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Psychiatric Severity and HIV-Risk Sexual Behaviors among Persons with Substance Use Disorders

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Abstract

Objective—The relationship between mental illness and human-immunodeficiency virus (HIV)-risk sexual behavior among persons with substance use disorders is not well established because of differences in assessing psychiatric factors (types, symptoms, severity), substance use (diagnosis, survey responses, past substance use) and HIV-risk sexual behaviors (individual measures, combination of sex/drug use risk behaviors) across studies. This study utilized a more global and dimensional aspect of psychiatric issues (problem severity), to examine the relationship with HIV-risk sexual behaviors and substance use among persons with substance use disorders.

Methods—Participants included 224 men and 46 women, with a mean age of 40.4 years ($SD = 9.5$). The most common substances were heroin/opiates, with 41.4% reporting use of these substances ($n = 110$, 110/266), while 27.8% reported using cocaine ($n = 74$, 74/266) and 12.8% reported using alcohol ($n = 34$, 34/266). Of all participants, 39 (14.4%) were identified as having high psychiatric severity (defined using the psychiatric severity score from the Addiction Severity Index), which was used as an indication of probable comorbid psychiatric and substance use disorders. Among these participants likely to have comorbid disorders, hierarchical linear regression was conducted to examine HIV-risk sexual behaviors (number of partners and unprotected sexual behaviors in the past 30 days) in relation to psychiatric severity, substance use, and gender.

Results—Gender (women) and psychiatric severity (higher) were significantly related to greater HIV-risk sexual behaviors. After entering gender and substance use into the regression model, psychiatric severity accounted for another 21.9% of the variance in number of partners and 14.1% of the variance in unprotected sexual behaviors. Overall, the models accounted for 55.5% and

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15.6% of the variance, respectively. A significant interaction was found for number of partners (but not frequency of unprotected behavior), such that those higher in psychiatric severity and higher in substance use had a greater number of sexual partners. The model including this interaction term accounted for 63.4% of the variance in number of partners.

Conclusions—Findings suggest psychiatric severity is an underlying risk factor for HIV-risk sexual behavior among persons with substance use disorders who have various psychiatric comorbidities.

Keywords

HIV-risk sexual behaviors; psychiatric severity; psychiatric comorbid substance use disorders; risk factors; substance use

Co-occurring psychiatric disorders among persons with substance use disorders are fairly common, affecting approximately four million adults in the United States (Abou-Saleh & Janca, 2004; Grant et al., 2004; Regier et al., 1990). Post-treatment outcomes are typically worse for persons who have comorbid psychiatric and substance use disorders (i.e., persons whose “dual-diagnosis” includes a substance use disorder) compared to persons with substance use disorders who do not have co-occurring psychiatric disorders (Burns, Teesson & O'Neill, 2005; Kushner, Abrams, Thuras, Hanson, Brekke, & Sletten, 2005), suggesting that mental illness poses health risks for persons with substance use disorders.

For instance, blood-borne infections including the human-immunodeficiency virus (HIV), substance use, and involvement in HIV-risk sexual behavior have been reported among persons with severe mental illnesses (e.g., schizophrenia, bipolar and major mood disorders) in multisite investigations (Rosenberg et al., 2003). Research evidence suggests persons with comorbid psychiatric and substance use disorders engage in more overall HIV-risk behaviors than persons who have substance use disorders alone, including a number of HIV-risk sexual behaviors (e.g., sex with intravenous drug users and engaging in sex for money/gifts) (Disney et al., 2006), and have a greater likelihood of reporting an HIV/AIDS diagnosis (Dausey & Desai, 2003). However, the relationship between mental illness and HIV-risk sexual behavior among persons with substance use disorders is not well established because the assessment of psychiatric symptoms and disorders has been limited to specific types (Dausey & Desai; McCusker, Goldstein, Bigelow, & Zorn, 1995; McHugh, Weitzman, Safren, Murray, Pollack, & Otto, 2012; Plotzker, Metzger, & Holmes, 2007; Reback, Kamien, & Amass, 2007; Rosenberg et al.) and lifetime/current prevalence rates (Disney et al., 2006; King, Kidorf, Stoller, Brooner, 2000). Assessing psychiatric comorbidity in a way that encapsulates a wider range of current symptoms and diagnostic types among persons with substance use disorders might help us better understand HIV-risk sexual behavior among persons with comorbid psychiatric and substance use disorders.

Psychiatric severity (i.e., the extent one is currently affected by psychiatric problems) has been widely used in addiction research and covers a wide range of psychiatric problems (Makela, 2004). However, there is a dearth of literature on psychiatric severity in relation to HIV-risk sexual behavior. One investigation among persons with substance use disorders and HIV-positive serostatus found participants who engaged in unprotected sexual practices

had significantly higher levels of psychiatric severity than those who did not engage in unprotected sexual practices, and that psychiatric severity was positively correlated to HIV-risk sexual behavior overall (Avants, Warburton, Hawkins, & Margolin, 2000). On the contrary, a later study found that lower levels of psychiatric severity predicted (combined) HIV-risk sexual/drug use behavior in a sample of persons whose psychiatric comorbidity was limited to bipolar disorder (Meade, Graff, Griffin, & Weiss, 2008). It is not clear whether psychiatric severity is a risk factor for HIV-risk sexual behavior among persons with comorbid psychiatric and substance use disorders.

In addition, other investigations have found that substance use predicted HIV-risk sexual behavior. For instance, the use of substances while engaging in sexual activities among patients with comorbid psychiatric and substance use disorders (Devieux, Malow, Lerner, Dyer, Baptista, Lucenko, et al., 2007) and use of alcohol among women injection drug users in detoxification treatment (Ress, Saitz, Horton, & Samet, 2001) were found to predict HIV-risk sexual behavior. Other evidence suggests sexual behavior varies in relation to sociodemographic characteristics and substance use across treatment sites (Mark et al., 2006). Although HIV-risk sexual behavior is influenced by a number of factors, few investigations have examined psychiatric severity, recent substance use, and sociodemographic characteristics as independent predictors of HIV-risk sexual behavior. Furthermore, to our knowledge no one has examined the relationship between psychiatric severity and substance use with regard to HIV-risk sexual behavior among persons with comorbid psychiatric and substance use disorders.

Taken together, findings across studies suggest that persons with comorbid psychiatric and substance use disorders engage in more HIV-risk sexual behavior than persons with substance use disorders alone, and that psychiatric severity is related to HIV-risk sexual behavior among persons with substance use disorders. It is not clear from current evidence whether psychiatric severity is associated with HIV-risk sexual behavior independently from substance use and sociodemographic characteristics, or whether there is a significant relationship between HIV-risk sexual behavior and psychiatric severity among persons with a range of psychiatric comorbidity that is not limited to one co-occurring diagnosis.

The present study examined psychiatric severity and HIV-risk sexual behavior among a sample of persons with comorbid psychiatric and substance use disorders exiting inpatient treatment for substance use disorders. The present study is an extension of a recent investigation that examined psychiatric severity and HIV-risk sexual behaviors in relation to lifetime physical/sexual abuse histories (Majer, Rodriguez, Bloomer, & Jason, 2014) but did not examine whether psychiatric severity was related to HIV-risk sexual behavior among those with comorbid psychiatric and substance use disorders. We hypothesized psychiatric severity would be significantly related to greater HIV-risk sexual behavior beyond what would be expected from substance use and sociodemographic characteristics among participants with comorbid psychiatric and substance use disorders.

METHODS

Participants

The sample was comprised of 270 adults (224 men and 46 women) with substance use disorders who were currently receiving (or had recently completed) abstinence-based treatment in northern Illinois, in the United States. Participants had a mean age of 40.4 years ($SD = 9.5$), were predominantly African-American ($n = 200$, 74.1%) and single ($n = 202$, 74.9%), and had an average of 10.9 years ($SD = 1.9$) of education (see Table 1). In terms of substances used, 41.4% ($n = 110$, 110/266) reported a history of using heroin/opiates, followed by 27.8% cocaine ($n = 74$, 74/266), 12.8% alcohol ($n = 34$, 34/266), 6.4% cannabis ($n = 17$, 17/266), 11.3% polysubstance use ($n = 30$, 30/266), and 0.4% amphetamine/crystal methamphetamine ($n = 1$, 1/266). Participants reported an average of three previous treatments for substance use disorders.

Procedures

The present investigation was approved and monitored by the institutional review board (IRB) of DePaul University's Office of Research Services that approved and monitored the investigation, and was conducted in accordance with the Declaration of Helsinki. All potential participants were engaged in a complete discussion of the study, and written consent was obtained after this discussion.

Eligible participants were enrolled in a larger randomized controlled trial of alternative models of aftercare and were either currently in or recently discharged from inpatient treatment for a substance use disorder. The larger trial is described in detail elsewhere (Jason, Olson, & Harvey, in press). The only exclusion criterion consisted of having a legal history of engaging in violent crime. Of all 324 individuals approached, 41 were excluded and 13 chose not to participate, resulting in an 83% overall response rate. Over 90% of participants ($n = 251$, 93%) were recruited from inpatient treatment facilities where they were completing inpatient services for substance use disorders. The remaining 19 (7%) were referred to the project through chain-referral sampling and had recently completed an inpatient treatment program. The vast majority of participants completed interviews prior to or on the day of completing their inpatient treatment program, and all received \$40 for their involvement.

Measures

Demographics—A brief survey was created to collect sociodemographic characteristics. This measure also provided information regarding participants' previous treatments for substance use disorders and incarceration histories.

Risk Behavior Survey (RBS)—We collected information regarding HIV-risk sexual behavior with the *Risk Behavior Survey (RBS)* (NIDA, 1993), a measure derived from the Risk Behavior Assessment (NIDA, 1991). The RBS is comprised of questions regarding sexual and drug use behaviors in the past 30 days. Participants were given the choice to self-administer the set of sexual behavior questions of the RBS due to the sensitivity of questions. High values of the RBS in terms of number of partners and frequency of

behaviors indicate greater risk. The RBS has been used in other studies to measure HIV-risk sexual behavior both in terms of the frequency of unprotected sexual behaviors (Hien, Campbell, Killeen, Hu, Hansen, Jiang, et al., 2010) and the number of sexual partners (Meade, Weiss, Fitzmaurice, Poole, Subramaniam, Patkar, et al., 2010). Participants' reported number of sexual partners was assessed to measure HIV-risk sexual behavior, consistent with previous investigations (Belenko et al., 2005; Holmes et al., 2005; Kang et al., 2002; Knittel et al., 2013; Mark et al., 2006; Meade et al., 2009; Richter, Komarek, Desmond, Celentano, Morin, Sweat, et al., 2013). Participants' reported frequency of unprotected sexual behaviors (various unprotected penetrative and oral sexual behaviors with men and women) was also assessed, consistent with previous research (Dausey & Desai, 2003; Disney et al., 2006; McHugh et al., 2012) including a psychiatric population (Meade et al., 2008). A description of the frequencies of both protected and unprotected sexual behaviors is provided elsewhere (Majer et al., 2014). The internal consistency of RBS items used in the present study was fairly good for HIV-risk sexual behavior (Cronbach's $\alpha = .71$).

Psychiatric severity—The *Addiction Severity Index-Lite* (ASI-Lite; McLellan, Cacciola, & Zanis, 1997), a briefer version of the *Addiction Severity Index* (ASI; McLellan et al., 1992), was used to assess current problem severity with respect to psychiatric problems. The ASI has good internal consistency, excellent predictive and concurrent validity (McLellan et al., 1992), and the ASI-Lite has been demonstrated as being quite comparable to the ASI with good validity and reliability (Cacciola, Alterman, McLellan, Lin, & Lynch, 2007).

Composite scores of the Psychiatric Severity Index (PSI), a subscale of the ASI, were calculated to assess psychiatric severity. This was achieved by using a weighted formula for questions involving a range of current psychiatric symptoms and problems (McLellan et al., 1992) that yielded scores ranging from .00 to 1.00, with high PSI scores representing greater psychiatric severity. The PSI is a widely-used measure in addiction research that produces a reliable and valid global estimate of psychopathology severity irrespective of diagnostic categorization (McLellan, Luborsky, Woody, O'Brien, & Druley, 1983), and the PSI has good internal consistency across studies ($\alpha > .70$; Makela, 2004; McLellan et al. 1983).

The PSI scores were used to calculate a high psychiatric severity group, an approach that has been used in previous research examining psychiatric factors (Ball, Nich, Rounsaville, Eagan, & Carroll, 2004) and as a measure psychiatric comorbidity (Majer, Jason, North, Ferrari, Porter, Olson, et al., 2008; Majer, Payne, & Jason, in press). McLellan et al. (1983) defined high PSI scores as one standard deviation from the mean. The present sample had a mean of .14 and a standard deviation of .17. We therefore selected those participants with PSI scores above .31 (.14 + .17) to represent the high psychiatric severity group ($n = 39$). Participants in the high psychiatric severity group reported an average PSI score of .47 ($SD = .13$), which is higher than PSI scores ($M = .34$, $SD = .19$) reported in a sample of persons with severe mental disorders (Carey, Cocco, & Correia, 1997), and higher than PSI scores reported in other studies among persons with substance use disorders diagnosed with co-occurring psychiatric disorders (Franken & Hendriks, 2001; McKay, Pettinati, Morrison, Feeley, Mulvaney, & Gallop, 2002). The internal consistency of PSI items used in the present study was fairly good ($\alpha = .70$).

Substance use—Miller's (1996) *Form-90* was administered to collect a continuous record of alcohol and drug use in the past six months. The Form-90 has excellent test-retest reliability in providing a retrospective time frame for recent substance use (Miller & DelBoca, 1994). The internal consistency of alcohol, drug use, and both alcohol and drug use items used in the present study was very good ($\alpha = .85$).

Data Analysis

A hierarchical linear regression was used to test for the influence of independent variables (sociodemographic variables, substance use, psychiatric severity) on levels of the outcome variable (HIV-risk sexual behaviors), entering independent variables sequentially in three steps. A correlation analysis was first conducted to examine associations between sociodemographic variables (age, gender, ethnicity) and HIV-risk sexual behaviors (number of partners, frequency of unprotected sexual behaviors), and gender was found to be the only sociodemographic variable to significantly correlate with one HIV-risk sexual behavior (number of partners, $r = .36, p < .05$). Therefore, we entered gender as the only sociodemographic variable in order to have an appropriate ratio of variables to cases for our regression model. Gender was first entered to control for its variance in HIV-risk sexual behavior. Substance use (number of days in the past six months) was included in the second step, and psychiatric problem severity index (PSI) values were included in the third step; all respective to their temporal relation to HIV-risk sexual behaviors.

Statistical methods—Descriptive analyses were conducted to provide sociodemographic characteristics of the sample in addition to describing rates of substance use, psychiatric problem severity, and HIV-risk sexual behaviors. Chi-square tests were conducted to examine proportional differences among participants based on categorical sociodemographic data.

Missing data—A listwise deletion approach was used to evaluate data and calculate analyses. Participants with missing data on any analytic model variable (16.3% of the entire sample) were excluded from analyses. A missing values analysis of all the independent and dependent variables indicated that the data were missing at random; Little's MCAR test; $\chi^2(26) = 25.501, p = .49$.

RESULTS

Preliminary Analyses

Participants in the high psychiatric severity group ($n = 39$) reported using alcohol on an average of 18.7 days ($SD = 39.9$) and drugs on 36.7 days ($SD = 52.1$), for a combined alcohol/drug use average of 26.7 days ($SD = 40.2$; range = 0-180) over the past six months. These participants reported an average of .86 sexual partners ($SD = 2.4$; range = 0-14) in the past 30 days, and an average 3.05 unprotected sexual practices ($SD = 5.70$; range = 0-18). Although there were proportionately more men and African-American participants in the sample; $\chi^2 = 117.34, df = 1, p < .01$ and $\chi^2 = 532.59, df = 3, p < .01$, respectively; there were no significant differences in the proportion of participants in the high psychiatric severity group based on gender or ethnicity. In addition, 95% of participants in the high psychiatric

severity group ($n = 37$) were completing inpatient treatment for substance use disorders at the time of assessment whereas 5% ($n = 2$) were chain-referred with a recent history of having completed inpatient treatment for substance use disorders.

Major Analyses

Results of the hierarchical regression model are presented in Table 2. Female gender was significantly associated with HIV-risk sexual behavior (number of partners) by 13%, with positive values indicating more sexual partners. The inclusion of substance use (in the past six months) in the second step fell short of the level of statistical significance; $F(1, 34) = 3.24, p = .081$. However, psychiatric problem severity index (PSI) scores in the third step significantly contributed to HIV-risk sexual behavior by accounting for 21.9% of the variance. We re-ran this regression model using frequency of unprotected sexual behaviors as the outcome variable, and the results were similar; only the inclusion of PSI scores in the third step was significantly related to HIV-risk sexual behavior (frequency of unprotected behaviors), accounting for 14.1% of the variance; $F(1, 33) = 5.51, p = .025, B = 18.39, SE B = 7.83, \beta = .413, p = .025$.

We conducted a regression model to examine the interaction between PSI scores and substance use on HIV-risk sexual behavior (number of partners, frequency of unprotected behaviors), having centered variables prior to calculating their products. Results of this model were similar to the previous model with respect to main factors in relation to number of partners; $F(3, 32) = 28.66, p < .001$. In addition, the interaction term (PSI scores x substance use) was statistically significant, indicating that participants who reported high PSI scores and high levels of substance use reported greater number of sexual partners; $B = .245, SE B = .036, \beta = .647, p < .001$. This model accounted for 63.4% of the variance. However, there was no significant interaction effect when the frequency of unprotected behaviors was used as the outcome variable; $F(3, 32) = 2.19, p = .11$. In addition, we re-ran this interaction model among both outcome variables with the inclusion of age and ethnicity in the first step, and the results from these analyses were similar.

DISCUSSION

Psychiatric severity was significantly related to greater HIV-risk sexual behavior, a finding that is inconsistent with a previous cross-sectional investigation (Meade et al., 2008) that found low PSI scores were significantly related to HIV-risk in a sample of persons with bipolar and substance use disorders. However, our study differed in three important ways. First, we examined HIV-risk behavior in terms of two separate sexual behaviors (number of sexual partners and frequency of unprotected sexual behaviors), not a combined sexual/drug risk behavior measure. Second, we used a measure of overall psychiatric severity as opposed to selecting one specific co-occurring diagnosis. Third, we employed a more inclusive variable of substance use that included both alcohol and drug use. Although we agree it is important to examine potential synergistic effects of specific psychiatric symptoms in relation to various drug use types when investigating HIV-risk (Meade & Weiss, 2007), the scope of the present investigation was to examine the role of psychiatric severity in relation to HIV-risk sexual behavior among persons likely to have psychiatric comorbidities (i.e.,

those who met the criterion cut-off value of the PSI). Thus, our findings suggest high levels (but not low levels) of psychiatric severity are associated with HIV-risk sexual behaviors among persons with various psychiatric comorbidities.

The relationship between psychiatric severity and HIV-risk sexual behavior is somewhat consistent with findings from one investigation (Avants et al., 2000) that found a positive correlation, but not a significant effect though regression analysis, between psychiatric severity and HIV-risk sexual behavior. However, those researchers examined psychiatric severity and cognitive factors in relation to HIV-risk sexual behavior within a multiple regression model among persons with substance use disorders regardless of their psychiatric severity status. The present study included substance use and sociodemographic variables within an analytic approach not previously tested among persons with high levels of psychiatric severity, and it is likely that the statistical significance of psychiatric severity as an independent variable was a product of this approach.

Psychiatric severity, and the interaction of psychiatric severity and substance use, accounted for a large portion of variance in our regression model associated with HIV-risk sexual behaviors, consistent with investigations that found less condom use among persons diagnosed with comorbid psychiatric and substance use disorders (King et al., 2000), and increased likelihood of HIV-risk among persons diagnosed with psychiatric disorders who also reported a high frequency of substance use (Carey, Carey, Maisto, Gordon, & Venable, 2001). The significant interaction effect of psychiatric severity and substance use in the present study is consistent with this body of research, suggesting that persons with high levels of psychiatric severity and high rates of substance use are at greater risk for HIV-risk sexual behavior. Some sociodemographic characteristics (age, ethnicity) and substance use were not significantly related to HIV-risk sexual behavior in the present study, suggesting that psychiatric severity is a risk factor for HIV-risk sexual behavior among persons with comorbid psychiatric and substance use disorders; more so than other variables such as age and substance use that were found in samples of persons with substance use disorders (McHugh et al., 2012; Scott & Dennis, 2012). It is possible that the lack of significance for substance use ($p = .081$) in the present study was a product of sample size and might be demonstrated to be a significant variable with larger samples in future investigations. Nonetheless, female gender was significantly related to greater HIV-risk behavior in terms of number of sexual partners, a finding that is consistent with previous research among women with incarceration histories (Epperson, Khan, El-Bassel, Wu, & Gilbert, 2011). Taken together, findings in the present study suggest women exiting criminal justice systems are at higher risk than men; especially when they have high levels of psychiatric problem severity.

A criterion cut-off score of the PSI was used in the present study as a proxy measure of comorbid psychiatric and substance use disorders, observed in approximately 14% of our participants. Although the prevalence rate of comorbid psychiatric and substance use disorders in the present study is lower than national averages (SAMHSA, 2010), the use of diagnostics instruments clearly would have provided a more reliable measure of psychiatric comorbidity, and possibly yielded a more representative prevalence rate of psychiatric comorbidity. However, the prevalence rate of psychiatric comorbidity in the present study is

consistent with findings from a national investigation (Kessler, Chiu, Demler, Merikangas, & Walters, 2005) that found a prevalence rate of persons with serious or moderate psychiatric disorders at 14%, suggesting that our proxy measure might have had sensitivity in identifying some participants who probably had a diagnosable co-occurring psychiatric disorder.

In addition, high levels of psychiatric severity such as those that met (and exceeded) the PSI criterion cut-off for inclusion in the high psychiatric severity group have been predictive of mood and anxiety disorders among persons with substance use disorders (Dixon, Myers, Johnson, & Corty, 1996; Franken & Hendriks, 2001). High levels of psychiatric severity have been associated with increased likelihood of psychiatric hospitalizations (Alterman, Bovasso, Cacciola, & McDermott, 2001). In addition, persons with substance use disorders who reported high psychiatric severity also reported significantly greater use of psychiatric medications compared to persons with low levels of psychiatric severity (Majer et al., 2008). Furthermore, high levels of psychiatric severity have been reported among persons with substance use disorders diagnosed with co-occurring psychiatric disorders (McKay et al., 2002). Therefore, although psychiatric comorbidity was not directly measured in the present study in terms of specific symptom clusters or diagnostic categories, we have some justification for using a criterion cut-off measure of the PSI to serve as a proxy measure for psychiatric comorbidity in the present study.

Thus, findings in the present study point to the need for examining the role of psychiatric severity in relation to HIV-risk sexual behavior among persons with substance use disorders who are diagnosed with various psychiatric comorbidities. It is conceivable that some who have diagnosable substance use disorders and co-occurring psychiatric illnesses, but report low levels of psychiatric severity, may not be involved in greater HIV-risk sexual behavior compared to those who are experiencing high levels of psychiatric severity. Likewise, it is possible that any interaction effect between high psychiatric severity on the one hand, and symptom clusters or diagnostic categories on the other hand, will vary in relation to HIV-risk sexual behavior, and it is plausible to suspect that recent substance use will have some impact on these interactions. Of course, such claims can only be verified through investigations that directly measure current psychiatric symptoms and diagnostic categories with established and reliable instrumentation in conjunction with assessment of current levels of psychiatric severity and HIV-risk sexual behavior.

The present study assessed psychiatric severity and HIV-risk sexual behavior within the past 30 days of assessment. Our approach to measuring HIV-risk sexual behavior in terms of one's number of sexual partners is consistent with other investigations (Belenko et al., 2005; Holmes et al., 2005; Kang et al., 2002; Knittel et al., 2013; Mark et al., 2006; Meade et al., 2009; Richter et al., 2013), suggesting that the influence of psychiatric severity is better understood when examining HIV-risk sexual behavior outcomes that are commonly used in research. However, a number of studies have examined the relationship between various psychiatric (symptoms, diagnoses, lifetime/current prevalence), HIV-risk (independent items/summary scores involving drug use behaviors, sexual behaviors, or both), and substance use (diagnoses, alcohol/drug use, questionnaire scores) variables, and there is little consistency in the methods used across studies in terms of instrumentation and time-frames

(i.e., the past one, six, and twelve months have all been used) of reported symptoms/indicators (see Meade & Weiss, 2007 for a review). Although there is considerable methodological and design variation across existing studies, results in the present investigation suggest researchers should consider assessing psychiatric severity when investigating predictors of HIV-risk sexual behavior among persons diagnosed with current comorbid psychiatric and substance use disorders.

Limitations

Although HIV-risk sexual behavior among persons with comorbid psychiatric and substance use disorders might be better understood by examining psychiatric severity, there are some limitations in the present study. For instance, causal inference is limited due to the cross-sectional nature of our design. Diagnostic instruments were not used in assessing psychiatric comorbid substance use disorder status, and the distribution of current psychiatric co-occurring disorders is unknown. In addition, the sample was heavily skewed towards men, which might limit generalizability to women, and the significant gender effect found among women in the study might not generalize in larger samples. A comparison group of persons who have psychiatric disorders (but no substance use problems) would help us better understand the impact psychiatric severity might have on HIV-risk sexual behaviors. Likewise, while participants' number of sexual partners and their frequency of engaging in unprotected sexual behaviors are important ways of measuring HIV-risk behavior, other measures such as engaging in sex work and whether participants' sexual partners are high risk (e.g., injection drug users, sex workers) might also indicate HIV-risk. In addition, examining protective factors related to reduced HIV-risk sexual behavior would have provided more insights in understanding the relationship between psychiatric severity and HIV-risk sexual behavior. Finally, the use of a cross-sectional design is another limitation of the present study, as repeated measures might have provided more information related to changes in both psychiatric severity and HIV-risk sexual behavior over time. Although results in the present study have implications for future research, it would be prudent for treatment providers to consider interventions that would decrease HIV-risk sexual behaviors among persons with comorbid psychiatric and substance use disorders who have high levels of psychiatric severity.

Conclusion

The present study examined variables associated with HIV-risk sexual behavior that have been examined in previous investigations involving persons with psychiatric and substance use issues. Our investigation is innovative in that it examined sociodemographic characteristics, recent substance use, and current psychiatric severity in relation to recent HIV-risk sexual behavior among persons completing inpatient treatment for substance use disorders who were likely to have had comorbid psychiatric and substance use disorders. Our design permitted analyses that yielded intriguing findings related to psychiatric severity and HIV-risk sexual behavior. The use of a standardized diagnostic instrument could provide current rates of specific co-occurring mental disorders for additional analyses and should be considered in future investigations, and longitudinal investigations are recommended to determine temporal relationships. Overall, findings from the present study

suggest that psychiatric severity is a risk factor for HIV-risk sexual behavior among persons with comorbid psychiatric and substance use disorders.

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REFERENCES

- Abou-Saleh MT, Janca A. The epidemiology of substance misuse and comorbid psychiatric disorders. *Acta Neuropsychiatrica*. 2004; 16:3–8. doi: 10.1111/j.16015215.2004.0075.x.
- Alterman AI, Bovasso GB, Cacciola JS, McDermott PA. A comparison of the predictive validity of four sets of baseline ASI summary indices. *Psychology of Addictive Behaviors*. 2001; 15:159–162. doi: 10.1037//0893-164X.15.2.159. [PubMed: 11419233]
- Avants SK, Warburton LA, Hawkins KA, Margolin A. Continuation of high-risk behavior by HIV-positive drug users: Treatment implications. *Journal of Substance Abuse Treatment*. 2000; 19:15–22. doi: 10.1016/S0740-5472(99)00092-6. [PubMed: 10867296]
- Ball SA, Nich C, Rounsaville BJ, Eagan D, Carroll KM. Millon Clinical Multiaxial Inventory-III subtypes of opioid dependence: Validity and matching to behavioral therapies. *Journal of Consulting and Clinical Psychology*. 2004; 72:698–711. doi: 10.1037/0022-006X.72.4.698. [PubMed: 15301655]
- Belenko S, Lin J, O'Connor L, Sung H-E, Lynch KG. Sexual and physical victimization as predictors of HIV risk among felony drug offenders. *AIDS and Behavior*. 2005; 9:311–323. doi: 10.1007/s10461-005-9005-2. [PubMed: 16133904]
- Burns L, Teesson M, O'Neill K. The impact of comorbid anxiety and depression on alcohol treatment outcomes. *Addiction*. 2005; 100:787–796. doi: 10.1111/j.1360-0443.2005.001069.x. [PubMed: 15918809]
- Cacciola JS, Alterman AI, McLellan AT, Lin Y-T, Lynch KG. Initial evidence for the reliability and validity of a “Lite” version of the Addiction Severity Index. *Drug and Alcohol Dependence*. 2007; 87:297–302. doi:10.1016/j.drugalcdep.2006.09.002. [PubMed: 17045423]
- Carey MP, Carey KB, Maisto SA, Gordon CM, Venable PA. Prevalence and correlates of sexual activity and HIV-related risk behavior among psychiatric outpatients. *Journal of Consulting and Clinical Psychology*. 2001; 69:846–850. doi: 10.1037//0022-006X.69.5.846. [PubMed: 11680563]
- Carey KB, Cocco KM, Correia CJ. Reliability and validity of the Addiction Severity Index among outpatients with severe mental illness. *Psychological Assessment*. 1997; 9:422–428.
- Dausey DJ, Desai RA. Psychiatric comorbidity and the prevalence of HIV infection in a sample of patients in treatment for substance abuse. *The Journal of Nervous and Mental Disease*. 2003; 191:10–17. doi:10.1097/00005053-200301000-00003. [PubMed: 12544594]
- Devieux JG, Malow R, Lerner BG, Dyer JG, Baptista L, Lucenko B, Kalichman SC. Triple jeopardy for HIV: Substance using severely mentally ill adults. *Journal of Prevention & Intervention in the Community*. 2007; 33:5–18. doi: 10.1300/J005v33n01_02. [PubMed: 17298927]
- Disney E, Kidorf M, Kolodner K, King V, Peirce J, Beilenson P, Brooner RK. Psychiatric comorbidity is associated with drug use and HIV risk in syringe exchange participants. *Journal of Nervous and Mental Disease*. 2006; 194:577–583. doi: 10.1097/01.nmd.0000230396.17230.28. [PubMed: 16909065]
- Dixon L, Myers P, Johnson J, Corty E. Screening for mental illness with the Addiction Severity Index. *American Journal on Addictions*. 1996; 5:301–307.
- Epperson MW, Khan MR, El-Bassel N, Wu E, Gilbert L. A longitudinal study of incarceration and HIV risk among methadone maintained men and their primary female partners. *AIDS & Behavior*. 2011; 15:347–355. doi: 10.1007/s10461-009-9660-9. [PubMed: 20063053]

- Franken IHA, Hendriks VM. Screening and diagnosis of anxiety and mood disorders in substance abuse patients. *American Journal on Addictions*. 2001; 10:30–39. doi: 10.1080/105504901750160448. [PubMed: 11268826]
- Grant BF, Stinson FS, Dawson DA, Chou SP, Dufour MC, Compton W, Kaplan K. 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*. 2004; 61:807–816. doi:10.1001/archpsyc.61.8.807. [PubMed: 15289279]
- Hien DA, Campbell AN, Killeen T, Hu M-C, Hansen C, Jiang H, Nunes EV. The impact of trauma-focused group therapy upon HIV sexual risk behaviors in the NIDA Clinical Trials Network “Women and Trauma” multi-site study. *AIDS and Behavior*. 2010; 14:421–430. doi:10.1007/s10461-009-9573-7. [PubMed: 19452271]
- Holmes WC, Foa EB, Sammel MD. Men’s pathways to risky sexual behavior: Role of co-occurring childhood sexual abuse, posttraumatic stress disorder, and depression histories. *Journal of Urban Health: Bulletin of the New York Academy of Medicine*. 2005; 82(Supplement 1):89–99. doi: 10.1093/jurban/jti028.
- Jason LA, Olson BD, Harvey R. Evaluating alternative aftercare models for ex-offenders. *Journal of Drug Issues*. (in press).
- Kang S-Y, Deren S, Goldstein MF. Relationships between childhood abuse and neglect experience and HIV risk behaviors among methadone treatment drop-outs. *Child Abuse & Neglect*. 2002; 26:1275–1289. doi: 10.1016/S0145-2134(02)00412-X. [PubMed: 12464301]
- Kessler RC, Chiu WT, Demler O, Merikangas KR, Walters EE. Prevalence, severity, and comorbidity of 12-month DSM-IV disorders in the national comorbidity survey replication. *Archives of General Psychiatry*. 2005; 62:617–627. doi:10.1001/archpsyc.62.7.709. [PubMed: 15939839]
- King VL, Kidorf MS, Stoller KB, Brooner RK. Influence of psychiatric comorbidity on HIV risk behaviors: Changes during drug abuse treatment. *Journal of Addictive Diseases*. 2000; 19:65–82. [PubMed: 11110066]
- Knittel AK, Snow RC, Griffith DM, Morenoff J. Incarceration and sexual risk: Examining the relationship between men’s involvement in the criminal justice system and risky behavior. *AIDS and Behavior*. 2013; 17:2703–2714. doi: 10.1007/s10461-013-0421-4. [PubMed: 23392910]
- Kushner MG, Abrams K, Thuras P, Hanson KL, Brekke M, Sletten S. Follow-up study of anxiety disorder and alcohol dependence in comorbid alcoholism treatment patients. *Alcoholism: Clinical and Experimental Research*. 2005; 29:1432–1443. doi: 10.1097/01.alc.0000175072.17623.f8.
- Majer JM, Rodriguez J, Bloomer C, Jason LA. Predictors of HIV-risk sexual behavior: Examining lifetime sexual and physical abuse histories in relation to substance use and psychiatric problem severity among ex-offenders. *Journal of the American Psychiatric Nurses Association*. 2014; 20:127–135. doi: 10.1177/1078390314527552.
- Majer JM, Jason LA, North CS, Ferrari JR, Porter NS, Olson BD, Molloy JP. A longitudinal analysis of psychiatric severity upon outcomes among substance abusers residing in self-help settings. *American Journal of Community Psychology*. 2008; 42:145–153. doi: 10.1007/s10464-008-9190-z. [PubMed: 18581228]
- Majer JM, Payne JC, Jason LA. Recovery resources and psychiatric severity among persons with substance use disorders. *Community Mental Health Journal*. (in press).
- Makela K. Studies of the reliability and validity of the Addiction Severity Index. *Addiction*. 2004; 99:398–410. doi:10.1111/j.1360-0443.2003.00665.x. [PubMed: 15049734]
- Mark HD, Nanda J, Davis-Vogel A, Navaline H, Scotti R, Wickrema R, Sochalski J. Profiles of self-reported HIV-risk behaviors among injection drug users in methadone maintenance treatment, detoxification, and needle exchange programs. *Public Health Nursing*. 2006; 23:11–19. doi: 10.1111/j.0737-1209.2006.230103.x. [PubMed: 16460416]
- McCusker J, Goldstein R, Bigelow C, Zorn M. Psychiatric status and HIV risk reduction among residential drug abuse treatment clients. *Addiction*. 1995; 90:1377–1387. [PubMed: 8616466]
- McHugh RK, Weitzman M, Safren SA, Murray HW, Pollack MH, Otto MW. Sexual HIV risk behaviors in a treatment-refractory opioid-dependent sample. *Journal of Psychoactive Drugs*. 2012; 44:237–242. doi: 10.1080/02791072.2012.703507. [PubMed: 23061323]

- McKay JR, Pettinati HM, Morrison R, Feeley M, Mulvaney FD, Gallop R. Relation of depression diagnoses to 2-year outcomes in cocaine-dependent patients in a randomized continuing care study. *Psychology of Addictive Behaviors*. 2002; 16:225–235. doi: 10.1037//0893-164X.16.3.225. [PubMed: 12236457]
- McLellan, AT.; Cacciola, JS.; Zanis, D. The Addiction Severity Index-Lite. Center for the Studies on Addiction. University of Pennsylvania/Philadelphia VA Medical Center; 1997.
- McLellan AT, Kushner H, Metzger D, Peters R, Smith I, Grissom G, Argeriou M. The fifth edition of the Addiction Severity Index. *Journal of Substance Abuse Treatment*. 1992; 9:199–213. [PubMed: 1334156]
- McLellan AT, Luborsky L, Woody GE, O'Brien CP, Druley KA. Predicting response to alcohol and drug abuse treatments. *Archives of General Psychiatry*. 1983; 40:620–625. [PubMed: 6847331]
- Meade CS, Weiss RD, Fitzmaurice GM, Poole SA, Subramaniam GA, Patkar AA, Woody GE. HIV risk behavior in treatment-seeking opioid-dependent youth: Results from a NIDA Clinical Trials Network multi-site study. *Journal of Acquired Immune Deficiency Syndromes*. 2010; 55:65–72. doi: 10.1097/QAI.0b013e3181d916db. [PubMed: 20393347]
- Meade CS, Kershaw TS, Hansen NB, Sikkema KJ. Long-term correlates of childhood abuse among adults with severe mental illness: Adult victimization, substance abuse, and HIV sexual risk behavior. *AIDS and Behavior*. 2009; 13:207–216. doi: 10.1007/s10461-007-9326-4. [PubMed: 17968646]
- Meade CS, Graff FS, Griffin ML, Weiss RD. HIV risk behavior among patients with co-occurring bipolar and substance use disorders: Associations with mania and drug abuse. *Drug and Alcohol Dependence*. 2008; 92:296–300. doi: 10.1016/j.drugalcdep.2007.07.013. [PubMed: 17850993]
- Meade CS, Weiss RD. Substance abuse as a risk factor for HIV sexual risk behavior among persons with severe mental illness: Review of evidence and exploration of mechanisms. *Clinical Psychology: Science and Practice*. 2007; 14:23–33. doi: 10.1111/j.1468-2850.2007.00059.x.
- Miller, WR. Form-90: A structured assessment interview for drinking and related behaviors.. In: Mattson, ME.; Marshall, LA., editors. Project MATCH Monograph Series. Vol. 5. National Institute of Alcohol Abuse and Alcoholism; Rockville, MD: 1996. Test Manual (NIH Publication No. 96–4004) Retrieved from <http://pubs.niaaa.nih.gov/publications/ProjectMatch/match05.pdf>
- Miller WR, Del Boca FK. Measurement of drinking behavior using the Form-90 family of instruments. *Journal of Studies on Alcohol*. 1994; 12(Suppl):112–118.
- National Institute on Drug Abuse (NIDA). Risk behavior survey. National Institute on Drug Abuse, Community Research Branch; Rockville, MD: 1993.
- National Institute on Drug Abuse (NIDA). Risk behavior assessment. Author; Rockville, MD: 1991.
- Plotzker RE, Metzger DS, Holmes WC. Childhood sexual and physical abuse histories, PTSD, depression, and HIV risk outcomes in women injection drug users: A potential mediating pathway. *The American Journal on Addictions*. 2007; 16:431–438. doi: 10.1080/10550490701643161. [PubMed: 18058406]
- Reback CJ, Kamien JB, Amass L. Characteristics and HIV risk behaviors of homeless, substance-using men who have sex with men. *Addictive Behaviors*. 2007; 32:647–654. doi:10.1016/j.addbeh.2006.06.008. [PubMed: 16876333]
- Rees V, Saitz R, Horton NJ, Samet J. Association of alcohol consumption with HIV sex- and drug-risk behaviors among drug users. *Journal of Substance Abuse Treatment*. 2001; 21:129–134. doi: 10.1016/S0740-5472(01)00190-8. [PubMed: 11728786]
- Regier DA, Farmer ME, Rae DS, Locke BZ, Keith SJ, Judd LL, Goodwin FK. Comorbidity of mental disorders with alcohol and other drug abuse: Results from the Epidemiologic Catchment Area (ECA) study. *JAMA: The Journal of the American Medical Association*. 1990; 264:2511–2518. doi:10.1001/jama.1990.03450190043026.
- Richter L, Komarek A, Desmond C, Celentano D, Morin S, Sweat M, Coates T. Reported physical and sexual abuse in childhood and adult HIV risk behavior in three African countries: Findings from Project Accept (HPTN-043). *AIDS and Behavior* (online). 2013 doi: 10.1007/s10461-013-0439-7.
- Rosenberg SD, Swanson JW, Wolford GL, Osher FC, Swartz MS, Essock SM, the Five-Site Health and Risk Study Search Committee. The five-site health and risk study of blood-borne infections

among persons with severe mental illness. *Psychiatric Services*. 2003; 54:827–835. doi: 10.1176/appi.ps.54.6.827. [PubMed: 12773596]

Substance Abuse and Mental Health Services Administration (SAMHSA). Results from the 2009 National Survey on Drug Use and Health: Mental health findings (NSDUH Series H-39, No. SMA 10-4609). Office of Applied Studies; Rockville, MD: 2010. Retrieved from <https://www.counseling.org/docs/public-policy-resources-reports/2k9mentalhealthresults.pdf?sfvrsn=2>

Scott CK, Dennis ML. The first 90 days following release from jail: Findings from the Recovery Management Checkups for Women Offenders (RMCWO) experiment. *Drug and Alcohol Dependence*. 2012; 125:110–118. doi.org/10.1016/j.drugalcdep.2012.03.025. [PubMed: 22542465]

Table 1Characteristics of Participants ($N = 270$)

Characteristic	<i>M (SD)</i>	<i>n (%)</i>
DEMOGRAPHICS		
Age (years)	40.4 (9.5)	
Education (years)	10.9 (1.9)	
Income (monthly)	\$367 (\$710)	
Gender		
Men		224 (83%) **
Women		46 (17%)
Race/Ethnicity		
African-American		200 (74.1%) **
White		57 (21.1%)
Hispanic/Latino		9 (3.3%)
Other		4 (1.5%)
Relationship status ($n = 263$)		
Single/never married		197 (74.9%)
Divorced/ separated/widowed		48 (18.3%)
Married/partnered		18 (6.8%)
Employment - past 3 years ($n = 260$)		
Unemployed		85 (32.7%)
Part-time		72 (27.7%)
Full-time		29 (11.2%)
Controlled environment/other ($n = 266$)		93 (35.0%)
SUBSTANCE USE		
Days of alcohol use ^{<i>I</i>}	18.7 (39.9)	
Days of drug use ^{<i>I</i>}	36.7 (52.1)	
Days of alcohol/drug use ^{<i>I</i>}	26.7 (40.2)	
HIV-RISK SEXUAL BEHAVIOR		
Number of sexual partners ^{<i>I</i>}	.86 (2.4)	
Frequency of unprotected sexual behavior ^{<i>I</i>}	3.05 (5.7)	

Note. PSI = psychiatric severity index.

**
 $p < .01$ ^{*I*}
In the past month

Table 2

Hierarchical Regression Analyses for Variables Predicting HIV-Risk Sexual Behavior among Participants with Likely Comorbid Psychiatric and Substance Use Disorders ($n = 39$)

Predictor		R^2	B	SE B	β
Number of sexual partners					
Step 1	Female Gender	.130 [*]	2.47	1.08	.36 [*]
Step 2	Substance use	.076	.02	.01	.28
Step 3	PSI scores	.219 ^{***}	10.24	2.89	.54 ^{***}
Total R^2		.55 [*]			
Frequency of unprotected sexual behaviors					
Step 1	Female Gender	.008	1.62	3.03	.09
Step 2	Substance use	.006	.01	.02	.08
Step 3	PSI scores	.141 [*]	18.39	7.83	.41 [*]
Total R^2		.156 [*]			

Note. R^2 = change in variance accounted for by the model; B = unstandardized coefficient; SE = standard error; β = beta.

 $p < .001$

*
 $p < .05$