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Prevalence of Psychiatric Disorders Among Young Injection Drug Users*

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Abstract

Background—Studies of individuals in treatment for substance use have found high rates of psychiatric disorders, however little is known about the mental health of drug users not in treatment. This study aimed to assess the prevalence of lifetime and recent substance use and psychiatric disorders among young injection drug users (IDU) outside of a treatment setting.

Methods—Participants were recruited through outreach and respondent-driven sampling. Trained interviewers administered the Psychiatric Research Instrument for Substance and Mental Disorders. Interviews were conducted at two field stations operated by Community Outreach Intervention Projects in Chicago. Participants were 570 young adults (18-25 years) who injected drugs in the previous 30 days. Heroin was the primary drug used in this sample. Past 12-month and lifetime substance use disorders and primary and substance-induced mental disorders were based on DSM-IV diagnostic criteria.

Results—Nearly all participants met the criteria for heroin dependence. Multiple substance use disorders were common; cannabis was the most common substance involved after heroin, followed by alcohol and cocaine. Major depression, alcohol dependence, antisocial personality disorder, and borderline personality disorder were highly prevalent. Other psychiatric disorders were observed at levels consistent with other young adult samples.

Conclusions—Young IDU experience major depression, alcohol dependence, anti-social personality disorder, and borderline personality disorder at high rates, and multiple substance use disorders are common. Anxiety disorders in this population appear to be similar in prevalence to young adults in general.

Keywords

injection drug use; mental health; comorbidity; respondent-driven sampling

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Conflict of Interest
All authors declare that they have no conflicts of interest.

1. Introduction

The co-occurrence of substance use and mental disorders in general is well-documented (Crawford et al., 2003; Grant et al., 2004b; Kessler, 2004; Kessler et al., 2005b; Myrick and Brady, 2003; Regier et al., 1990), and studies of individuals in drug treatment have consistently found high rates of psychiatric comorbidity (Compton et al., 2000; Havassy et al., 2004; Mason et al., 1998; Weaver et al., 2003). In particular, studies of heroin users have documented elevated rates of antisocial personality disorder (Brooner et al., 1997; Craig et al., 1997), major affective disorders (Brooner et al., 1997; Darke and Ross, 1997; Rabkin et al., 1997; Tondo et al., 1999), and anxiety disorders (Bremner et al., 1996; Callaly et al., 2001; Darke et al., 1994; Milby et al., 1996) including post-traumatic stress disorder (PTSD).

In a study of methadone maintenance patients in Baltimore, for example, Brooner et al. (1997) found that 25% of the sample met the criteria for anti-social personality disorder (ASPD), and 16% met the criteria for major depression. These rates were significantly higher than general population age-stratified rates observed in the Epidemiological Catchment Area (ECA) study (Robins et al., 1984). Women were more likely than men to have a lifetime Axis I diagnosis (33% vs. 16%), while men were more likely to have a personality disorder, particularly ASPD (34% vs. 15%). More recently, Chen et al. (2011) reported high rates of psychiatric disorders among opioid-dependent patients recruited from an inpatient substance use treatment facility in Washington, D.C.; 44% having a mood disorder, 36% anxiety disorder, 33% ASPD, and 29% borderline personality disorder. A number of Australian studies have also found high rates of depressive and anxiety disorders, as well as ASPD, among heroin users in methadone maintenance treatment and other treatment modalities (Callaly et al., 2001; Darke et al., 1998; Darke et al., 1994; Mills et al., 2004; Teesson et al., 2005).

Less is known, however, about the prevalence of co-morbid disorders among street populations of heroin users, especially younger (under 30) heroin users. A recent study of heroin users participating in a syringe exchange program in Baltimore showed that psychiatric and substance abuse co-morbidity were highly prevalent (Kidorf et al., 2004). Over 50% of the sample was diagnosed with at least one non-substance use Axis I disorder or ASPD. In a comparison of methadone maintenance treatment program (MMTP) enrollees and needle exchange participants, Brienza and colleagues (2000) found that major depression was more prevalent in the needle exchange group (54%) than in the MMTP group (42%). Both of these studies drew on samples of primarily older (> 30) injection drug users (IDU).

A study of Australian methadone maintenance clients (Darke et al., 1994) suggests that co-morbid disorders may be more prevalent among younger compared to older heroin users. Although the levels of psychopathology were high for the entire sample, younger age was associated with a greater likelihood of a current diagnosis of ASPD. Another study of 210 young heroin users (most entering treatment) in Australia showed even higher levels of psychopathology using structured clinical interviews (Mills et al., 2004). Current major depression was identified in 23% of the sample; 75% had a lifetime diagnosis of ASPD; and 37% had a lifetime diagnosis of PTSD.

Though recent studies of young heroin users are few, the data strongly suggest that, compared to older heroin users, they are more likely to be women (Inciardi et al., 1998), Caucasian (Broz and Ouellet, 2008; Des Jarlais, 1992), and suburban (Thorpe et al., 1998). Changes in the demographics of IDU have implications for the prevalence of comorbid

conditions. For example, women heroin users have been found to be two to three times as likely as men to be diagnosed with PTSD (Kidorf et al., 2004; Mills et al., 2004). Brady and colleagues (Brady et al., 1998) found that those with a primary or first diagnosis of PTSD, primarily women, had a higher prevalence of other psychiatric disorders and higher rates and levels of opiate use.

The present study was conducted to assess psychiatric morbidity in a sample of young injection drug users recruited outside of a treatment setting. While we expect to find elevated rates of psychiatric problems compared to the general population of young adults, we are uncertain how this sample might compare with treatment samples of mostly older substance users. Users with psychiatric problems might be more likely to seek drug abuse treatment, in which case those in treatment would show higher levels of psychopathology than those not in treatment. On the other hand, users with multiple problems may be more isolated and less likely to seek help, or may delay seeking help, in which case we might expect to see even higher rates of psychiatric problems among young out-of-treatment heroin users. The findings from this study may help drug treatment providers and criminal justice systems better meet the particular needs of young IDU for dual methods of drug and psychiatric treatments.

2. Methods

Study procedures were approved by the Institutional Review Board of the University of Illinois at Chicago.

2.1. Sample recruitment

The study was conducted at two field sites of the Community Outreach Intervention Projects in West and Northwest Side neighborhoods in Chicago. These sites provide a variety of services including HIV testing and counseling, hepatitis (HBV and HCV) testing, substance abuse treatment referrals, and needle exchange. The neighborhood populations are largely Black and Latino, however young White suburban drug users come to these neighborhoods to buy drugs.

Participants were eligible for the study if they had injected drugs at least once in the past 30 days, and were age 18 to 25. Current injection was verified by trained counselors who inspected for injection stigmata, and age was verified with a driver’s license or state identification card.

Study participants were recruited using outreach and respondent driven sampling (RDS) methods (Heckathorn, 1997; Heckathorn et al., 2002). RDS is predicated on the recognition that those best able to access members of hidden populations are their own peers. RDS motivates peers through a dual incentive system that offers rewards both for being interviewed and for recruiting others. Initial participants were recruited by outreach workers at the two field sites. After completing their interview, these participants were given coupons to recruit other young injection drug users, serving as “seeds” for the RDS chains. Seeds were selected to be heterogeneous with respect to gender, race/ethnicity, socioeconomic status, and sexual orientation. Because recruitment chains tended to be short, and many seeds were not productive, outreach workers also continued to recruit participants directly throughout the study. Forty percent of enrolled participants were recruited by outreach.

Each seed, and each recruited participant that followed, received up to four recruitment coupons after completing the interview. Coupons included a map to the field site from which they were issued, a toll-free phone number for obtaining more information or for arranging

appointments, and a unique serial number, with the first digit identifying the site. The coupon numbers were entered into a computer database that established links between seeds and the chains of recruits and recruiters that followed. Participants received compensation for each coupon that was brought in by a person eligible to participate in the study. Compensation began at $15 and was later increased to $20 in an effort to increase recruitment.

To reduce the chance for coercion, the recruit was not required to enroll in the study in order for the recruiter to receive compensation. Fifteen eligible recruits declined to participate. Participants who distributed coupons had to return to the field site to receive compensation, and were paid $10-$15 for the coupon review session, independent of compensation for coupons redeemed. Those who successfully recruited eligible potential participants, and returned to the field site for a coupon review, were given additional coupons. Lost coupons were replaced upon request, and the original coupons voided.

2.2. Procedures

After screening for eligibility, and completing informed consent procedures, participants completed a brief computer-based assessment including questions about the size and composition of their injection drug-using network, and the nature of their relationship with their recruiter. The responses to these questions are used to assess sampling biases. Participants then completed an audio computer-assisted self-interview (ACASI) to assess socio-demographic background, family background, drug use, injection risk behavior, sexual risk behavior, recent mental health and substance use treatment services, HIV and hepatitis testing, HIV/hepatitis knowledge, attitudes regarding and subjective norms for HIV risk behavior, and self-efficacy for sex- and injection-related HIV risk reduction behaviors.

Following the ACASI, a trained interviewer administered the Psychiatric Research Interview for Substance and Mental Disorders (PRISM, version 6). On request, or if no interviewer was immediately available, participants were allowed to make an appointment to return for the PRISM interview. Participants were compensated for completing the interviews. Compensation was initially set at $50 and was later increased to $75 due to the demanding nature of the PRISM interview.

2.2.1. PRISM Instrument—The PRISM is a semi-structured clinical interview that provides diagnoses based on DSM-IV criteria, and is specifically designed to differentiate between the expected effects of intoxication and withdrawal, and between primary (independent) and substance-induced psychiatric disorders (Caton et al., 2005; Hasin et al., 2006; Hasin et al., 1996). The PRISM places sections on substance use at the beginning of the interview to enable the patient's substance use history to be understood before psychiatric disorders are assessed. An independent disorder is diagnosed when a significant portion of the episode occurred when the expected effects of intoxication or withdrawal could not have occurred, i.e., during a period of sustained abstinence or only occasional use, beginning at least two weeks prior to the onset of heavy use, or continuing at least four weeks after cessation of use. A "substance-induced" disorder occurs during a period of excessive substance use or in the 4 weeks following the cessation of use and requires the full criteria to be met. For example, substance-induced major depressive disorder must have a duration of at least two weeks, and five of the nine depression symptoms, including depressed mood or anhedonia, must be present. Furthermore, the substance consumed must be "relevant" to the disorder (i.e., its effects can cause symptoms identical to the disorder that is being assessed), and each of the component symptoms entering into a diagnosis must be clearly excessive in comparison to the expected effects of intoxication or withdrawal. For example, insomnia during a period of stimulant intoxication could be counted toward the

diagnosis of substance-induced depression if it occurred during depressed mood in excess of the level experienced during the non-depressed substance using baseline. Disorders that may be diagnosed as substance-induced include major depression, mania, dysthymia, psychosis, panic disorder, and generalized anxiety disorder.

For both substance use and psychiatric disorders, diagnoses were made using two time frames: “past year” (criteria were met within the past 12 months) and “prior” (criteria were met before the previous 12 months). Lifetime prevalence takes into account both past year and prior diagnoses.

2.2.2. PRISM Retest—As part of the procedures to continuously monitor and improve interviewer performance, a subset of participants (1 in 7) was randomly selected to be retested by a different interviewer. These participants were given an appointment to return for a second interview within two weeks. Participants were compensated $45-$50 for the second PRISM interview.

2.2.3. Statistical Analysis—Data analyses were conducted using Stata 11 (StataCorp, 2009). RDS analyses were conducted using the user-written Stata program -rds- (Schonlau, 2010; Schonlau and Liebau, 2010).

2.2.4. Sample Composition—The sample composition was analyzed to assess productivity of seeds and referral chains; affiliation across gender, race/ethnicity, and urban/suburban residence; and degree (size) of IDU networks.

2.2.5. PRISM Diagnoses—Sample prevalence and RDS estimates of population prevalence were computed for lifetime and past year abuse and dependence (by substance), major depressive disorder, dysthymia, cyclothymia, mania, hypomania, psychotic disorder (including schizophrenia, schizophreniform disorder, schizoaffective disorder, mood disorder with psychotic features, delusional disorder, brief psychotic disorder, psychotic disorder due to a medical condition, and psychotic disorder not otherwise specified), specific phobia, social phobia, panic disorder, agoraphobia, generalized anxiety disorder, obsessive-compulsive disorder, posttraumatic stress disorder (PTSD), antisocial personality disorder, and borderline personality disorder. RDS estimates are adjusted for bias in the chain-referral sampling process (Heckathorn, 2002; Heckathorn, 2007). Nonparametric bootstrap percentile-based confidence intervals were computed for the RDS estimates.

Seventy-five participants returned for the second PRISM interview within 60 days and were included in the retest reliability analysis. Agreement rates and kappa coefficients were computed.

3. Results

A total of 612 eligible participants were enrolled in the study; 1 ACASI file was lost due to a computer malfunction, and 41 participants did not complete a PRISM interview due to scheduling difficulties or failure to return for an appointment (40), or incoherence (1). The present analyses are based on 570 complete interviews. The sample was 62% male, 78% non-Hispanic White and 14% Hispanic; the median age was 23. The majority of participants (72%) lived outside of the city. A sizeable proportion (44%) had some post-secondary education, while 23% had not completed high school; most (68%) were unemployed.

The final sample consisted of 140 unproductive seeds, 97 productive seeds, and 333 recruits; the maximum depth (levels of recruitment) was 13 and the average depth of recruits was 2.6. RDS estimates of population characteristics are shown in Table 1, as well as mean degree

(network size), degree adjusted for differential recruitment, and homophily (a measure of the extent to which group members recruited within their own group). Population estimates for gender and race/ethnicity differed only slightly from the sample proportions, however RDS estimates suggest that urban-dwelling young IDU may be underrepresented.

The median age of first injection was 19, and the average duration of injection was three years. Heroin was the primary drug injected; 96% of participants had injected heroin by itself, while 13% had injected heroin combined with cocaine (speedball).

3.1. Substance use disorders

Kappa coefficients for lifetime and past year substance use disorders indicated fair to good reliability, with most in the moderate agreement range of 0.40–0.60.[1] Lifetime disorders tended to have better reliabilities.

The sample prevalence and RDS estimates of past year substance use disorders are presented in Table 2. RDS estimates correct for bias in the sampling process (Heckathorn, 2002). For some variables RDS estimates could not be computed. This usually occurs when there are zero-count cells in the transition matrix, as happens when the sample prevalence is close to 0 or 1, or when one group is recruited exclusively by members of the same group.

As expected, nearly all participants (N = 556, 97.5%) met the criteria for heroin dependence in the past year. Forty-four percent of participants (N = 248) met the criteria for dependence on at least one other substance in the past year, and 35% (N = 200) met the criteria for abuse of at least one other substance (in the absence of dependence); 37% (N = 212) had no other substance use disorder in the past year.

Cannabis use disorders were highly prevalent with an estimated 43% of male IDU experiencing cannabis abuse (20.7%, 95% CI 14.5 – 27.5) or dependence (22.7%, 95% CI 14.4 – 33.2) in the past year, and 33% of female IDU experiencing cannabis abuse (25.9%, 95% CI 13.7 – 39.6) or dependence (7.0%, 95% CI 2.6 – 14.4) in the past year. Lifetime rates of cannabis use disorders were 64% for men (abuse 30.5%, 95% CI 23.3 – 38.7, dependence 33.8%, 95% CI 24.1 – 44.2) and 48% for women (abuse 33.1%, 95% CI 20.8 – 45.7, dependence 15.0%, 95% CI 8.1 – 25.6). Estimates of past year alcohol use disorders were 25% for men (abuse 12.3%, 95% CI 7.4 – 18.1, dependence 12.4%, 95% CI 8.5 – 17.0) and 21% for women (abuse 9.9%, 95% CI 2.3 – 19.6, dependence 11.0%, 95% CI 5.4 – 18.6); lifetime prevalence estimates were 49% for men (abuse 23.6%, 95% CI 16.7 – 31.5, dependence 25.0%, 95% CI 18.1 – 32.8) and 42% for women (abuse 14.7%, 95% CI 6.6 – 24.9, dependence 27.5%, 95% CI 17.7 – 39.2). The prevalence of cocaine use disorders in the past year was estimated at 14% for both men (abuse 2.0%, 95% CI 0.6 – 3.9, dependence 11.9%, 95% CI 7.1 – 18.2) and women (abuse 2.2%, 95% CI 0.5 – 7.3, dependence 11.7%, 95% CI 6.6 – 18.2), and opiate use disorders were experienced by an estimated 12% of male (abuse 2.3%, 95% CI 0.7 – 4.3, dependence 9.5%, 95% CI 5.4 – 15.0) and 13% of female IDU (abuse 0.7%, 95% CI 0.2 – 2.0, dependence 11.8%, 95% CI 5.3 – 20.7). Lifetime cocaine use disorders were estimated at 38% for men (abuse 7.3%, 95% CI 4.1 – 11.0, dependence 30.1%, 95% CI 22.2 – 38.8) and 41% for women (abuse 11.1%, 95% CI 3.4 – 21.2, dependence 29.8%, 95% CI 19.3 – 42.3); lifetime opiate use disorders were estimated at 21% for men (abuse 6.0%, 95% CI 2.9 – 10.2, dependence 14.7%, 95% CI 9.9 – 20.4) and 22% for women (abuse 1.2%, 95% CI 0.3 – 3.2, dependence 20.9%, 95% CI 12.4 – 31.5).

[1]Kappa coefficients, and prevalence rates and RDS estimates of lifetime substance use disorders can be found in the Supplementary Material, which can be found by accessing the online version of this article at http://dx.doi.org and by entering doi:…

3.2. Psychiatric comorbidity

Kappa coefficients for lifetime and past year psychiatric disorders indicated fair to good reliability, with most in the moderate agreement range of 0.40-0.60. Lifetime disorders tended to have better reliabilities.

Sample prevalence and RDS estimates of lifetime and past year psychiatric disorders are presented in Tables 3 and 4. Where applicable, substance-induced disorders and primary disorders are reported separately. For major depression and dysthymia we also present the rates for primary and substance-induced disorders combined. For bootstrap confidence intervals on the RDS estimates, the number of successful replications is reported; the estimation procedure frequently failed on replications when the prevalence of the disorder was low (<.01).

The most prevalent disorder was major depression, with estimated lifetime rates of 25% (95% CI 16.9 – 34.9%) for men and 31% (95% CI 21.2 – 42.1%) for women, including both primary and substance-induced episodes. Most past year episodes of major depression and dysthymia were substance-induced. In contrast, there were no reported instances of substance-induced manic episode. Anxiety disorders generally had low prevalence, however for women the estimated rate of PTSD was 10.6% (95% CI 5.1 – 17.1%), and primary panic disorder was 5.6% (95% CI 0.7 – 12.4%).

Antisocial and borderline personality disorders were also highly prevalent with estimated lifetime rates respectively of 23% (95% CI 15.9 – 30.2%) and 20% (95% CI 12.4 – 27.6%) for men and 17% (95% CI 8.4 – 28.5%) and 25% (95% CI 15.2 – 36.3) for women.

3.3. Psychiatric and substance use treatment

The majority of participants (N = 390, 68%) had received some kind of substance use treatment; the mean age of first treatment was 19 (SE = 0.14). Women were more likely than men to have received abstinence medication (54% vs. 45%; OR = 1.46, 95% CI 1.04 – 2.06). Five percent of participants (N = 28) reported current treatment. Over half (N = 335, 59%) of participants had participated in a twelve-step program, with 10% (N = 56) reporting current participation.

Nearly half (N = 281, 49%) of participants had ever received some kind of psychiatric treatment; the mean age of first treatment was 15 (SE = 0.27). Women were more likely to have received psychiatric treatment than men (OR = 1.88, 95% CI 1.33 – 2.65), and were also more likely be currently receiving treatment (12% vs. 4%; OR = 3.41, 95% CI 1.70 – 6.82). About half (N = 12, 52%) of participants with primary major depression in the past year reported psychiatric treatment in the past year. Less than half (N = 59, 44%) of participants with past year substance-induced major depression had received treatment, and 34% (N = 29) of participants with an anxiety disorder in the past year had received treatment in the past year.

4. Discussion

Consistent with other recent studies of injection drug users in this city (Thorpe, et al., 2001; Broz and Ouellet, 2008), the majority of young IDU were White, suburban, and injected primarily heroin. Multiple substance use disorders were common in this sample, with alcohol, cannabis, and cocaine being the most common secondary substances. Prior other opiate dependence was also not uncommon.

With a few exceptions (e.g., cannabis dependence among men), RDS estimates of substance use disorders were smaller than the sample prevalence rates. RDS estimates are adjusted to

account for biases in the sampling process, including bias due to differential recruitment and to differential degree (Heckathorn, 2002). It appears that individuals with multiple substance use disorders tend to have larger networks and so have a greater probability of selection.

Major depression and alcohol dependence were clearly elevated, and dysthymia was slightly elevated in this sample compared to lifetime rates for 18-29 year olds in the National Comorbidity Survey Replication (NCS-R; Kessler et al., 2005a). Lifetime alcohol dependence was diagnosed in 6.3% of 18-29 year olds in the NCS-R, compared to 25% of men and 28% of women in the current study. Lifetime major depression was diagnosed in 15.4% of 18-29 year olds in the NCS-R, compared to 25% of men and 31% of women in the current study, while lifetime dysthymia was diagnosed in 1.7% of 18-29 year olds in the NCS-R, compared to 2.3% of men and 4.7% of women in the current study. In contrast, lifetime rates of anxiety disorders were similar to or lower than those in the NCS-R for 18-29 year-olds.

Among female IDU, RDS estimates of 12-month alcohol abuse (9.9%) and dependence (11.0%) were over 70% greater than rates found in the 2001-2002 National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) for White 18-29 year old women (5.6% for abuse, 6.4% for dependence) (Grant et al., 2004a), however the NESARC rates fall within the 95% confidence intervals for the RDS estimates.

Antisocial and borderline personality disorders were prevalent with rates well above those reported for general population samples. The lifetime prevalence of ASPD among 18-29 year old men and women in NESARC was 6.2% (Grant et al., 2004c), and it was 8.5% among non-college-attending 18-24 year olds (Blanco et al., 2008), while it was 23% among men and 17% among women in the current study. Estimates of the prevalence of borderline personality disorder in the U.S. adult population are 1.4% based on the NCS-R full sample, and 1.6% based on a clinical reappraisal sub-sample (Lenzenweger et al., 2007), much lower than the rates of 19.5% for men and 25% for women in the current study. Although the general population rates are likely to be higher for young people, it is not likely that they exceed ten percent. While adult antisocial behavior (stealing, conning, lying, etc.) may be directly related to efforts to acquire drugs, a diagnosis of ASPD also requires some evidence of conduct disorder (three or more symptoms) prior to age 15.

Psychiatric service use by persons affected by a mental disorder appears to be similar to that in the general population. In the NCS-R, 33% of individuals with major depressive disorder in the past 12 months, and 35% of those with panic disorder or PTSD, reported mental health service use in the past year (Wang et al., 2005).

Comparisons with other studies drawing from substance abuse treatment or needle exchange programs (NEP) are complicated by differences in age, race, and substances used, as well as methodological differences. Compared to a sample of opiate-dependent subjects recruited from needle exchange programs in Baltimore, MD (Kidorf et al., 2004) rates of most Axis I disorders were similar. In contrast, compared to a multi-modal treatment sample of drug dependent subjects (about half with opiate dependence) recruited in St. Louis, MO (Compton et al., 2000) lifetime rates of most comorbid psychiatric diagnoses (alcohol dependence, major depression, dysthymia, antisocial personality disorder, phobic disorders, generalized anxiety disorder) were lower in this sample of young IDU. Rates of recent major depression (19% for men and 24% for women) were lower than those found in a Providence, RI sample of older opiate users recruited from methadone maintenance therapy and needle exchange programs (34%-66%; Brienza et al., 2000), even though the current study used a longer time frame (past year versus past six months). Chen et al. (2011) also reported high rates of current mood disorders (37% of men, 65% of women) and anxiety disorders (28%

of men, 58% of women) among opiate-dependent subjects in treatment compared to the current study. These results suggest that mood and anxiety disorders are more prevalent among IDU seeking substance abuse treatment.

Borderline personality disorder was less prevalent in the current study (19.5% males, 25.3% females) than in the Mills et al. (2004) study of young IDU entering treatment (46% of males, 59% of females), and among women in the Chen et al. (2011) inpatient substance use sample (26% and 40% among opioid-dependent men and women, respectively), while a study of young heroin users recruited outside of treatment in Spain (Rodriguez-Llera, 2006) found rates similar to the current study.

The lifetime rates of ASPD among men (23%), and lifetime alcohol dependence among men (25%) and women (28%) were consistently lower than those reported in studies drawing from NEPs or treatment programs. Lifetime alcohol dependence in U.S. studies ranged from 50% (Brooner et al., 1997) to 87% (Dinwiddie, 1997); the higher rates in these samples may be related to their older age. Rates of ASPD among men ranged from 32% (Chen et al., 2011) to 52% (Compton et al., 2000) in U.S. studies. Since ASPD is generally more prevalent among younger men, the higher rates found among older IDU suggests that male IDU with ASPD may be more likely to continue to inject drugs. Alternatively, treatment samples may be biased due to court-mandated treatment. Chen et al. (2011), for example, reported that 58% of the study participants were court-mandated to attend treatment.

4.1. Limitations

We experienced significant difficulties in recruiting the sample; only 41% of individuals selected as “seeds” successfully recruited other participants, only 58% of the sample was recruited by RDS, and most recruitment chains did not achieve significant depth. These shortcomings are reflected in wide confidence intervals for the RDS estimates. Consequently, our ability to detect significant differences in comparisons with other samples is limited. These difficulties in recruiting were likely due to the nature of the population being largely suburban, and having small fragmented networks, unlike the older urban population of injection drug users. New strategies will be needed to reach young suburban IDU who do not travel into the city.

There are also limitations associated with the PRISM. Retest reliabilities of the diagnoses derived from the PRISM interview were modest. Participants often had difficulty recalling past feelings and behaviors. However, previous research suggests that recall errors are most likely to involve less severe symptoms and behaviors (Fendrich and Mackesy-Amiti, 2000; Fendrich and Warner, 1994).

4.2. Conclusions

Young IDU experience major depression, alcohol dependence, anti-social personality disorder, and borderline personality disorder at high rates compared to the general population of young adults. Anxiety disorders in this population, on the other hand, appear to be similar in prevalence to young adults in general. Mood and anxiety disorders, as well as anti-social personality disorder and borderline personality disorder, were generally less prevalent in the current study than in samples drawn from treatment programs. Yet, significant proportions of young IDU with psychiatric disorders are in need of treatment.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Drug Alcohol Depend. Author manuscript; available in PMC 2013 July 01.

Table 1

Characteristics of the Sample (N=570)

		Sample		Population Estimate		Avg. Degree		
		N	%	%	SE[1]	Raw	Adj	Homophily
Sex								
	Male	353	62%	67%	3.3%	7.0	4.0	−0.03
	Female	217	38%	33%	3.3%	7.5	4.3	0.04
Race/Ethnicity								
	Hispanic	64	14%	12%	2.4%	7.0	4.3	0.14
	NH White	477	82%	83%	3.4%	7.3	4.2	0.18
	NH Black/Other	29	4%	5%	2.7%	5.2	3.4	0.21
Residence								
	Urban	160	28%	37%	5.7%	6.7	3.8	0.51
	Suburban	410	72%	63%	5.7%	7.4	4.3	0.57

[1] Bootstrap standard error based on 500 replications

Table 2

Sample prevalence and RDS population estimates of past year substance use disorders

		Male				Female			
	Estimate	***Prev.***	***95% Conf. Int.***		***N/Reps***	***Prev.***	***95% Conf. Int.***		***N/Reps***
Heroin Abuse	Sample Prev	0.006	0.001	0.020	353	0.005	0.000	0.025	217
	RDS Estimate	--				--			
Heroin Dependence	Sample Prev	0.966	0.941	0.982	353	0.986	0.960	0.997	217
	RDS Estimate	--				--			
Alcohol Abuse	Sample Prev	0.139	0.104	0.179	353	0.088	0.054	0.133	217
	RDS Estimate	0.123	0.074	0.181	4997	0.099	0.023	0.196	4997
Alcohol Dependence	Sample Prev	0.167	0.130	0.210	353	0.129	0.087	0.181	217
	RDS Estimate	0.124	0.085	0.170	5000	0.110	0.054	0.186	5000
Cannabis Abuse	Sample Prev	0.210	0.168	0.256	353	0.194	0.143	0.252	217
	RDS Estimate	0.207	0.145	0.275	5000	0.259	0.137	0.396	5000
Cannabis Dependence	Sample Prev	0.187	0.148	0.232	353	0.088	0.054	0.133	217
	RDS Estimate	0.227	0.144	0.332	4973	0.070	0.026	0.144	4973
Cocaine Abuse	Sample Prev	0.034	0.018	0.059	353	0.046	0.022	0.083	217
	RDS Estimate	0.020	0.006	0.039	4314	0.022	0.005	0.073	4314
Cocaine Dependence	Sample Prev	0.161	0.125	0.204	353	0.157	0.111	0.212	217
	RDS Estimate	0.119	0.071	0.182	5000	0.117	0.066	0.182	5000
Stimulant Abuse	Sample Prev	0.014	0.005	0.033	353	0.018	0.005	0.047	217
	RDS Estimate	0.010	0.002	0.024	1735	0.011	0.003	0.034	1679
Stimulant Dependence	Sample Prev	0.028	0.014	0.051	353	0.014	0.003	0.040	217
	RDS Estimate	--				--			
Sedative Abuse	Sample Prev	0.057	0.035	0.086	353	0.101	0.065	0.149	217
	RDS Estimate	0.034	0.014	0.059	4998	0.060	0.021	0.127	4998
Sedative Dependence	Sample Prev	0.091	0.063	0.126	353	0.097	0.061	0.144	217
	RDS Estimate	0.047	0.022	0.090	4996	0.053	0.019	0.100	4996
Opiate Abuse	Sample Prev	0.028	0.014	0.051	353	0.060	0.032	0.100	217
	RDS Estimate	0.023	0.007	0.043	4091	0.007	0.002	0.020	4091
Opiate Dependence	Sample Prev	0.122	0.090	0.161	353	0.152	0.107	0.207	217
	RDS Estimate	0.095	0.054	0.150	5000	0.118	0.053	0.207	5000

		Male				Female			
	Estimate	***Prev.***	***95% Conf. Int.***		***N/Reps***	***Prev.***	***95% Conf. Int.***		***N/Reps***
Hallucinogen Abuse	Sample Prev	0.031	0.016	0.055	353	0.023	0.008	0.053	217
	RDS Estimate	0.019	0.005	0.042	3034	0.027	0.003	0.070	3015
Hallucinogen Dependence	Sample Prev	0.028	0.014	0.051	353	0.028	0.010	0.059	217
	RDS Estimate	--				--			

Note: Confidence intervals are exact binomial for Sample Prevalence and percentile-based bootstrap for RDS Estimates.

Reps: number of successful bootstrap replications; -- : RDS Estimate could not be computed

Drug Alcohol Depend. Author manuscript; available in PMC 2013 July 01.

Drug Alcohol Depend. Author manuscript; available in PMC 2013 July 01.

Table 3

Sample prevalence and RDS population estimates of lifetime psychiatric disorders

		Male				Female			
	Estimate	***Prev.***	***95% Conf. Int.***		***N/Reps***	***Prev.***	***95% Conf. Int.***		***N/Reps***
Affective disorders									
Primary Major Depression	Sample Prev	0.088	0.060	0.122	353	0.212	0.160	0.272	217
	RDS Estimate	0.096	0.050	0.164	4996	0.218	0.135	0.321	4996
Substance-Induced Major Depression	Sample Prev	0.221	0.179	0.268	353	0.346	0.283	0.413	217
	RDS Estimate	0.194	0.124	0.288	5000	0.258	0.167	0.361	5000
Major Depression (any)	Sample Prev	0.258	0.213	0.307	353	0.401	0.335	0.469	217
	RDS Estimate	0.248	0.169	0.349	5000	0.309	0.212	0.421	5000
Primary Dysthymia	Sample Prev	0.000	0.000	0.010	353	0.032	0.013	0.065	217
	RDS Estimate	--				0.023	0.004	0.053	4889
Substance-Induced Dysthymia	Sample Prev	0.037	0.020	0.062	353	0.028	0.010	0.059	217
	RDS Estimate	0.023	0.004	0.051	4240	0.024	0.005	0.073	4240
Dysthymia (any)	Sample Prev	0.037	0.020	0.062	353	0.060	0.032	0.100	217
	RDS Estimate	0.023	0.004	0.051	4922	0.047	0.010	0.101	4922
Primary Manic Episode	Sample Prev	0.020	0.008	0.040	353	0.018	0.005	0.047	217
	RDS Estimate	0.013	0.003	0.025	3041	0.012	0.001	0.030	3014
Anxiety disorders									
Primary Panic Disorder	Sample Prev	0.017	0.006	0.037	353	0.032	0.013	0.065	217
	RDS Estimate	0.022	0.004	0.048	4673	0.066	0.011	0.135	4672
Substance-Induced Panic Disorder	Sample Prev	0.000	0.000	0.010	353	0.005	0.000	0.025	217
	RDS Estimate	--				--			
Primary Agoraphobia w/o Panic	Sample Prev	0.000	0.000	0.010	353	0.023	0.008	0.053	217
	RDS Estimate	--				0.011	0.004	0.028	3785
Primary GAD	Sample Prev	0.008	0.002	0.025	353	0.018	0.005	0.047	217
	RDS Estimate	0.011	0.002	0.243	1942	0.040	0.032	0.136	1848
Substance-Induced GAD	Sample Prev	0.011	0.003	0.029	353	0.014	0.003	0.040	217
	RDS Estimate	--				--			
Specific Phobia	Sample Prev	0.008	0.002	0.025	353	0.028	0.010	0.059	217
	RDS Estimate	--				--			

		Male				Female			
	Estimate	***Prev.***	***95% Conf. Int.***		***N/Reps***	***Prev.***	***95% Conf. Int.***		***N/Reps***
Social Phobia	Sample Prev	0.034	0.018	0.059	353	0.106	0.068	0.155	217
	RDS Estimate	0.034	0.010	0.064	4757	0.059	0.021	0.112	4757
Obsessive-Compulsive Disorder	Sample Prev	0.023	0.010	0.044	353	0.023	0.008	0.053	217
	RDS Estimate	0.010	0.002	0.025	2941	0.023	0.005	0.048	2930
Post-traumatic Stress Disorder	Sample Prev	0.059	0.037	0.090	353	0.166	0.119	0.222	217
	RDS Estimate	0.038	0.011	0.106	4926	0.120	0.059	0.194	4926
Any primary anxiety disorder	Sample Prev	0.130	0.097	0.170	353	0.295	0.235	0.360	217
	RDS Estimate	0.104	0.060	0.159	5000	0.262	0.166	0.370	5000
Psychotic disorders									
Primary Psychotic Disorder	Sample Prev	0.000	0.000	0.010	353	0.018	0.005	0.047	217
	RDS Estimate	--				0.010	0.002	0.030	2738
Substance-Induced Psychosis	Sample Prev	0.020	0.008	0.040	353	0.037	0.016	0.071	217
	RDS Estimate	0.012	0.004	0.028	2540	0.039	0.008	0.121	2536
Psychotic Disorder (any)	Sample Prev	0.020	0.008	0.040	353	0.055	0.029	0.095	217
	RDS Estimate	0.012	0.004	0.027	2862	0.048	0.013	0.126	2858
Personality disorders									
Childhood Conduct Disorder	Sample Prev	0.147	0.112	0.189	353	0.129	0.087	0.181	217
	RDS Estimate	0.118	0.067	0.174	4959	0.091	0.029	0.178	4959
Antisocial Personality Disorder	Sample Prev	0.297	0.250	0.348	353	0.226	0.172	0.287	217
	RDS Estimate	0.227	0.159	0.302	5000	0.172	0.084	0.285	5000
Borderline Personality Disorder	Sample Prev	0.190	0.150	0.235	353	0.281	0.222	0.346	217
	RDS Estimate	0.195	0.124	0.276	5000	0.253	0.152	0.363	5000

Note: Confidence intervals are exact binomial for Sample Prevalence and percentile-based bootstrap for RDS Estimates.

Reps: number of successful bootstrap replications; -- : RDS Estimate could not be computed

Table 4

Sample prevalence and RDS population estimates of past year psychiatric disorders

		Male				Female			
	Estimate	*Prev.*	*95% Conf. Int.*		*N/Reps*	*Prev.*	*95% Conf. Int.*		*N/Reps*
Affective disorders									
Primary Major Depression	Sample Prev	0.025	0.012	0.048	353	0.065	0.036	0.106	217
	RDS Estimate	0.024	0.006	0.048	4870	0.055	0.019	0.103	4870
Substance-Induced Major Depression	Sample Prev	0.184	0.145	0.229	353	0.295	0.235	0.360	217
	RDS Estimate	0.158	0.098	0.240	5000	0.194	0.117	0.288	5000
Major Depression (any)	Sample Prev	0.210	0.168	0.256	353	0.346	0.283	0.413	217
	RDS Estimate	0.186	0.118	0.277	5000	0.240	0.156	0.341	5000
Primary Dysthymia	Sample Prev	0.000	0.000	0.010	353	0.014	0.003	0.040	217
	RDS Estimate	--				0.009	0.007	0.031	3178
Substance-Induced Dysthymia	Sample Prev	0.034	0.018	0.059	353	0.023	0.008	0.053	217
	RDS Estimate	0.023	0.004	0.050	4188	0.024	0.005	0.073	4187
Dysthymia (any)	Sample Prev	0.034	0.018	0.059	353	0.037	0.016	0.071	217
	RDS Estimate	0.024	0.004	0.051	4690	0.033	0.005	0.083	4690
Primary Manic Episode	Sample Prev	0.011	0.003	0.029	353	0.009	0.001	0.033	217
	RDS Estimate	0.006	0.002	0.014	2129	0.004	0.003	0.017	1853
Anxiety disorders									
Primary Panic Disorder	Sample Prev	0.011	0.003	0.029	353	0.023	0.008	0.053	217
	RDS Estimate	0.008	0.002	0.020	4415	0.056	0.007	0.124	4408
Substance-Induced Panic Disorder	Sample Prev	0.000	0.000	0.010	353	0.000	0.000	0.017	217
	RDS Estimate	--				--			
Primary Agoraphobia w/o Panic	Sample Prev	0.000	0.000	0.010	353	0.009	0.001	0.033	217
	RDS Estimate	--				--			
Primary GAD	Sample Prev	0.003	0.000	0.016	353	0.014	0.003	0.040	217
	RDS Estimate	--				--			
Substance-Induced GAD	Sample Prev	0.008	0.002	0.025	353	0.000	0.000	0.017	217
	RDS Estimate	--				--			
Specific Phobia	Sample Prev	0.008	0.002	0.025	353	0.018	0.005	0.047	217

		Male				Female			
	Estimate	***Prev.***	***95% Conf. Int.***		***N/Reps***	***Prev.***	***95% Conf. Int.***		***N/Reps***
	RDS Estimate	--				--			
Social Phobia	Sample Prev	0.023	0.010	0.044	353	0.074	0.043	0.117	217
	RDS Estimate	0.030	0.008	0.059	3213	0.038	0.008	0.081	3213
Obsessive-Compulsive Disorder	Sample Prev	0.014	0.005	0.033	353	0.018	0.005	0.047	217
	RDS Estimate	0.002	0.002	0.008	1846	0.015	0.004	0.035	1807
Post-traumatic Stress Disorder	Sample Prev	0.037	0.020	0.062	353	0.129	0.087	0.181	217
	RDS Estimate	0.014	0.003	0.027	3111	0.106	0.051	0.171	3111
Any primary anxiety disorder	Sample Prev	0.091	0.063	0.126	353	0.244	0.189	0.307	217
	RDS Estimate	0.067	0.035	0.114	4999	0.214	0.126	0.319	4999
Psychotic disorders									
Primary Psychotic Disorder	Sample Prev	0.000	0.000	0.010	353	0.005	0.000	0.025	217
	RDS Estimate	--				--			
Substance-induced Psychosis	Sample Prev	0.011	0.003	0.029	353	0.018	0.005	0.047	217
	RDS Estimate	--				--			
Psychotic Disorder (any)	Sample Prev	0.011	0.003	0.029	353	0.023	0.008	0.053	217
	RDS Estimate	--				--			
Personality disorders									
Antisocial Personality Disorder	Sample Prev	0.278	0.232	0.327	353	0.217	0.164	0.277	217
	RDS Estimate	0.209	0.145	0.282	5000	0.163	0.076	0.273	5000
Borderline Personality Disorder	Sample Prev	0.153	0.117	0.195	353	0.235	0.180	0.297	217
	RDS Estimate	0.146	0.080	0.221	5000	0.194	0.106	0.293	5000

Note: Confidence intervals are exact binomial for Sample Prevalence and percentile-based bootstrap for RDS Estimates.

Reps: number of successful bootstrap replications; -- : RDS Estimate could not be computed