) instrument a brief, self-report form assessing outpatient psychiatric and substance abuse treatment utilization developed for this study.

Consistent with previous CM research (Peirce et al., 2006) we defined treatment success as the longest duration of continuous abstinence (defined as the highest number of consecutive stimulant-negative urine drug tests). The continuous abstinence count was reset if the participant provided a psycho-stimulant positive urine sample or failed to provide a sample. Participants provided samples for urine testing three times per week during the 12-weeks of treatment.

### 2.3. Contingency management intervention

When participants tested negative for amphetamine, methamphetamine, and cocaine they were invited to engage in the variable magnitude of reinforcement procedure (VMRP; Petry et al., 2005). VMRP consists of making "draws" from a bowl of tokens representing different prize magnitudes (50% "good job", 41.8% \$1, 7.2% \$20, 0.2% \$80). Tokens were exchanged for gift cards or tangible prizes. For every week of sustained abstinence participants received one extra draw. Draws were reset to zero when a positive drug test occurred or when a participant failed to provide a sample. Participants received an additional draw at each study visit if their urine and breath samples were negative for other drugs and alcohol. Participants received 12 weeks of VMRP. Participants also received treatment-as-usual at the CMHC consisting of case management, psychiatric medications, and outpatient addiction treatment.

### 2.4. Data analyses

The relationship between independent variables and the dependent variable was first investigated using bivariate correlations. Variables that appeared to have no relationship ( $r < 0.1$  and not statistically significant) with the dependent variable were not entered into regression analyses. Remaining variables were 'forced' into a four-step hierarchical linear regression analysis in the following order: demographics, substance use, psychiatric severity, and service utilization variables. The order of blocks was based on our study hypothesis. Statistical significance was set at alpha,  $p < 0.05$ .

## 3. Results

Table 1 summarizes results of the regression analysis. The model accounted for 37.4% ( $R^2 = 0.374$ ) in the longest duration of stimulant abstinence. Demographic variables accounted for 0.1% of the variance on the outcome. No demographic variables were significant predictors. Drug use severity variables accounted for 13.5% of variance. Stimulant-negative urine test at intake was associated with longer duration of abstinence ( $B = -0.35$ ,  $p < 0.05$ ). Psychiatric severity variables accounted for 10.9% of the variance in the outcome variable. Lower BSI scores were associated with longer duration of abstinence ( $B = -0.28$ ,  $p < 0.05$ ). Service use variables

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