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An exploratory study of mental health and HIV risk behavior among drug-using rural women in jail

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Abstract

Objective—Rural women, particularly those involved in the criminal justice system, are at risk for HIV due to the increasing prevalence of injection drug use, as well as limited services. Research on HIV risk correlates, including drug use and mental health, has primarily focused on urban women incarcerated in prisons. The purpose of this exploratory study is to examine dual HIV risk behavior by three different mental health problems (depression, anxiety, and PTSD) among drug-using women in rural jails.

Methods—This study involved random selection, screening, and face-to-face interviews with 136 women from rural jails in one Appalachian state. Analyses focused on the relationship between mental health and HIV risk among this sample of drug-using women.

Findings—Nearly 80% of women self-reported symptoms of depression, and more than 60% endorsed symptoms consistent with anxiety and PTSD symptoms. Mental health was significantly correlated with severity of certain types of drug use, as well as risky sexual activity. In addition, for women experiencing anxiety and PTSD, injection drug use moderated the relationship between mental health and risky sexual activity.

Implications—Based on these rates of drug use, mental health problems, and the emergence of injection drug use in rural Appalachia, the need to explore the relationships between these issues among vulnerable and understudied populations, such as rural women, is critical. Due to service limitations in rural communities, criminal justice venues such as jails provide opportune settings for screening, assessment, and intervention for drug use, mental health, and HIV education and prevention.

Research has indicated growing numbers of females involved in the correctional system over the past two decades, particularly in jails where the number of women has grown at nearly twice the rate of men (Harrison & Beck, 2006). Women enter correctional facilities with a number of needs including histories of drug abuse, co-occurring mental health problems, and trauma (Johnson, 2006; Sacks, 2004; Staton-Tindall et al., 2007). Their drug abuse histories may have also led to high-risk health behaviors, including injection and risky sexual behavior, making them more susceptible to contracting infectious diseases such as the Human Immunodeficiency Virus (HIV) (DeGroot & CuUvin, 2005; Maruschak, 2004). Despite the increased prevalence of these issues among women currently or formerly

incarcerated, limited research has focused on the relationship between co-occurring drug use, mental health problems, and HIV risk behavior. In addition, research is limited on specific groups of women, such as those from rural areas. Rural women involved in the criminal justice system are at high risk due to increasing injection drug use and needle sharing, as well as limitations in service availability. Thus, the purpose of this exploratory study is to examine HIV risk behavior by three different mental health problems (depression, anxiety, and PTSD) among drug-using women in rural jails.

Drug use among women in the criminal justice system

Numerous studies have documented the high rate of drug use and abuse among women who are currently or formerly incarcerated (e.g., Horton, 2011; Millay et al., 2009; Staton-Tindall et al., 2007a; Staton-Tindall et al., 2007b). Data from national studies of incarcerated populations have consistently shown that women report higher rates of drug use than men (Mumola & Karberg, 2007; Sipes, 2012). For example, a national Bureau of Justice Statistics report found that the percentage of women in state prison meeting drug dependence or abuse criteria exceeded that of males in 2004 (60.2% vs. 53.0%; Mumola & Karberg, 2007). In a study with incarcerated women, Johnson (2006) reported that 80% of the sample had ever used an illegal drug, and nearly two-thirds (62%) regularly used a substance in the six months prior to arrest and reported regular use of two or more substances. Incarcerated women also report significantly higher rates of substance use than women in the community (Jordan, Schlenger, Fairbank, & Cadell, 1996). While drug use rates are consistently high among women involved in the criminal justice system, one study found that rates are similar across jail and prison populations (Staton-Tindall et al., 2011).

Co-occurring mental health

The literature has noted that “co-occurring” is defined as a condition when one or more mental health disorders is present with a drug and/or alcohol disorder (Sacks, 2004). Among women substance users in general, co-occurring mental health issues have been consistently reported in the research (e.g., Johnson, 2006; Miles, Svikis, Kulstad, & Haug, 2001). Depression and anxiety are the most common mental health problems, and in some cases, the symptoms are severe (Peters et al., 1997; Sacks, 2004; Staton-Tindall, Leukefeld, & Webster, 2003).

Rates of co-occurring substance use and mental health are high in samples of women currently or formerly incarcerated. In addition to high rates of drug use, women in the criminal justice system are also likely to experience mental health problems (Macdonald, 2013; Singer et al., 1995), and they are more likely than male inmates to be diagnosed with a mental health disorder (Gunter et al., 2012; Peters, et al., 1997). Du et al. (2013) reported that among substance users in the criminal justice system, women were significantly more likely than men to have co-occurring depression (58% vs 45%) and anxiety (16% vs. 7%). Women currently or formerly incarcerated are also more likely to have histories of childhood victimization (e.g., Bowles, DeHart, & Webb, 2012). Among individuals in jails and prisons who are identified as having a comorbid substance abuse and mental health

issue, women tend to have increased problem severity in other areas including family relationships and health (Du, Huang, Zhao, & Hser, 2013).

Much of the research on women in the criminal justice system with co-occurring drug use and mental health problems has been conducted in prisons. However, jail environments – facilities where women tend to serve lesser sentences and often have access to fewer resources – also serve women with a co-occurring drug use and mental health problems. While research in jail is limited in general, one study found that nearly three-fourths of women in jail had a co-occurring mental health and substance use disorder (Abram, Teplin, & McClelland, 2003). In addition, women in jail who reported a need for drug abuse services more frequently indicated utilization of mental health services in the past year as compared with women who did not report a need for drug abuse services (Alemagno, 2001).

HIV risk behaviors among women involved in the criminal justice system

Women currently or formerly incarcerated who report co-occurring substance abuse and mental health problems may also be at high-risk for engaging in other risk behaviors, such as injection drug use and risky sexual behavior, which can have detrimental health consequences. These health risk behaviors may subsequently increase their chances for contracting HIV, which has been noted to be considerably higher among samples of women in prison compared to the general population (DeCroot & CuUvin, 2005; Maruschak, 2004). The correlation between drug use and HIV risk behaviors is often characterized by frequent injection drug use, sharing needles and drug injection equipment, unprotected sexual behavior with partners also engaging in risky behaviors (Evans et al., 2003; Hagan et al., 2001; Young et al., 2013), and sex exchange for drugs or money to buy drugs (Tobin et al., 2012). While the association between these types of risks behaviors and increased HIV is well-documented, most studies focus on either high risk drug practices (including injection behaviors) or on high risk sexual practices. Recent research has documented that dual HIV risk behavior (engaging in high risk drug and sexual practices) can lead to even higher likelihood of HIV acquisition or transmission (El Bassel et al., 2012; Neaguis, et al., 2013).

The association between HIV risk and mental health is a developing area of research. Specifically among individuals involved in the criminal justice system, one study in an inner city Chicago jail found that having a mental health disorder was significantly associated with increased HIV risk behavior (McClelland et al., 2002). The link between specific mental health issues, such as anxiety, and HIV risk behaviors has also been made in recent research (O'Cleirigh et al., 2013). This study found that PTSD, in particular, was associated with more risky sexual behavior in younger gay men compared to older men. Specific to women, risky sexual and drug use behavior among women have also been shown to be associated with PTSD and history of childhood abuse (Meade, Kershaw, Hansen, & Sikkema,2009; Plotzker, Metzger, & Holmes, 2007). Another study found that rates of depression have been found to be six times higher among female sex workers who engage in HIV risk behavior (Sagtani et al., 2013).

While studies have focused on the general relationship between drug use, mental health, and health risk behaviors, examination of these issues has been ignored among rural women in

the literature. While prevalence rates of HIV may be lower in certain rural areas of the country, risk behaviors remain high including infrequent condom use and sharing of drug injection equipment (Oser et al., 2006). Engagement in these types of risk behaviors remains problematic due to high rates of infectious diseases such as Hepatitis C (Havens et al., 2013) and the increased likelihood of HIV transmission once it enters the social network. Considering the complexity of the social networks in rural areas and the degree of shared injection drug use and sexual behaviors, rural drug users are critical populations to examine potential for HIV transmission (Havens, Walker, & Leukefeld, 2007; Leukefeld et al., 2002 Young & Havens, 2012). Women injectors are particularly vulnerable in that they may trade sexual behaviors for drugs, find themselves in the position of being injected by a partner or dealer in order to receive their drug, and to share drug injection equipment (Tompkins, Sheard, Wright, Jones, & Howes, 2006; Young et al., 2014). In addition, individuals who engage in dual risk (risky injection practices and risky sexual activities) are at even higher risk for contracting and transmitting HIV (Neaigus, et al., 2013). Therefore, it becomes clear there is an urgent and compelling need to better understand factors associated with HIV among this vulnerable group of women already at increased risk due to limited access to drug treatment and healthcare resources in their rural communities.

Focus of the current study

In summary, the conceptual framework for this project includes supporting research which indicates that drug use is consistently associated with increased HIV risk behavior among women (Staton-Tindall et al., 2007). In addition, supporting research indicates that mental health problems including depression (Bradley et al., 2008; Klein et al., 2008), anxiety (Reyes et al., 2007) and PTSD (Hutton et al., 2001) are also associated with increased HIV risk. Despite the high rates of co-occurring substance use and mental health problems among individuals who are incarcerated, a group with documented higher rates of HIV and related risk than the general population, limited research has examined how HIV risk behavior may vary among rural women with co-occurring substance use and mental health problems. In addition, while most of the research on criminal-justice involved women and co-occurring issues has been done in prisons (e.g., Zlotnick et al., 2008) and in urban areas (e.g., Abram et al., 2003), jails provide important venues to identify and better understand women at risk for drug abuse, mental health, and HIV risk behaviors, particularly in rural areas. Because jails are typically located in rural communities and there is a high turnover due to short sentences and less severe charges, the jail population is likely to reflect local trends in social issues including drug use, mental health, and health risk behaviors. Thus, the purpose of this exploratory study is to examine dual HIV risk behavior by three different mental health problems (depression, anxiety, and PTSD) among drug-using women in rural jails. Specifically, this study incorporates an innovative model to examine how presence of one HIV risk behavior (injection drug use) influences other HIV risk behaviors (risky sexual activity) among women with co-occurring mental health and substance use issues. It is expected that mental health problems will be prevalent in this sample of drug-using women. Due to the high-risk nature of this drug-using, criminally involved sample, it is also expected that the relationship between mental health issues and HIV risk behavior (i.e., risky sexual activity) will be moderated by engagement in other risk behaviors (IV drug use).

Methods

Participants

As part of a larger study (NIH/NIDA 1R01-DA033866), data were collected from 136 female participants. The women were recruited from rural jail facilities located in three Kentucky counties in Appalachia (Appalachian Regional Commission, 2013) between December 2012 and September 2013. Participants were selected based on the following selection criteria: 1) NIDA-modified ASSIST (NM-ASSIST) score of 4+ for any drug, indicating at least moderate risk for substance abuse (NIDA, 2009); 2) engagement in at least one sex risk behavior in the past 3 months; and 3) willingness to participate.

Procedure

This study was approved by the university IRB and due to the sensitive nature of drug use, mental health, and health risk questions, a federal Certificate of Confidentiality was obtained to further ensure privacy of data for this incarcerated sample. Data reported here are preliminary as the study is on-going. For the current sample, recruitment took place at each of three jails each month. During a given month, recruitment days were randomly selected for each jail from all possible days in the month to ensure that a representative sample of potential participants was selected. On the selected recruitment day for each jail, potential study participants were then randomly selected for screening from the jail roster. Specifically, using a cluster sampling procedure based on projected release dates from the jail, all women residing in the jail on the day of screening had an equal opportunity of being selected if they had a release date within a time frame of 2 weeks to 3 months (verified by on-line jail records). From the potential sampling frame, the data coordinator randomly selected participants for screening using the Research Randomizer computer-based program (www.randomizer.org).

Participants selected for the study were invited to a short screening session at the jail. Participants were provided informed consent, allowed to ask questions about the study, and ensured confidentiality. The screening form took about 20 minutes to complete and included the NIDA-modified Alcohol, Smoking and Substance Involvement Screening Test (NM-ASSIST), five questions to ascertain risky sexual behavior, and other items to assess study eligibility. Participants meeting study eligibility were informed of their status at the time of screening and scheduled for a baseline interview. To date, 310 women have been randomly selected for screening, 243 participated in the screening session (67 were released early between random selection and screening), and 146 were eligible to participate in the baseline. Of those eligible to participate, 10 were released early prior to being scheduled for the baseline for a final sample size of 136.

Baseline interviews were conducted with 136 women face-to-face at the jail in a private room. Participants were asked to respond to questions about drug use, mental health, and HIV risk behaviors prior to entering the jail using Computer Assisted Personal Interview (CAPI) software. No jail staff were present for interviews. Participants were paid $25 for their time. At the conclusion of the interviews, participants were offered the opportunity for HIV/HCV testing. All study staff were state certified HIV/HCV testing counselors.

Measures

Sociodemographics—Primary demographic variables for the study included age (participant's age in years at baseline interview), education (number of years of formal education), marital status (currently married vs. other status), and employment (employed vs. unemployed in past 6 months). Because all but one participant reported being white/Caucasian, race is not included as a variable in the analyses.

Incarceration history—Individuals were asked how many days they had been incarcerated during their current sentence as of the baseline interview date. Participants were also asked how many times they had been incarcerated as an adult. Both of these were coded as continuous variables.

Substance use—In order to profile the sample, participants were asked to indicate the number of days in the six months prior to incarceration that they had used alcohol and a number of illicit substances. Participants were also asked how many days in the past six months they had used multiple substances and how many days in the past six months they had been "high" on drugs.

In addition to these use pattern measures, the NM-ASSIST was also used as an initial screening tool to assess severity of substance use and substance-related problems. The original ASSIST was developed and validated by the World Health Organization (WHO) for both men and women (Humeniuk & Ali, 2006) to detect substance abuse risk in health care settings. The NM-ASSIST was selected for use in this study because it can be administered by an interviewer, and scores can be used to interpret participant risk levels of problem severity that map onto indicators for brief intervention. Participants were asked six questions related to intensity and frequency of use for each of the following substances: alcohol, cannabis, cocaine, prescription stimulants, methamphetamine, sedatives, street opiates, and prescription opiates. NM-ASSIST questions assessed their desire to use the drug, how often they actually used it in the three months before incarceration, what life problems its use had caused, and how they and others felt about their use of this substance. Using standard scoring (NIDA, 2009), a risk score was computed for each type of drug which ranged from zero to 39. Scores are indicative of substance abuse risk and need for intervention.

Mental health—The Global Appraisal of Individual Needs (GAIN-I version 5) is a well-validated screening instrument to assess the presence of symptoms consistent with mental health problems (Dennis, 1998). Participants were asked about their mental health within the past year. Specifically for this analysis, participants were asked about symptoms associated with depression, anxiety, and PTSD. Because the GAIN was administered by research staff rather than trained mental health professionals, analyses focused on the presence of self-reported symptoms consistent with mental health problems rather than "diagnoses". Coding was based on the GAIN manual and scoring instructions. Individuals who met symptom criteria consistent with each mental health problem were dichotomously coded. Thus, the three mental health problems were coded separately as depression (yes/no), anxiety (yes/no), and PTSD (yes/no) based on the self-reported endorsement of symptom profiles.

HIV risk behaviors—Several variables were examined using frequencies to demonstrate the extent of HIV risk behaviors among women in this sample. The following dichotomous (yes/no) questions were asked: (1) Have you ever injected a drug in your lifetime?, (2) Have you injected a drug in the past six months prior to incarceration?, (3) Have you shared a needle with anyone in the past year?, (4) Have you shared works (cooker, cotton, rinse water) with anyone in the past year?, (5) Have you had more than one male sex partner in the past year?, (6) Have you ever traded sex for money/drugs/food, and (7) Have you traded sex for money/drugs/food in the past year?

Injection drug use was further assessed based on the number of days of drug injection in the 30 days before incarceration. Participants were asked how many days in the past thirty they had injected a variety of illicit substances. Using the "max" command in Stata version 12, number of injection days was determined based on the substance they reported injecting most frequently in the past 30 days. For example, if a participant reported injecting prescription opiates on 10 of the past thirty days and methadone on 5 of the past thirty days, that respondent would receive a score of 10. Responses were coded as continuous with a range of 0-30.

To assess sexual risk, participants were asked about the number of male sex partners they had in the year before incarceration. Given that participants were asked for a specific number of past year male sex partners, this is treated as a count variable. Because a preliminary descriptive analysis indicated that 95% of participants reported almost no condom use in the past year with a self-perceived regular partner and 75% reported no condom use with a casual partner, number of partners was chosen as the measure for assessing sexual health risk.

Analytic Plan

Data were analyzed using Stata version 12 SE. Descriptive statistics were examined for each of the descriptive and primary study variables. To address the first study objective, examining HIV risk behavior by three different mental health problems (depression, anxiety, and PTSD), a series of t-tests and chi-square analyses were used to examine differences in substance use patterns and HIV risk behavior based on specific mental health problems. To address the second study objective, examining whether the relationship between mental health issues and HIV risk behavior (i.e., risky sexual activity) is moderated by engagement in other risk behaviors (IV drug use), three negative binomial regression models were analyzed. Specifically, to examine if number of injection drug use days has an effect on the relationship between our predictor variable – anxiety, depression, or PTSD – and our outcome variable – number of male sex partners – interaction terms were included in each of the three models to measure the product of each mental health issue and number of injection drug use days. Having reached significance at the bivariate level, the following control variables are included in each of the three regression models: participant age, marital status, and employment status. Using a two-tailed significance test with a sample of 136 women and an error cutoff of 0.05, power for these regression models was determined to be appropriate (1-β error probability = 0.80) to detect a medium effect.

To assess if number of injection days moderates the relationship between having a mental health problem and risky sexual behavior, three interaction terms were calculated. The interaction terms examine the relationship between number of injection days and, (1) anxiety, (2) depression, and (3) PTSD. The primary moderator term was days of injection drug use in the past 30 days. While data was collected on sharing practices, only women who reported recent injection drug use were asked those questions – limiting the sample size for multivariate analysis. Because the moderator, number of injection days in the past month, had an overdispersion of zeroes, a zero-inflated negative binomial regression was initially used; however, goodness-of-fit tests indicated that the zero-inflated models did not differ from the standard negative binomial models. Therefore, for ease of interpretation and consistency, all three models were run using standard negative binomial regression.

Negative binomial regression Model 1 examines the effect of anxiety on number of male sex partners, as moderated by number of recent injection days. Anxiety, number of recent injection days, and an interaction term combining the two (as well as the control variables) served as the predictor variables. In each regression model, the outcome variable of interest is HIV sexual risk, assessed by number of recent male sex partners. Number of past year male sex partners is the outcome variable. Models 2 and 3 are identical to Model 1 except depression (Model 2) and PTSD (Model 3) are substituted in place of anxiety. Incidence rate ratios, β coefficients, and standard errors for all three regression models are reported in Table 3.

Results

Substance use, mental health, and HIV risk

As shown in Table 1, women in the sample were about 31 years old, white, and had approximately 11.2 years of education. Less than one third of women had been employed in the six months before incarceration, and 39.7% were married at the time of interview. Women reported an average of 6.3 adult incarcerations and had currently been incarcerated for an average of 76.5 days.

Of the three mental health problems examined, depression was the most common problem, affecting nearly 77% of women in the sample. Symptom profiles for anxiety and post-traumatic stress affected 61.8% and 62.5% (respectively) of women in this sample. While 16.2% of women in the sample did not report any mental health problems, a nearly a quarter reported two of the three mental health problems examined, and over 47% reported symptoms consistent with all three mental health problems. While women were recruited into the sample as drug users, rates of drug use were considerably high during the six months prior to entering jail. The most commonly used drugs included illicit use of oxycodone (average of 78.8 days in past six months) and anti-anxiety medications like Xanax® and Valium ® (average of 71.6 days). The majority of women reported using multiple substances per day during the six months before jail (80.9%), and being high on most days during that time period (average of 135.3 days). These frequencies are reported in Table 1.

With regard to HIV risk behavior, over three quarters of women in this sample reported having ever injected a drug in their lifetime (75.7%), and almost two-thirds reported injecting a drug during the past six months before entering jail (62.5%). Of the 62.5% who reported injection drug use, 70.3% reported sharing needles and 96.6% reported sharing injection works (cooker, cotton, rinse water). Women also reported an average of 24.4 lifetime male sex partners and about 3.6 male partners in the past year. Furthermore, 39% reported having ever exchanged sex for money, drugs, or food, with over 22% having done so in the past year.

Drug use and HIV risk by mental health issue

As shown in Table 2, compared to women without anxiety, women who reported experiencing anxiety had significantly higher NM-ASSIST scores for cocaine ($p < .05$), sedative ($p < .05$), illicit opioid ($p < .05$), and prescription opiate use ($p < .01$). In addition, women who reported experiencing depression had significantly higher cocaine ($p < .01$), illicit opioid ($p < .05$), and prescription opiate NM-ASSIST scores ($0 < .01$). Women endorsing depression symptoms also injected drugs on significantly more days in the past month than women without depression (14.5 days vs. 9, respectively, $p < .05$). And finally, women who reported PTSD had a significantly higher methamphetamine NM-ASSIST score ($p < .01$). In terms of HIV risk behavior, women with PTSD were more likely to have injected any drug in the past year and injected on a greater number of days in the past month ($p < .05$ for both).

Relationship between mental health and HIV risk

Results from the three negative binomial regression models are shown in Table 3. In model 1, for women endorsing anxiety symptoms, more injection drug use days predicts a higher number of male sexual partners ($p < .05$). Injection drug use had no effect on number of male sex partners for women without anxiety. Additionally, being employed ($p < .01$) was associated with having fewer male sex partners.

In model 2, injection drug use did not significantly moderate the relationship between depression and number of male sex partners; however, being employed was associated with having fewer male sex partners ($p < .01$).

As in the anxiety model, injection drug use did significantly moderate the relationship between PTSD and number of male sex partners (model 3) such that for women endorsing PTSD symptoms, more injection drug use days predicts a higher number of male sexual partners ($p<.05$). In other words, among women who reported experiencing PTSD, those who injected drugs on more days had significantly more male sex partners than those who injected drugs on fewer days ($p < .05$). As in models 1 and 2, being employed ($p<.01$) was associated with fewer male sex partners in model 3.

Discussion

Several studies have demonstrated high rates of drug use (e.g. Sipes, 2012; Staton-Tindall et al., 2007) and mental health problems (e.g. Abram et al., 2003) among incarcerated women. Whether described as unique problems or as co-occurring issues (e.g. Sacks, 2004), the

literature consistently suggests that the criminal justice system is a repository for individuals with serious clinical issues. While the literature in recent years has well-documented the extent of overlap of substance use and mental health among women, we know less about how co-occurring mental health and substance use issues may relate to other health risk problems, such as injection drug use and sexual activity. In addition, most of the work in this area has been done with urban women (e.g., Abram et al., 2003; McClelland et al., 2002) and women in prison (Zlotnick et al., 2008), which may neglect samples of at-risk women in rural areas with unique vulnerabilities. This study contributes an exploration of the relationship between mental health issues and HIV risk among rural women with drug use histories.

Findings indicate that rates for drug use and mental health issues among this sample of rural women in jail are fairly high compared to other samples. While women in this study were recruited based on drug use, the use of a validated screening tool (GAIN) with this population indicate that not only are mental health problems prevalent, but they are clinically significant. Specifically, about 80% of the women in this sample met GAIN symptom criteria for depression. This rate of depression is notably higher than other studies of women in jails (15-25%) (Teplin et al., 1997), and women in prison with substance use issues (38%) (Zlotnick et al., 2008). Rates for anxiety and post-traumatic stress were also high, with nearly two-thirds of the sample reporting symptoms consistent with these issues. These rates are also higher than other studies of women in jail which reported 18.5% for anxiety and 11.3% for PTSD (Binswanger et al., 2010). It is possible that this is a cultural anomaly with some studies reporting that rural women are more likely to suffer from chronic depression and have significant barriers to health services compared to their urban counterparts (American Psychological Association, n.d.). It is also possible that self-reporting symptoms to research staff with the afforded confidentiality protections may be different than a more formal assessment for these important mental health problems with a trained mental health professional. Contributing factors of the high rates of mental health issues should be examined in future research.

In addition to mental health problems, women in this sample reported high risk scores on the NM-ASSIST (indicative of need for intervention) for prescription opiate use and sedatives and about half reported injection drug use in the past six months – suggesting the highest risk category. While the NM-ASSIST has been largely validated in health care and drug treatment settings (Humeniuk et al., 2008), it has also received increased attention in criminal justice settings in recent years due to the ease of use and the complexity of drugs it allows for screening (Staton-Tindall et al., 2013). Other studies using the NM-ASSIST suggest that scores among this randomly selected group of women drug users in rural jails report substance use rates comparable to individuals diagnosed with substance dependence (Humeniuk et al., 2008), with high-risk use of sedatives and opiates being considerably higher in this sample. This finding is likely reflective of the high rate of prescription drug abuse in the Appalachian region, which has been well-documented (Havens et al., 2013; Zhang et al., 2008).

Rural women in this sample also reported engagement in a number of HIV risk behaviors. While the majority of the sample reported fewer than five sex partners in the past year,

which is less than other samples of women in jails (McClelland, et al., 2002), the majority of women in the sample reported not using condoms with main or casual partners. In addition, about three-quarters reported injecting drugs in their lifetimes, and about two-thirds reported recent injection. This is significantly higher than McClelland and colleagues (2002) found in a sample of female jail inmates from inner city Chicago (19%). In addition, in the current sample of rural women, nearly 40% reported injecting two or more drugs in the past six months and sharing needles and other drug injection equipment. This degree of injection behavior may contribute to altered brain chemistry and decision making abilities related to safe drug use practices. This finding suggests that rural women drug users that spend time in local jails may be engaging in serious health risk behaviors that increase their susceptibility for contracting HIV. While the current study focused on the practice of injection drug use rather than injection of specific types of drugs, this would be an important area of research for HIV prevention intervention efforts. Also, the degree of HIV risk among this rural sample of women may also be related to characteristics of their social network. Limited research on HIV risk among rural individuals has suggested that risk behavior (injection drug use, sharing injection equipment, and unprotected sex) within networks of rural drug users creates an important risk for HIV transmission (Havens et al., 2013; Young et al., 2013). While network analysis goes beyond the scope of the current study, this is an important area for future research among rural women in the criminal justice system.

This study also explored bivariate relationships between mental health and drug use among this high risk sample of women. . Findings indicated that endorsement of generalized anxiety symptoms was associated with increased NM-ASSIST risk scores for cocaine, sedatives, and opiates. Similarly, PTSD symptoms were associated with increased methamphetamine use and injection drug use. The opiate finding is consistent with other studies, but the cocaine and methamphetamine findings are somewhat surprising since other studies have shown that individuals with anxiety symptoms are more likely to self-medicate with drugs that suppress the central nervous system (CNS) rather than to activate it (Robinson et al., 2009). The opposite has also been reported for depression symptoms – drugs which activate the CNS such as cocaine can alleviate symptoms of depression (Morton, 1999), which is consistent with significant differences for cocaine and methamphetamine in the current analysis. These findings may be explained by early theories that suggest individuals may use certain kinds of substances to alleviate negative emotions (e.g. Khantzian, 1990; Khantzian, 1997), which may or may not be consistent with their psychopharmacology and may increase the risk for re-entry relapse in the transition from jail to the community. It is also possible that the repeated use of certain kinds of substances may also cause or precipitate mental disorders. This should be a focus of future research.

This study also examined main effects of mental health and HIV. Findings indicated that depression and PTSD were both being significantly associated with injection drug use in the past month. In addition, women who self-reported PTSD symptoms reported significantly more male sexual partners in the past six months compared to women who did not report PTSD symptoms. This is consistent with other research with women in jails, which suggested that mental health problems are predictive of HIV behavior (McClelland et al., 2002). It is also consistent with studies focused specifically on PTSD and HIV risk (O'Cleirigh et al., 2013). While descriptive trends were noted for anxiety and depression

with regard to sexual activity, these analyses did not reach significance. Because incarcerated women have been shown to have high rates of abuse and trauma histories (e.g., Tripodi & Pettus-Davis, 2013), the relationship between past trauma and current experience of trauma-related symptoms should be considered in future research among rural drug-using women at risk for HIV.

This study also proposed an innovative model to examine dual HIV risk in this sample of women with co-occurring mental health and substance use. Specifically, we further explored the relationship between mental health and HIV risk to examine whether engagement in one HIV risk behavior was predictive of additional risks for women with certain mental health issues (dual risk). Findings indicated that two of the mental health models were significant – anxiety and PTSD. Specifically, for women who had symptoms consistent with these mental health problems, more days of injection drug use was positively associated with more sex partners. These findings suggest that for some mental health issues, HIV risk may be accentuated for women drug users. While other studies have noted that there is a correlation between high risk sexual behavior and injection drug use for women (Evans et al., 2003), the role of mental health in this relationship has been largely ignored in clinical and empirical research. An exception is a review which noted that having a history of physical and sexual abuse is potentially related to the high prevalence of HIV among incarcerated women (DeGroot, 2000). Considering the research on the high rates of mental health problems among incarcerated women, the number of HIV+ women in the criminal justice system, and studies which demonstrate the increased risks associated with engaging in more than one HIV risk behavior (i.e., Neagius, et al., 2013; Strathdee, et al., 2003), this area of empirical and clinical research is critical and needs further exploration – especially in rural areas where the rates of injection drug use continue to increase (e.g., Havens et al., 2013).

This study has limitations. Recruitment included a small sample of incarcerated women drug users from rural jails in one state. The sample size limited complex, multivariate analysis for certain HIV risk behaviors (e.g., sharing of drug injection equipment). While the sample was randomly selected, the sampling frame may still limit generalizability to other samples of women involved in the criminal justice system and substance users. Data was also based on self-report of sensitive information including drug use, mental health, and HIV risk behavior. While correctional officers were not present during interviews and a Certificate of Confidentiality was obtained to increase protections, it is still possible that women were concerned about confidential reporting in the jail environment. Measures of HIV risk behavior were limited in scope to address important network characteristics of rural women in this sample. For example, this study focused on the number of male sex partners, but did not elicit information regarding at-risk behavior among their male partners. These behaviors and related network characteristics of rural women should be considered in future research. Finally, while validated instruments were used for data collection related to mental health problems (GAIN), study findings from the screener were not validated by a more thorough mental health assessment for diagnosis by a trained mental health professional. This is an important area for future empirical and clinical research.

Despite these limitations, this exploratory study makes a contribution to the literature with its focus on a vulnerable, understudied group of rural women from local jails in the

Appalachian region. In the few existing studies that focus on gender differences among jail inmates, females are considerably more likely than males to experience both drug abuse problems and mental health issues including depression and anxiety (Binswanger et al., 2010; Peters et al., 1997). Based on these rates of drug use, mental health issues, and the emergence of health risk behaviors such as injection drug use in rural Appalachia, the need to explore the relationships between these issues among vulnerable and understudied populations such as rural women is critical. These findings also have important implications for practitioners in jail and other criminal justice settings. For example, because women are typically incarcerated in jails for a short period of time compared to prison or community custody settings, there may be a critical window for screening/assessment for substance use and co-occurring mental health issues in jail settings. Because studies have shown that women's participation in drug treatment can also have a positive impact on their risky sexual behavior (Latka et al., 2005), this study also has policy implications of expansion of substance abuse treatment in jail settings. Having a better understanding of co-occurring substance use, mental health, and other health risk behavior, as well as the complexity of HIV risk, also has important implications for re-entry to the community and for making appropriate treatment referrals. However, because there are limitations of health and behavioral health services in rural communities to provide substance use and mental health treatment, there is further support for criminal justice venues such as jails to provide on-site treatment and prevention interventions.

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Table 1
Sample profile of mental health, substance use, and HIV risk behavior (N=136)

Demographics	Mean or Percent
Age	31.3
White	98.5%
Years of Education	11.2
Married	39.7%
Employed in 6 mo. before Incarceration	29.4%
Days Incarcerated (current sentence)	76.5
Number of times incarcerated as an adult	6.3
Mental Health[1]	
Anxiety	61.8%
Depression	77.2%
Post-Traumatic Stress	62.5%
Endorses symptoms for two mental health problems	23.5%
Endorses symptoms for all three mental health problems	47.1%
Substance use (average # days in past 6 months)	
Oxycodone	78.8
Anti-anxiety medication	71.6
Buprenorphine	53.9
Marijuana	57.2
Lortab/Hydrocodone	43.6
Percocet	33.8
Methamphetamine	32.8
Alcohol	18.3
Methadone	16.2
Downers/sleeping pills	10.7
Used multiple drugs in past 6 mo.	80.9%
Mean # of days in past 6 mo. used multiple drugs	108.6
# of days in 6 mo. prior was high on drugs	135.3
HIV Risk Behavior	
Ever injected a drug in lifetime	75.7%
Injected drug in past 6 months	62.5%
Shared needles in past year (n=59)	70.3%
Shared works in the past year (n=59)	96.6%
Average number of lifetime male sex partners	24.4 (range 2-250)
Average number of sex partner in past year	3.6 (range 0-100)
Ever traded sex for money/drugs/food	53 (39.0%)
Any past year exchange of sex for drugs or money	31 (22.8%)

[1] Note: Mental health issues based on meeting GAIN criteria.

Table 2

Bivariate analyses of substance use and HIV risk behavior by mental health problem (N=136)

	Anxiety		Test Statistic (χ^2/t-score)	Depression		Test Statistic (χ^2/t-score)	PTSD		Test Statistic (χ^2/t-score)
	yes	no		yes	no		yes	no	
ASSIST Scores (range 0-39)									
Cannabis	9.9	9.1	-0.4	10.2	7.8	-1.1	9.6	9.6	0.0
Cocaine	8.9	4.5	-2.2*	8.5	3.0	-2.33**	8.4	5.3	-1.5
Stimulants	4.1	4.3	0.2	4.1	4.3	0.1	4.1	4.2	0.1
Methamphetamine	12.4	10.9	-0.6	12.4	9.9	-0.8	14.1	8.2	-2.3**
Sedatives	20.4	15.9	-1.7*	19.3	16.5	-0.9	18.6	18.9	0.1
Illicit opioids	8.1	3.8	-2.03*	7.4	3.2	-1.7*	7.7	4.4	-1.5
Prescription opiates	29.5	23.6	-2.4**	28.7	22.3	-2.2**	28.6	25.0	-1.4
HIV Risk Behavior									
# male sex partners (past year)	4.4	2.2	-1.4	4.0	2.1	-1.0	4.7	1.7	-1.8
Any IDU (past year)	66.7%	53.9%	2.2	64.8%	51.6%	1.8	68.2%	51.0%	4.0*
# IDU days (past month)	14.6	11.2	-1.4	14.5	9.0	-2.0*	14.9	10.7	-1.7*

* p<.05,

** p<.01

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Table 3

Negative binomial models examining number of injection days as a moderator of the relationship between mental health problems and risky sexual behavior (N=136)

	Number of Past Year Male Sex Partners					
	Model 1		Model 2		Model 3	
	IRR	β (SE)	IRR	β (SE)	IRR	β (SE)
Demographics						
Married	0.74	-.30 (0.18)	0.76	-.27 (0.19)	1.12	0.11 (0.11)
Employed	0.59	-.53 (0.21)**	0.56	-0.58 (0.21)**	0.55	-0.60 (0.20)**
Age	0.98	-.02 (0.01)	0.99	-0.01 (0.01)	0.99	-0.01 (0.01)
Anxiety	1.22	0.20 (0.27)	--	--	--	--
Anxiety * # Inj Days	1.03	0.03 (0.01)*	--	--	--	--
Depression	--	--	1.21	0.19 (0.30)	--	--
Depression * # Inj Days	--	--	1.02	0.02 (0.02)	--	--
PTSD	--	--	--	--	1.62	0.48 (0.26)*
PTSD * # Inj Days	--	--	--	--	1.03	0.03 (0.01)*
Number of Injection Days	1.01	0.01 (0.01)	1.01	0.01 (0.02)	1.01	0.01 (0.01)
Sample Size	13651.23***		13644.37***		13658.21***	
Model χ^2						

* = p < .05;

** = p < .01

Note: Incidence rate ratios and β coefficients are reported. Standard errors are in parentheses