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Substance Dependence and Remission in Schizophrenia: A Comparison of Schizophrenia and Affective Disorders

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Abstract

The present study examined psychiatric functioning, substance use and consequences, and motivation to change in people with schizophrenia and affective disorders and current or remitted cocaine dependence. Data were collected as part of a naturalistic, longitudinal study examining substance use, motivation to change, and the process of change in people with schizophrenia and affective disorders who were currently dependent or in remission from cocaine dependence. We examined the following questions: (1) Do those in remission show better psychiatric functioning than those who are currently dependent? (2) How do people with schizophrenia and current cocaine dependence differ in terms of substance use and consequences from people with schizophrenia in remission and people with affective disorders and current drug dependence? (3) What internal factors and external factors are associated with changes in substance use in schizophrenia and how do these compare to those in nonpsychotic affective disorders? Results indicated that people with schizophrenia and current dependence reported higher levels of positive and negative symptoms than those in remission. Remission status was related to less use of other drugs, fewer days of drug problems, less distress from drug problems, and more lifetime drug-related consequences. Those with current dependence reported more days of drinking and drinking to intoxication, as well as higher rates of current alcohol use disorders than the remitted group. When compared to those with affective disorders and cocaine dependence, those with schizophrenia and current dependence reported fewer days of problems associated with their drug use, less distress from drug problems, and fewer recent and lifetime consequences associated with their drug use. The schizophrenia dependent group generally showed the lowest readiness to change, fewest efforts being made to change, and lowest confidence in the ability to change. Implications of these findings are discussed.

Introduction

Substance use disorders (SUDs) in people with schizophrenia are among the most pressing problems facing the mental health system. People with schizophrenia report six times the risk of developing a drug use disorder as do those in the general population (Regier et al., 1990), and clinical studies find that between 20-65% of schizophrenia patients surveyed in

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treatment settings experience comorbid substance use disorders (Alterman et al., 1982; Barbee et al., 1989; Drake, Osher, & Wallach, 1989; Mueser, Bennett, & Kushner, 1995; Mueser, Yarnold, & Bellack, 1992; Schneirer & Siris, 1987). SUDs in people with schizophrenia confer a range of serious psychiatric (Alterman et al., 1982; Barbee et al., 1989; Carpenter, Heinrichs, & Alphas, 1985; Drake & Wallach, 1989; Hays & Aidroos, 1986; Haywood et al., 1995; Lambert, Griffith, & Hendrickse, 1996; Negrete & Knapp, 1986; Owen et al., 1996; Pages et al., 1998), social (Carey, Carey, & Kalichman, 1997; Cohen, Test, & Brown, 1990; Dixon, 1999; Landmark, Cernovsky, & Merskey, 1987; Marzuk, 1996; Soyka, 2000), and economic (Bai, Lin, Hu, & Yeh, 1998; Dickey & Azeni, 1996; Garnick, Hendricks, Comstock, & Horgan, 1997) consequences that compromise the functioning of an already multiply handicapped clinical population and the mental health system charged with its care.

As clinical interest in dual diagnosis has increased, research has focused on investigating and documenting the high prevalence and far-reaching negative impact of SUDs in schizophrenia. As a result, we now have a good understanding that SUDs affect a majority of people with schizophrenia and are a major impediment to good outcomes. Several other lines of research have contributed in important ways to our understanding of SUDs in schizophrenia by highlighting the ways in which drug use among people with dual SUDs and schizophrenia is similar to that of other less impaired substance abusers. For example, research has examined drug of choice and use patterns in people with schizophrenia, finding that there is not a consistent relationship between substance use and specific forms of symptomatology (Dixon, Haas, Weiden, Sweeney, & Francis, 1991; Mueser, Bellack, Douglas, & Wade, 1990). Rather, the data suggest that preference for street drugs varies over time and as a function of the demographic characteristics of the sample, similar to patterns in the general population (Mueser, Yarnold, & Bellack, 1992). Similarly, people with schizophrenia often report the same reasons for their drug use as primary substance abusers: using to cope with negative affective states, interpersonal conflict, and social pressures (Bradizza, Stasiewicz, & Carey, 1998; Dixon et al., 1991; Krausz, Mass, Haasen, & Gross, 1996; Noordsy et al., 1991; Pristach & Smith, 1996; Sandberg & Marlatt, 1991), as well as reasons related to socialization and boredom (Carey et al., 1999; Mueser et al., 1995; Warner et al., 1994). The situational context seems to be an important determinant of substance abuse for people with schizophrenia, as it is for other abusers (McCraday, 1993), with findings that about half of alcohol abuse occurs in a social context (Dixon Haas, Weiden, Sweeney, & Francis, 1990). In addition, there has been a good amount of research attention devoted to ways to structure treatment of SUDs for people with schizophrenia. As a result, we now have a general consensus on a number of elements required for effective treatment, including integration of psychiatric and substance abuse treatment (Carey, 1996; Drake & Mueser, 2000; Lehman & Dixon, 1995; Ziedonis & Fisher, 1994; Mueser, Noordsy, Drake, & Fox, 2003), conceptualizing treatment as a long-term, ongoing process (Bellack & DiClemente, 1999; Minkoff, 2000; Osher & Kofoed, 1989), and use of a harm reduction model, especially during the early stages of treatment (Carey et al., 2002; Ziedonis et al., 2000). We are also starting to accumulate evidence that a number of strategies for treating SUDs can be adapted to meet the needs of people with schizophrenia (Bellack et al., 2006). When taken together, these lines of research illustrate that SUDs in schizophrenia are prevalent and dangerous. While in some ways substance use in schizophrenia resembles that of people more broadly, at this point we have a good understanding that people with schizophrenia have additional unique and challenging treatment needs.

While research to date has provided an important outline of the problem of SUDs in schizophrenia, in-depth questions about factors that contribute to the maintenance and resolution of substance dependence in schizophrenia have yet to be examined. In a review of the literature on the epidemiology and course of comorbid schizophrenia and SUDs,

Westermeyer (2006) identified several areas of research that would “support clinical efforts” (p. 352) with people with dual SUDs and schizophrenia, including comparing the ways in which people with schizophrenia and SUDs differ from those with other psychiatric disorders in order to better understand features and consequences of SUDs that are common across different disorders versus those that are specific to schizophrenia. In addition, Westermeyer (2006) stressed the need for a closer examination of remission out of SUDs and conversion from early and partial remission to sustained remission among people with schizophrenia. Others have similarly called for research on how remission is achieved and maintained in schizophrenia, as well as more and better information on the heterogeneity among people with schizophrenia and substance dependence or in remission that can, ultimately, help us tailor interventions to specific subgroups of people in need (Drake, Wallach, & McGovern, 2005). Importantly, it is assumed there is a range of negative consequences of drug use for people with dual SUDs and schizophrenia, and that these negative consequences are ameliorated or reversed during a period of remission (i.e. no or minimal drug use). However, the hypothesis that functioning in any domain (psychiatric, social, cognitive) substantially improves in remission has not been fully examined. Some have found that people with SMI who are former or remitted substance abusers are similar to current abusers on measures of symptoms and depression (Carey, Carey, & Simons, 2003; Margolese et al, 2006), while others have found that remission is associated with improvements in these domains (Cuffel & Chase, 1994). The mixed nature of these findings suggests that a more in-depth examination of how people with schizophrenia in remission differ from those with current SUDs is needed. Importantly, such findings would inform those who work with this population of the kinds improvements that can be expected in remission, as well as the limitations on functioning that will remain even once remission is achieved.

In addition, we have little understanding about the factors that lead people with schizophrenia to make changes in their drug use. The Transtheoretical Model of Change (TTM; Prochaska, DiClemente, & Norcross, 1992; Prochaska & DiClemente, 1992) has, over the years, transformed our thinking about substance abuse treatment, with an increasing emphasis on internal motivational states as the major factors underlying change efforts. While the TTM has proven to be a useful model for understanding the development and persistence of addictive disorders in diverse populations (Prochaska, DiClemente, & Norcross, 1992), it is unclear if such a conceptualization provides the best explanation for change in people with schizophrenia and SUDs. The standard measures for assessment of these constructs have been found to perform well in people with severe mental illness (Nidecker, DiClemente, Bennett, & Bellack, 2008), and there is evidence to suggest that people with schizophrenia can understand TTM-related constructs (Carey, Prunine, Maisto, Carey, & Barnes, 1999). However, the many and varied cognitive deficits associated with schizophrenia may make it difficult for people with the disorder to understand some of the abstract, internally-focused concepts that are inherent to the TTM model. It could be that events that are more concrete and immediately relevant to the lives of people with schizophrenia, such as homelessness, victimization, arrests, or advice/threats from family or friends are more relevant to pushing people with schizophrenia into making changes in substance use than motivational factors.

The present study examined psychiatric functioning, substance use and consequences, and motivation to change in people with schizophrenia and affective disorders with current or remitted cocaine dependence. Data were collected as part of a naturalistic, longitudinal study examining substance use, motivation to change, and the process of change in people with schizophrenia and affective disorders who met DSM-IV criteria for current Cocaine Dependence or Cocaine Dependence in Early Remission with five assessments over twelve months (n=240). We examined the following questions: (1) Do people with schizophrenia in

remission from cocaine dependence show better psychiatric functioning than those who are currently dependent? (2) How do people with schizophrenia and current cocaine dependence differ in terms of substance use and consequences from people with schizophrenia in remission and people with affective disorders and current drug dependence? (3) What internal factors and external factors are associated with changes in substance use schizophrenia, and how do these differ from those with non-psychotic affective disorders?

Methods

Participants

Data were collected as part of a naturalistic longitudinal study examining substance use and motivation to change in people with affective disorders or schizophrenia with either current cocaine dependence or cocaine dependence in remission. Participants were assessed five times over twelve months. Participants were recruited from outpatient mental health clinics affiliated with a Veterans Administration Medical Center and a division of psychiatry at a public university. Individuals with affective disorders or schizophrenia/schizoaffective disorder and a DSM-IV diagnosis of current cocaine dependence and those who fulfilled criteria for cocaine dependence in early full or sustained full remission (indicating remission for between 1-12+ months) were recruited. Additional inclusion criteria were: 1) age between 18 and 55 years, and 2) ability and willingness to provide consent to participate. Exclusion criteria (for all groups) were: 1) documented history of neurological disorder or head trauma with loss of consciousness, 2) mental retardation as indicated by chart review or prorated IQ score from the short form of the WAIS-R, or 3) inability to effectively participate in the protocol assessments due to intoxication or psychiatric symptoms. Of the 4095 medical records screened, 1044 (25.49%) were found to be eligible to participate based on both a review of the record and brief discussions with the individual and/or his/her clinician. Of those who passed screening, 41% were approached for possible participation. The remaining percentage either could not be located in order to be offered the opportunity for study participation (generally due to these individuals failing to attend or discontinuing treatment at the mental health clinic) or expressed interest in study participation yet failed to attend multiple appointments to discuss informed consent. Of those who were eligible and approached for study participation, 397 (38.03%) people signed consent to participate (3.07% were approached but refused). Of those who signed consent, 73 (18.39%) completed consent only, 11 (2.77%) signed consent to participate and completed some but not all of the baseline assessment, and 73 (18.39%) were ruled ineligible (for reasons such as not meeting criteria for a current or remitted SUD or severe mental illness). Data for the present study were taken from the baseline study assessment (n=240).

Measures

Diagnostic and symptom assessments—The **Structured Clinical Interview for DSM-IV** (SCID –I; Spitzer, Williams, Gibbon, & First, 1992; First, Spitzer, Gibbon, & Williams, 1994) was used to establish diagnosis. Interviews were completed by doctoral or masters level psychologists. Diagnoses were achieved utilizing all available information (patient report, medical records, treatment providers). Inter-rater reliability (kappa) for the SCID diagnoses (psychiatric and substance abuse/dependence) was greater than 0.80. The **Positive and Negative Syndrome Scale** (PANSS; Opler, Kay, Lindenmayer, & Fiszbein, 1992) was used to assess symptoms of severe mental illness, with separate ratings for positive symptoms, negative symptoms, and general psychopathology. The PANSS has good reliability and validity (Kay, Fiszbein, & Opler, 1987).

Substance use and consequences—The **Addiction Severity Index** (ASI; McLellan et al., 1992a; 1992b) was used to assess drug use frequency and severity. The ASI is a semi-

structured interview that is widely used in the field (e.g., Carroll et al., 1993; McLellan et al., 1992a; 1992b). We administered the drug, alcohol, family/social, and legal sections of the ASI, as they are the most reliable sections for this population (Carey et al., 1997; Hodgins and el-Guebaly, 1992). The **Inventory of Drug Use Consequences** (InDUC; Tonigan & Miller, 2002) was used to assess substance-related negative consequences. The original InDUC has 50 items that evaluate lifetime (InDUC-L) and recent (past 3-months; InDUC-R) adverse consequences in 5 domains: Physical, Interpersonal, Intrapersonal, Impulse Control, and Social Responsibility. Individuals first complete the Lifetime items, which ask if a consequence has ever happened (0 = No, 1 = Yes); this is followed by the Recent items which ask if a consequence has happened in the past 3-months (0 = Never to 3 = Daily or almost daily). For the present study, the InDUC was modified for severe mental illness (InDUC-M). Items tapping issues not relevant to most people with schizophrenia were removed, as were items focused on abstract or future concepts. Several items, including those in the Control scale designed to detect careless responding (Tonigan & Miller, 2002) were removed to avoid redundancy and to decrease length. The final version of the InDUC used here included 36 items. There is evidence that a brief version of the InDUC has good reliability in people with severe mental illness (Bender, Griffin, Gallop, & Weiss, 2007). In our sample, internal consistency reliabilities for the InDUC-M Lifetime (Chronbach's alphas ranged from 0.68 for the Social Responsibility scale to 0.88 for the Intrapersonal subscale) and Recent subscales (Chronbach's alphas ranged from 0.69 for the Impulse Control subscale to 0.89 for the Physical subscale) were good.

Service use—The Substance Use Event Survey for Severe Mental Illness (SUESS; Bennett, Bellack, & Gearon, 2006) assesses clinical issues and service utilization. Developed for people with dual SUDs and severe mental illness, the SUESS is a brief (20-30 minutes) measure that assesses service use and descriptive information that may relate to service use in people with dual disorders. The SUESS also gathers information about recent changes in drug use and assesses the importance of 13 reasons for change: being arrested, health concerns, victim of a crime, psychiatric illness, psychiatric medications, influence of family member, influence of friend, influence of therapist, drug abuse treatment, money, housing, influence of religion, and boredom. In addition, the SUESS gathers information about beginning new drug abuse treatment and assesses the importance of 5 intrinsic (thought about pros and cons, hit rock bottom, saw someone else high, someone you know quit, had a religious experience) and 8 extrinsic (warned by a family member, traumatic event, change in lifestyle, psychological problems, warned by a doctor, physical health problems, referred by court/probation/parole, referred by case manager/therapist) reasons for seeking treatment adapted from measures by Sobell, Toneatto, and Leo (1993) and Cunningham, Sobell, Sobell, & Gaskin (1994). Preliminary findings suggest that the psychometric properties and validity of the SUESS are good (Bennett et al., 2006).

Transtheoretical Model of Change Variables—Stage of change was assessed with the University of Rhode Island Change Assessment-Maryland (URICA-M). The original URICA is a 32-item self-report questionnaire, which employs a 5-point Likert scale asking respondents to rate their degree of agreement (or disagreement) with each item (DiClemente & Hughes, 1990). Items refer to a “problem” that the respondent identifies. The URICA-M is a modified version designed to suit the needs of people with severe mental illness including: (1) reading items aloud to accommodate those who cannot read or do not have eyeglasses; (2) modifying language to make it simpler to understand for those with cognitive deficits; (3) defining the “problem” referred to in each item as “illegal drug use”; and (4) including only 24 items. The URICA-M includes four subscales: Precontemplation, Contemplation, Action, and Maintenance (DiClemente & Prochaska, 1998). A single

readiness to change score is calculated by subtracting the Precontemplation score from the sum of the Contemplation, Action, and Maintenance scores. Factor analytic research has validated this single continuous readiness to change score (Carbonari, DiClemente, & Zweben, 1994). The possible range of the readiness score is -2.00 to 14.00 with higher scores representing greater readiness. The **Processes of Change Questionnaire** (POC, Prochaska, Velicer, DiClemente, & Fava, 1988) was used to assess the frequency of occurrence of 10 core behavioral processes on 5-point Likert scales (1=never to 5=repeatedly). We used the 20-item version that yields a total processes score (indicating the overall number of processes used), an experiential processes subscore (n=10 items that reflect processes including consciousness raising and dramatic relief) and a behavioral processes subscore (n=10 items that reflect behavioral management strategies including contingency management and stimulus control). The drug version of the **Decisional Balance Questionnaire** (Prochaska et al. 1994; Velicer, DiClemente, Prochaska, & Brandenburg, 1985) were used to assess self-reported “pros” and “cons” of drug use. In order to enhance the ecological validity for our population, we added several items that have been identified as important in our pilot work (e.g., being on conditional release from jail, being evicted from a residence, court control of one’s children). Drug abstinence self-efficacy was assessed using the **Temptation to Use Drugs Scale** and the **Abstinence Self-Efficacy Scale** (DiClemente, Carbonari, Montgomery, & Hughes, 1994), 20-item scales that assess the degree to which subjects feel “tempted” to use drugs in different situations and the degree to which they feel confident in their ability to abstain from drug use in those situations. Respondents make ratings using 5-point Likert scales. Total and subscale scores (Negative Affect, Social/Positive Influences, Physical and Other Concerns, Withdrawal and Urges) are calculated. Psychometric properties of these scales are strong across addictive behaviors (DiClemente et al., 1994; Hiller, Broome, Knight, & Simpson, 2000; Velicer, DiClemente, Rossi, & Prochaska, 1990).

Procedures

Study procedures were approved by the University of Maryland Institutional Review Board. Medical records of all new intakes at several recruitment sites were reviewed once per week to determine preliminary eligibility. All participants completed a standardized informed consent process with trained recruiters and were advised that a Federal Certificate of Confidentiality would protect the information they provided. Participants completed the diagnostic interview first, and generally completed the remaining baseline assessments, including the substance use/severity instruments and measures of the TTM within a week. Participants completed self-report interviews of substance use and provided urine samples for drug screens at 3-, 6-, 9-, and 12-month follow-up assessments.

Data Analysis

Group comparisons were made via t-tests, Wilcoxon rank sum tests, chi-squared tests, and multivariate analysis of variance (MANOVA). In all analyses in which MANOVA was used, post-hoc univariate comparisons were examined only when the overall MANOVA was significant to protect against Type-I error. All significant MANOVAs were followed by univariate ANOVAs or t-tests to explore which variables in particular explained the overall difference. All univariate effects were evaluated with Tukey’s honestly significant difference.

Results

Descriptive Characteristics of Study Groups

Overall, 240 participants completed all baseline assessments. Participants were 62.9% male, 79.2% African-American, 20.4% white, and had a mean age of 43.2 (sd=7.20, range 22-64)

and a mean of 11.9 years of education ($sd=2.2$, range 4-18). Participants comprised four groups: (1) 72 with schizophrenia/schizoaffective disorder + current cocaine dependence (S/D); (2) 48 with schizophrenia/schizoaffective disorder + cocaine dependence in remission (S/R), (3) 65 with non-psychotic affective disorder + current cocaine dependence (A/D); and (4) 55 with non-psychotic affective disorder + cocaine dependence in remission (A/R). The study groups did not differ on gender, percentage that were unmarried, or years of education. Both schizophrenia groups had higher percentages of African-American participants (90.28% in S/D; 85.42% in S/R) than did the affective disorder groups (63.08% in A/D; 69.09 in A/R) ($X^2=18.19$, $df=3$, $p=.0004$). The mean age for the S/R group (mean=45.38, $sd=6.20$) was higher than the other study groups (mean age S/D=41.14, $sd=7.23$; mean age A/D=43.77, $sd=7.89$; mean age A/R=43.15, $sd=6.75$) ($F=3.59$, $df=3$, $p=.014$). Study groups were comparable on years of regular substance use, with no group differences on mean years of drinking to intoxication, mean years of heroin use, mean years of cocaine/crack use, or mean years of marijuana use.

Psychiatric Functioning in S/D and S/R Groups

A series of t-tests, Wilcoxon rank sum tests, and chi-squared tests was used to compare the S/D and S/R groups on psychiatric severity (age at SMI onset, number of hospitalizations, family history of psychiatric problems, SCID global assessment of functioning, self-reported distress from psychiatric problems in the last 90 days) and past 90-day psychiatric treatment use (hospitalization, medication use, seen mental health professional, received group treatment). No significant differences were found. MANOVA was used to compare the groups on negative symptoms, positive symptoms, and general psychopathology scores from the PANSS; this MANOVA was significant ($F=3.17$, $df=3/116$, $p=.0271$). Univariate tests showed that the S/D group had a higher level of negative symptoms (mean=2.38, $sd=0.78$) than the S/R group (mean=2.00, $sd=0.64$, $F=7.76$, $p=0.0062$).

Features of Substance Dependence in Schizophrenia and Affective Disorders

S/D versus A/D—To examine how substance dependence differs between diagnostic groups, we conducted three MANOVAs comparing the S/D and A/D groups on variables tapping recent (last month) substance use and problems (Table 1). The first MANOVA included days of use of cocaine, heroin, and marijuana in the last month; days of drug problems in the last month; and ratings of distress due to drug problems in the last month. This MANOVA was significant ($F=2.53$, $df=6/125$, $p=.0240$). Due to skew, Wilcoxon tests were used to examine group differences on individual variables. The A/D group reported more days of drug problems and more distress from drug problems in the last month than the S/D group. The second MANOVA compared the groups on recent consequences (InDUC-M recent subscale scores); this MANOVA was significant ($F=3.34$, $df=5/109$, $p=.0075$). The A/D group had more recent consequences on the InDUC-Physical and Intrapersonal subscales than the S/D group. The third MANOVA compared the groups on lifetime consequences (InDUC-M lifetime subscale scores); this MANOVA was significant ($F=4.89$, $df=5/111$, $p=.0004$). The A/D group reported more lifetime consequences than the S/D group in every domain.

We then conducted descriptive analyses (t- and chi-square tests) comparing the groups on legal (drug arrest, non-drug arrest, on probation, spend night in jail, all assessed for last 90 days; lifetime number of months incarcerated; lifetime number of times charged with a crime) and victimization (robbed/mugged, beaten/kicked, raped/sexually assaulted, and shot/stabbed; all assessed for past 90 days) issues, drinking patterns and alcohol use disorders (days of drinking and days of drinking to intoxication in the last month, current alcohol use disorder, lifetime alcohol use disorder), and substance abuse treatment use (inpatient drug treatment, talked with professional about drug use, outpatient drug treatment, inpatient

alcohol treatment, talked with professional about drinking, and outpatient alcohol treatment; all assessed for past 90 days). Two variables were log transformed due to skew (number of months incarcerated in lifetime, and number of times charged with a crime). Few differences were found between the groups. There was a trend for the S/D group to be more likely to have spent a night in jail in the last 90 days (18.06%) than the A/D group (7.69%, $X^2=3.21$, $df=1$, $p=.08$); the S/D group also had more lifetime months of incarceration (mean=1.47, $sd=1.91$) than the A/D group (mean=0.44, $sd=1.58$, $t=53.36$, $p=.001$). The A/D group reported a greater rate of rape/sexual assault in the last 90 days (6.15%) than the S/D group (0%, $X^2=4.56$, $df=1$, $p=.05$). There were no differences in treatment use.

S/D versus S/R—In order to examine how being in remission from cocaine dependence might impact substance use patterns and problems in schizophrenia, we conducted several comparisons of the S/D and S/R groups. First, Wilcoxon tests were used to compare the groups on days of use of cocaine, heroin, and marijuana in the last month; days of drug problems in the last month; and ratings of distress due to drug problems in the last month (Table 2). The S/D group reported more days of use of all drugs, more days of drug problems, and higher rates of distress related to drug problems. Second, we conducted two MANOVAs comparing the groups on recent and lifetime drug-related consequences (Table 2). The MANOVA comparing InDUC-M Recent scores was not significant. The MANOVA comparing InDUC-M Lifetime scores was significant ($F=3.82$, $df=5/91$, $p=.004$). The S/R group reported more lifetime consequences than the S/D group in every domain.

We then conducted descriptive analyses comparing the S/D and S/R groups on the variables tapping legal and victimization issues, recent and past drinking patterns and alcohol use disorders, and substance abuse treatment use listed above. Although there were no meaningful differences on legal or victimization variables, there were several differences in current drinking and alcohol use disorders. The S/D group reported more days of any drinking than the S/R group (S/D mean=5.20, $sd=7.79$; S/R mean=1.33, $sd=4.12$; $Z=-5.29$, $p=.0001$), more days of drinking to intoxication (S/D mean=4.81, $sd=7.97$; S/R mean=1.26, $sd=4.13$; $Z=-4.39$, $p=.0001$), and higher rates of current alcohol use disorders (S/D=31.71%, S/R=7.89%, $X^2=6.92$, $df=1$, $p=.009$). There were no differences in treatment use.

Internal and External Factors and Change

Group comparisons on TTM variables—We conducted two MANOVAs comparing the four diagnostic groups on: (MANOVA 1) URICA-M subscale scores; and (MANOVA 2) ASES and TUDS total scores and experiential, and behavioral scores from the POC Scale. Both MANOVAs were significant (MANOVA1: $F=5.44$, $df=12/611$, $p<.0001$; MANOVA 2: $F=6.72$, $df=12/614$, $p<.0001$). Group differences are presented in Figures 1 and 2. Both schizophrenia groups were higher on precontemplation than the affective disorder groups ($F=15.95$, $p=.0001$); the S/D group had the highest precontemplation scores (mean=2.60, $sd=0.84$), though they were not significantly different from the S/R group (mean=2.30, $sd=0.76$). The S/D group was significantly lower in contemplation (mean=4.09, $sd=0.64$) than both affective disorder groups (A/D mean=4.51, $sd=0.41$; A/R mean=4.38, $sd=0.38$), and was lower in action (mean=3.99, $sd=0.63$) than all other groups (A/D mean=4.30, $sd=0.54$; A/R mean=4.38, $sd=0.40$; S/R mean=4.33, $sd=0.47$). For the other TTM variables, the dependent groups were higher in temptation, lower in confidence, and lower in behavioral processes than remitted groups. While there were no significant differences by diagnosis, the S/D group generally showed the lowest readiness to change, fewest efforts being made to change, and lowest confidence in the ability to change.

Motivational factors associated with change—To examine motivational differences that might be related to changes in drug use, we conducted exploratory analyses of

differences on TTM variables in two smaller S/D subgroups – S/D participants who reported a recent (last 90 days) decrease in drug use (n=36) and those who did not (n=35). Differences were examined via MANOVA; results are presented in Table 3. The first MANOVA included URICA stages of change, ASES total score, TUDS total score, and InDUC-L total score; this MANOVA was significant ($F=3.36$, $df=7/48$, $p=.0053$). Those who had made a change were higher on URICA-Maintenance and reported a greater number of lifetime consequences than those who hadn't made a change. The second MANOVA compared these groups on experiential, behavioral, and total scores from the POC; this MANOVA was significant ($F=4.98$, $df=2/68$, $p=.0096$). Those who had made a change used more behavioral and experiential processes than did those who had not.

To determine if factors underlying change were similar across diagnostic groups, we repeated these MANOVAs comparing S/D subjects who reported a recent decrease in their substance use (n=36) with similar A/D subjects (n=47). Results are presented in Table 3. The first MANOVA (URICA stages of change, ASES total score, TUDS total score, InDUC-L total score) was significant ($F=5.27$, $df=7/67$, $p=.0001$). Those who had made a change in the A/D group were lower in precontemplation, higher in contemplation, and reported more lifetime consequences than did those in the S/D group. The second MANOVA (experiential, behavioral, total scores from the POC) was significant ($F=3.51$, $df=2/81$, $p=.0346$). Those who had made a change in the A/D group used more behavioral and experiential processes than did those in the S/D group.

We then compared S/D and A/D subgroups on 13 self-reported reasons for change (see Methods section for a complete list). There were few group differences. Participants in the A/D group were more likely to report that drug abuse treatment impacted their recent decrease in drug use (A/D=52.1%, S/D=27.8%, $X^2=5.00$, $df=1$, $p=.025$), while there was a trend for those in the S/D group to more often report being arrested as a reason for change (A/D=8.3%, S/D=22.2%, $X^2=3.24$, $df=1$, $p=.072$).

Motivational factors associated with seeking treatment—To examine motivational differences that might be related to treatment seeking, we conducted exploratory analyses of differences on TTM variables in two smaller S/D subgroups – S/D participants who reported starting a new drug treatment program in the last 90 days (n=19) and those who did not (n=53). Results are presented in Table 3. The first MANOVA included URICA stages of change, ASES total score, TUDS total score, and InDUC-L total score; this MANOVA was not significant. The second MANOVA compared these groups on experiential, behavioral, and total scores from the POC; this MANOVA was not significant.

To determine if factors underlying treatment seeking were similar across diagnostic groups, we repeated these MANOVAs, this time comparing S/D subjects who reported recently (last 90 days) beginning a new drug treatment program (n=19) with similar A/D subjects (n=28). Results are presented in Table 3. The first MANOVA (URICA stages of change, ASES total score, TUDS total score, InDUC-L total score) was significant ($F=3.33$, $df=7/35$, $p=.0080$). Those who had started a new treatment program in the A/D group were lower in precontemplation, higher in contemplation, and higher in confidence than those in the S/D group. The second MANOVA (experiential, behavioral, total scores from the POC) was significant ($F=11.44$, $df=2/44$, $p=.0001$). Those who began a new treatment program in the A/D group used more behavioral and experiential processes than did those in the S/D group.

Discussion

The present study explored the ways in which cocaine dependence impacts and is experienced by people with schizophrenia. By comparing people with schizophrenia and

current cocaine dependence to those in remission, we were able to examine how drug use impacts psychiatric functioning, substance use and consequences, and motivation to change within schizophrenia, as well as to explore whether functioning improves in remission. By comparing people with schizophrenia and current cocaine dependence to those with affective disorders, we were able to examine whether dependence in schizophrenia is different from what is found in other psychiatric disorders in any fundamental way.

In terms of psychiatric functioning, people with schizophrenia and current dependence were more symptomatic than those in remission, reporting higher levels of both recent positive and negative symptoms. The finding that drug use is associated with poorer current psychiatric functioning is intuitive and in line with other findings (Swartz et al., 2006; Talamo et al., 2006). The fact that there were no differences between those with current dependence and those in remission on variables tapping recent psychiatric treatment suggests that drug use does not make it any less likely that people with schizophrenia will access mental health services. The lack of difference on variables such as age of onset, number of hospitalizations, and family history of psychiatric problems suggests that severity of psychiatric disorder may not impact the ability of people with schizophrenia to achieve remission from drug problems.

There were many differences between the schizophrenia dependent and remitted groups in terms of drug use and consequences. The dependent group reported more days of drug use (for both cocaine and other drugs), more days of drug problems, and more distress from drug problems than the remitted group. Moreover, the current dependent group reported more days of drinking and drinking to intoxication, as well as higher rates of current alcohol use disorders than the remitted group. In contrast, the remitted group reported more lifetime drug-related consequences. It is possible that the combination of more perceived drug-related consequences, less other drug use, and lack of alcohol problems is a significant factor in remission. That is, the ability to remit from cocaine dependence in schizophrenia may be related to recognizing the serious impact of drug use on one's life and functioning, to limiting problem use to one drug, and to having only one substance class (drugs) to address rather than two (drugs and alcohol). The addition of multiple drugs and alcohol may represent a significant barrier to remission in schizophrenia. The fact that those who have given up a drug (i.e. remitted group) now view it as more of a problem (and in retrospect report a higher level of lifetime drug-related consequences), while current users are less likely to see drug use as problematic (and so report fewer lifetime drug-related consequences) suggests that it may be the *perception* of having many drug related problems that is more important to remission than the actual number of problems accrued.

When compared to participants with affective disorders, those with schizophrenia and current dependence reported fewer days of problems associated with their drug use and less distress from drug problems. Importantly, there was no difference between these groups on days of drug use. In addition, the schizophrenia group reported fewer recent and lifetime consequences associated with their drug use. It is possible that people with schizophrenia do, in fact, experience fewer problems and consequences as a result of their drug use than do those with affective disorders. Due to the serious nature of their symptomatology and associated cognitive and social deficits, many people with schizophrenia do not participate in social and interpersonal activities that could be impacted by drug use, thereby lessening the overall impact of drug use in these domains. Another explanation is that people with schizophrenia and current dependence may have less insight into the connection between their drug use and life problems. Because schizophrenia itself is associated with important social and functional impairments, it may be difficult for individuals to determine which life problems are caused or worsened by drug use. Importantly, it may be this perception – that

drug use is not the cause of many consequences - that may change for people with schizophrenia who are able to transition into remission from drug dependence.

Several comparisons were made on readiness to change variables. Those with schizophrenia and current cocaine dependence showed a pattern of high precontemplation scores, accompanied by low confidence, and low use of change strategies. This pattern captures a constellation of internal, motivational barriers to remission: the belief that change is not needed, low self-efficacy in one's ability to change, and few efforts to make change happen. In contrast, those with affective disorders and current dependence were highest in contemplation and reported greater use of change strategies. Here again, people with affective disorders, who reported higher distress and more consequences from their drug use, may be better cognitively able to translate this distress into a greater consideration of the benefits of change and greater use of change strategies. Interestingly, when subgroups of participants with current dependence who had or had not made a recent change in their drug use were compared, those with schizophrenia who had made a change appear much more similar to the affective disorder and schizophrenia remitted groups: they reported more consequences, higher maintenance stage score, and more change efforts than those with schizophrenia and current dependence who had not made a change. This suggests that change is associated with the recognition that drug use is causing problems (i.e. more negative consequences) as well as making some actual effort to do things differently. Although there were a few minor differences in life events related to change (the schizophrenia group more often reported being arrested as related to change; the affective disorder group more often reported attending substance abuse treatment as contributing to change), overall there were not large diagnostic group differences in the sorts of life events that go along with change. It is, perhaps, reaching a quantitative (many consequences) versus qualitative (different sorts of problems) threshold that inspires change. Results were similar when we compared subgroups of participants who did or did not start a new substance abuse treatment program. In these comparisons, there were no differences on motivational variables between the schizophrenia subgroups; in line with other findings, the affective disorder subgroup that began new substance abuse treatment showed higher contemplation scores, greater confidence, and greater use of processes of change than the schizophrenia subgroup. Thus we again see that doing something in the service of change (starting a new substance abuse treatment) is associated with the recognition that change is needed, higher self-efficacy, and trying out change activities. Given the smaller sample sizes included in these subgroup analyses, these comparisons must be considered exploratory.

Limitations of the study include the possibility that the sample is not fully representative of individuals with severe mental illness in the community (due to participants being connected with and attending outpatient mental health treatment), and for the remitted groups, the fact that data on length of remission (early vs. sustained) were not available. While the study groups were large in comparison to those in the literature on samples of people with severe mental illness and substance use disorders, the analyses addressed a large number of comparisons; future analyses would be improved by including larger sample sizes. In particular, the analyses of TTM variables in study subgroups (changers/nonchangers; treatment seekers/nonseekers) were based on smaller sample sizes. In spite of these limitations, there are several clinical implications of these findings. First, remission from drug dependence is associated with improvements in symptoms, making it an important component of psychiatric treatment. Conversely, current dependence did not lessen use of psychiatric treatment in this sample; it is important that psychiatric treatment address drug dependence as a way to improve mental health functioning and outcomes. Second, although people with schizophrenia and current drug dependence may report fewer consequences from their drug use, it might be that recognition of consequences is an important component of, and precursor to, remission. Early treatment for substance use disorders in schizophrenia

may need to involve helping people gain an understanding of the ways in which drug use is causing problems for them independently of their mental illness. In addition, treatment for drug dependence may be further complicated by comorbid alcohol abuse or dependence. Careful assessment of drinking patterns and including alcohol as a focus of treatment may be an important factor in helping people with schizophrenia and current drug dependence move towards remission. Finally, motivational strategies may be useful in helping people with schizophrenia and current drug dependence to better recognize the benefits of change, to build self efficacy, and to support gradual experimentation with change strategies.

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Figure 1.
URICA-M Subscale Scores for Four Diagnostic Groups

Figure 2.
ASES and TUDS Total Scores and Experiential and Behavioral Scores from the POC Scale
for Four Diagnostic Groups

Table 1

Comparisons of A/D and S/D Groups on Recent Drug Use and Recent and Lifetime Consequences

Variable	A/D (n=65)	S/D (n=72)	Test	<i>p</i>
Mean Days of Drug Use and Problems in the Last Month (SD) (MANOVA (F=2.53, df=6/125, p=.0240))				
Days of cocaine use	5.42 (7.14)	6.64 (8.11)	Z=-1.0558	ns
Days of heroin use	2.15 (5.60)	1.27 (4.24)	Z=1.3215	ns
Days of marijuana use	0.69 (1.98)	1.22 (4.27)	Z=-0.5671	ns
Days of drug-related problems	10.50 (11.75)	8.31 (11.86)	Z=2.1448	p=.03
Rating of distress	2.57 (1.49)	1.77 (1.56)	Z=2.8446	p=.005
Subscales from InDUC-Recent (MANOVA F=3.34, df=5/109, p=.0075)				
Physical	7.25 (5.18)	5.32 (4.83)	F=4.28	p=.04
Interpersonal	5.92 (5.19)	4.48 (4.50)	F=2.51	ns
Intrapersonal	9.83 (5.13)	6.54 (6.11)	F=9.95	p=.002
Impulse control	4.20 (3.94)	3.07 (3.00)	F=2.98	ns
Responsibility	4.53 (3.71)	3.78 (3.41)	F=1.27	ns
Subscales from InDUC-Lifetime (MANOVA F=4.89, df=5/111, p=.0004)				
Physical	6.03 (1.86)	4.67 (2.36)	F=12.20	p=.0007
Interpersonal	5.22 (1.81)	3.38 (2.29)	F=18.47	p=.0001
Intrapersonal	5.38 (1.14)	3.96 (2.23)	F=19.10	p=.0001
Impulse control	6.48 (2.92)	4.25 (2.82)	F=17.76	p=.0001
Responsibility	3.48 (0.91)	2.75 (1.29)	F=12.62	p=.0006

Table 2

Comparisons of S/D and S/R Groups on Recent Drug Use and Lifetime Consequences

Variable	S/D (n=72)	S/R (n=48)	Test	<i>p</i>
Mean Days of Drug Use and Problems in the Last Month (SD)				
Days of cocaine use	6.64 (8.11)	0	Z=-8.25	p=.0001
Days of heroin use	1.27 (4.24)	0	Z=-2.97	p=.003
Days of marijuana use	1.23 (4.27)	0.70 (4.42)	Z=-3.00	p=.003
Days of drug-related problems	8.31 (11.86)	2.61 (6.64)	Z=-3.45	p=.0006
Rating of distress	1.77 (1.56)	1.09 (1.41)	Z=-2.50	p=.012
Subscales from InDUC-Lifetime (MANOVA F=3.82, df=5/91, p=.0035)				
Physical	4.67 (2.36)	6.20 (1.84)	F=11.85	p=.0009
Interpersonal	3.58 (2.29)	5.48 (1.89)	F=18.50	p=.0001
Intrapersonal	3.96 (2.23)	5.18 (1.66)	F=8.48	p=.0045
Impulse control	4.25 (2.82)	6.60 (3.11)	F=15.06	p=.0002
Responsibility	2.75 (1.29)	3.53 (0.91)	F=10.65	p=.0015

Table 3

Differences on TTM Variables among Subgroups of S/D and A/D Groups

Variable	Made a change ¹			Started new treatment ²		
	S/D+ (n=36)	A/D+ (n=47)	S/D- (n=35)	S/D+ (n=19)	A/D+ (n=28)	S/D- (n=53)
URICA-Precontemplation	2.66 (0.88)	1.75 (0.57) _b	2.55 (0.81)	2.53 (0.71) _a	1.70 (0.54) _b	2.63 (0.88)
URICA-Contemplation	4.17 (0.53)	4.52 (0.38) _b	3.99 (0.73)	4.13 (0.49) _a	4.49 (0.48) _b	4.07 (0.69)
URICA-Action	4.11 (0.55)	4.28 (0.52)	3.86 (0.70)	4.07 (0.45)	4.30 (0.49)	3.96 (0.69)
URICA-Maintenance	3.93 (0.69) _a	3.94 (0.61)	3.47 (0.80) _b	3.63 (0.74)	3.71 (0.62)	3.72 (0.79)
ASES Total	2.78 (0.81)	3.05 (0.98)	2.79 (1.01)	2.26 (0.69) _a	3.21 (1.10) _b	2.98 (0.90)
TUDS Total	2.95 (0.91)	3.11 (0.95)	2.92 (0.87)	3.07 (0.78)	2.87 (0.99)	2.90 (0.92)
InDUC-L total	22.66 (8.30) _a	27.87 (5.92) _b	14.25 (9.12) _b	21.38 (8.87)	26.00 (7.26)	18.37 (9.76)
POC-Behavioral	3.34 (0.59) _a	3.54 (0.77) _b	2.85 (0.72) _b	2.84 (0.60) _a	3.72 (0.68) _b	3.19 (0.71)
POC-Experiential	3.13 (0.61) _a	3.48 (0.58) _b	2.77 (0.91) _b	2.71 (0.75) _a	3.41 (0.54) _b	3.12 (0.68)
POC-Total	3.24 (0.51) _a	3.51 (0.60) _b	2.81 (0.76) _b	2.77 (0.59) _a	3.56 (0.54) _b	3.12 (0.68) _b

Note: Different subscripts reflect significant difference from S/D+ group.

¹Made a change=reported a decrease in drug use in the last 90 days; “+”=reported a change; “-”=reported no change.²Started new treatment=reported starting new drug treatment in the last 90 days; “+”=reported starting new program; “-”=reported not starting new program.