Published in final edited form as:

J Addict Dis. 2011 ; 30(3): 248–257. doi:10.1080/10550887.2011.581989.

Comparing Injection and Non-Injection Routes of Administration for Heroin, Methamphetamine, and Cocaine Uses in the United States

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Abstract

Research examining the demographic and substance use characteristics of illicit drug use in the United States has typically failed to consider differences in routes of administration, or has exclusively focused on a single route of administration—Injection Drug Use (IDU). Therefore, a significant gap exists in our understanding of the degree to which IDUs are different from those who use illicit drugs via other routes, such as oral, inhalation, or smoked (non-IDUs). Data from the 2005–2007 National Survey on Drug Use and Health (NSDUH) were used to compare past-year IDU and non-IDU routes of administration for people who use the three drugs most commonly injected drugs in the US: heroin, methamphetamine, and cocaine. Among past-year users, IDUs were more likely than those using via other routes to be older (aged 35+), unemployed, possess less than a high school education, and reside in rural areas. IDUs also exhibited higher rates of abuse/dependence, perceived need for substance abuse treatment, and co-occurring physical and psychological problems. Fewer differences between IDUs and non-IDUs were observed for heroin users compared to methamphetamine or cocaine users. These results highlight significant differences in demographics, clinical/psychological manifestations, and treatment needs of injection drug users compared to those engaging in other routes of administration.

Keywords

Injection drug use; cocaine; methamphetamine; heroin; routes of administration; epidemiology

Introduction

Much of the past research on illicit drug use conducted over the last several decades has focused on how users differ in their risk factor profiles, sequence of involvement across various drugs, consumption trajectories (i.e., quantity/frequency), likelihood to progress to abuse/dependence, and treatment response (Kandel, Yamaguchi, & Klein, 2006; McLellan, McKay, Forman, Cacciola, & Kemp, 2005; Vega et al., 2002). Less is known about the effects of different routes of self-administration, including injection (subcutaneous, intramuscular, intravenous), oral ingestion, smoking, and nasal inhalation methods. This

lack of attention is notable, because the way in which a drug is ingested significantly affects how it is metabolized by the body (i.e., pharmacokinetics), and hence, the immediate and long-term psychological and physiological responses to its use (McKim, 2000). An emerging trend in substance abuse interventions is to develop pharmacological and behavioral treatments that are tailored to the unique needs of individual users (Ducharme, Knudsen, & Roman, 2006; Geppert & Bogenschutz, 2009; Grella, 2008; Schnabel, 2009). By learning more about how routes of administration are related to user characteristics, we could improve our ability to tailor substance abuse treatment and prevention strategies to individual users.

Injection drug use appears to be the most harmful route of administration. This is most likely because of the transmission of blood borne diseases such as HIV and hepatitis C virus through needle sharing (Des Jarlais et al., 2003; Kral, Bluthenthal, Erringer, Lorvick, & Edlin, 1999; Thomas et al., 1996). IDUs also suffer a disproportionate risk of overdose (Sterrett, Brownfield, Korn, Hollinger, & Henderson, 2003; Warner-Smith, Darke, & Day, 2002) and represent the highest proportion of those involved in the substance abuse treatment system (Amodeo, Lundgren, Chassler, & Witas, 2008; Chassler, Lundgren, & Lonsdale, 2006; SAMHSA, 2007). The preclinical literature also justifies focusing on IDUs as a unique population. Laboratory studies have shown that IDU carries the highest abuse potential because it delivers a large bolus of the drug directly into the blood stream, which is then rapidly transported to the brain. In contrast, drugs ingested via other routes (e.g., smoking/inhalation) are filtered through the lungs and/kidneys before being absorbed into the brain (Vann et al., 2009, Porrino 1993). While it is readily acknowledged that injection drug use is physiologically different when compared to other routes of administration, the vast community-based substance abuse research literature has failed to identify and directly test the degree to which IDUs represent a distinct population based on demographic characteristics, usage patterns, and psychosocial profile. The few studies comparing IDUs and non-IDUs have primarily examined differences in routes of administration for only a single drug, such as heroin, or used samples drawn from rather homogenous populations, such as regional studies of street-based users in a single metropolitan area (Barrio et al., 2001; Gossop, Marsden, Stewart, & Treacy, 2000). A study with a large, geographically diverse sample of IDUs and non-IDUs involved with different usage patterns of several types of illicit drugs would help determine whether IDUs are really a distinctive class of users with unique etiologies as well as prevention and intervention needs. The current study addresses this important gap in the literature using a large, nationally diverse sample of IDUs and non-IDU to identify potential differences in the demographic, psychological, and substance use profiles.

Methods

Sample

This study combines repeated cross-sectional data (2005–2007) from the National Survey on Drug Use and Health (NSDUH), which is an annual, nationally representative survey of youth (age 12–17) and adults (age 18 or older) in the United States. The procedures and characteristics of the sample have been published extensively elsewhere (SAMHSA, 2008). Briefly, the sample includes approximately 65,000 respondents each year. The target population is the civilian, noninstitutionalized population of the United States (including civilians living on military bases) and residents of noninstitutional group quarters (e.g., college dormitories, group homes, civilians dwelling on military installations) and persons with no permanent residence (homeless people in shelters and residents of single rooms in hotels). As much of the prior research on IDU has used local, community-based samples, the NSDUH provides an important complement to these prior field studies.

Instrument and Measures

The NSDUH collects information on a large range of illicit substances, including consumption patterns, treatment utilization, and diagnoses aligned with the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) criteria for abuse and/or dependence (APA, 2000) for alcohol and selected drugs. Beginning in 2005, the NSDUH expanded the non-core instrument to include additional items on routes of administration for illicit drugs used in the past-year, including injection, oral, nasal inhalation, and smoking. These items were asked in reference to the following three substances: heroin, methamphetamine, and cocaine. Lifetime usage questions were also asked in an open-ended format in which a respondent could list any drug they had ever injected. The rationale for focusing on heroin, methamphetamine, and cocaine is that preliminary analyses indicated that over 90% of lifetime injectors reported injecting at least one of these three drugs. The remaining 10% were distributed among a wide array of drugs with extremely small sample sizes, including prescription drugs (opiates, stimulants), steroids, PCP, and LSD. We categorized routes of administration into a dichotomous variable of IDU and non-IDU for each drug. Epidemiological evidence reviewed above suggests that injection has more deleterious health consequences than other forms of ingestion. Therefore, we coded respondents as engaging in IDU even if they had also reported use via another route.

In terms of psychosocial characteristics, a single question assessed perceptions of general health status. The occurrence of a major depressive episode (MDE) in the past-year was also assessed using established clinical DSM-IV criteria (SAMHSA, 2009). Substance use treatment received was coded if the respondent reported receiving therapy or treatment, including detoxification and treatment for any medical problems associated with their drug use. Unmet treatment need was defined as the presence of a past-year DSM-IV diagnosis for abuse and/or dependence on heroin, methamphetamine, or cocaine, but the respondent did not report receiving substance abuse treatment. Key demographic variables included sex, age, race, marital status, employment, US veteran, and urbanicity.

Analyses

All analyses were restricted to past-year users of heroin, methamphetamine, or cocaine, unless otherwise noted. First, we used cross-tabulations to characterize the demographic profile of IDUs compared to other routes of administration. Bivariable and multivariable logistic regression models were also used to identify the most informative discriminators between IDU and non-IDU routes of administration. Second, we examined whether IDUs and non-IDUs differed by co-occurring substance use disorders, psychological and behavioral risks, and treatment utilization. We also further probed whether these relations varied by type of drug (i.e., heroin, methamphetamine, and cocaine) used in the past-year. It is important to clarify that for these latter analyses, a respondent may be classified as an IDU for one substance and a non-IDU for another substance. This variable-centered strategy allowed us to examine how characteristics related to IDU may vary across substances of abuse. This approach differs from a more complex person-centered strategy that would seek to investigate subtypes of users based on the number and types of drugs ingested as well as their route of administration. Finally, we present the magnitude of the observed statistically significant effect sizes estimated using procedures outlined by Cohen (1988). An important caveat about statistical significance tests and measures of effect sizes is warranted. These parameters should always be interpreted with an eye toward discerning whether the observed differences are also meaningful in terms of clinical and public policy. Therefore, effect sizes (e.g., Cohen's *d*) are perhaps most useful as a standardized measure for comparative examination of effects across studies that use similar populations, designs, and measures (e.g., meta-analyses). They are also use for studies that projecting the impact of changes in clinical and/or public health interventions (e.g., simulation/predictive modeling.

Due to the complex sampling design of the NSDUH, all descriptive and inferential analyses were conducted with SUDAAN release 10.0 (RTI, 2009). SUDAAN incorporates the sample weights of the NSDUH to create nationally representative estimates. It also implements a Taylor series linearization to account for the NSDUH's multistage probability sampling design. It also accommodates domain-level analyses, which occur when analyses are conducted on subpopulations (e.g., past-year illicit drug users) selected from the larger study sample. For this project, multiple years of NSDUH data were combined to increase the sample of injection drug users, so additional corrections to the weights and variance estimation were implemented. All statistically significant results described below exhibited p-values below the standard .05 threshold level for a two-tailed test.

Results

Routes of Administration

Of the combined 166,619 respondents aged 12 or older that completed the NSDUH survey between 2005 and 2007, a weighted percentage of 2.69% reported any past-year use of heroin (0.19%), methamphetamine (0.56%), or cocaine (2.36%). Slightly less than 7% (0.17% of 2.69% shown in Table 2) of past-year users reported injecting these drugs. About half of heroin users injected, compared to 13% of methamphetamine users and 3% of cocaine users. Among all past-year IDUs, heroin was the most preferred drug (53%), followed by methamphetamine (43%) and cocaine (40%). A large percentage (66%) of the IDUs reported injecting only one type of drug, which was nearly evenly divided between heroin (39%) and methamphetamine (41%). The remaining 18% injected only cocaine. A relatively small percentage (4%) of past-year IDUs injected all three drugs.

Demographic Characteristics of IDUs and Non-IDUs

Compared to those using heroin, methamphetamine, and cocaine via routes other than IDU, the odds of being an IDU in the past-year were significantly lower among the employed, either full or part-time, college graduates, or those living in major metropolitan areas (see Table 1). These statistically significant findings observed in the bivariable models also remained significant in the multivariable models that controlled for all variables listed in Table 1. Strong racial disparities were observed in the multivariable model, where whites (6.9%) were more likely to be IDUs than either blacks (4.9%) or those classified as "other" racial minority groups (3.5%). No differences were observed between white (6.9%) and Hispanics (6.7%), as the estimated odds for both the bivariable and multivariable models were close to 1.0. An age-graded effect was present such that rates of IDU were higher for each successive age cohort. Gender and veteran status were not significantly associated with injection drug use.

Prevalence of Co-Occurring Health Conditions and Treatment Needs among IDUs and Non-IDUs

IDUs had significantly poorer health outcomes than non-IDUs, including lower perceived general health (21% versus 13% reporting fair/poor health; $p<0.05$) and a higher prevalence of major depressive episodes (26% versus 18%; $p<0.05$) (see Table 2). IDUs also had higher rates of arrests in the past-year (50% versus 19%; $p<0.05$). The prevalence of STDs was similar among IDUs and non-IDUs (11% versus 8%; $p>0.05$).

In terms of substance use characteristics, over half (60%) of IDUs met the DSM-IV criteria for abuse and/or dependence compared to slightly less than one-third (27%) of non-IDUs ($p<0.05$). Almost half (44%) of IDUs exhibited a co-occurring illicit drug use disorder compared to 24% of non-IDUs ($p<0.05$). With the exception of alcohol use disorders, the prevalence of substance use disorders was higher among IDUs, so it is not surprising that the

likelihood of treatment was nearly 4 times as higher (42% versus 11%) for IDUs. However, among those exhibiting a substance use disorder, there was a higher unmet need for treatment for non-IDUs relative to IDUs (75% versus 47%; $p < 0.05$). A larger percentage of IDUs reported a need for substance abuse treatment compared to non-IDUs (19% versus 7%; $p < 0.05$). As reported in Table 3, all the statistically significant effect sizes met Cohen's threshold for a large effect (0.8 or higher).

Differences by Type of Drug

The final step of our analyses was to examine differences between IDUs and non-IDUs in outcomes by the type of drug used in the past-year. Overall, the findings for the substance-specific models were similar to the full models that combined the substances by route of administration with some notable exceptions. Heroin IDUs tended to resemble non-IDUs, as evidenced by the limited number of statistically significant differences (i.e., two of ten outcomes examined). In contrast, the profile of outcomes tended to be much worse for IDUs compared to non-IDUs for methamphetamine users (i.e., four of ten outcomes) and cocaine users (i.e., eight of ten outcomes). However, a higher proportion of IDUs of heroin met criteria for abuse and/or dependence and exhibited higher odds of being in treatment.

Discussion

The results reported herein show that IDUs represent a relatively unique type of illicit substance user, with distinct demographic characteristics, usage patterns, and psychosocial profiles. Our findings indicate that injection drug use is associated with substantially more substance abuse-related problems, including a higher prevalence of abuse/dependence, unemployment, and co-occurring mental and physical disorders. McLellan and colleagues (2000) note that addiction is a chronic and relapsing disorder that is characterized by a progression of steps from initial to increasing use, then compulsive use with a high frequency of relapse (McLellan, Lewis, O'Brien, & Kleber, 2000). Findings from this study indicate that IDUs are clearly at the high-end of this addiction spectrum, and likely require specialized interventions. According to Lau (2006), interventions should be tailored to specific populations when the target group and the general population show differences in: 1) etiology: risk or protective factors; 2) nosology: symptom patterns or clinical manifestations; 3) treatment response; or 4) treatment engagement: participation, attrition, adherence (Lau, 2006). Our findings support the first two conditions. We identified differences between IDUs and non-IDUs in potential etiological mechanisms (e.g., major depressive episodes) as well as problem phenomenology (e.g., prevalence of abuse/dependence and co-occurring substance use disorders).

Many pharmacological and behavioral studies have shown efficacy in treating opiate (e.g., buprenorphine) or stimulant (e.g., Matrix model) addiction (Fareed, Vayalapalli, Casarella, Amar, & Drexler, 2010; Shoptaw, Rawson, McCann, & Obert, 1994). While these studies include IDUs as part of the patient population, only rarely are analyses conducted that specifically test the robustness of these interventions to the user's preference for route of administration. Therefore, efforts are needed to understand and potentially expand the repertoire of evidence-based treatments that are available to frontline treatment providers to address unique subpopulations based on different routes of administration (NIDA, 1999; SAMHSA, 2009). For example, we observed that IDUs have higher rates of co-occurring major depressive disorder. This suggests that interventions for IDUs should also consider the types of co-morbidity between mental and addictive disorders. In preparation for the development of specialized interventions for IDUs, the framework from Lau (2006) highlights that comparative effectiveness studies are needed to examine how IDUs may differ in their treatment response to behavioral and pharmacological therapies. As findings from the current work suggest, IDUs face a large number of problems related to substance

use, and these problems appear to characterize a treatment resistant population in need specialized treatments.

The placement of these interventions is also important. Since IDUs are disproportionately engaged in the criminal justice system, criminal justice diversion programs, such as Drug Courts, and treatment for incarcerated offenders should also consider the unique needs of IDUs. In contrast, the subpopulation of non-IDUs may not adequately access HIV/substance abuse information, STD testing and prevention/treatment tools (e.g., syringes/condoms) offered by existing public health interventions such as syringe exchange programs (Bluthenthal, 1998).

Some additional differences between IDUs and non-IDUs observed in this study deserve comment. The finding that heroin IDUs were similar to non-IDU of heroin is notable. Latkin et al. (2001) also concluded that heroin users represent a homogenous class in finding no differences in dependence, though they did observe that IDUs had higher utilization of health care. This is likely due to complications related to risky injection practices, such as infectious diseases and soft-tissue infections (Ciccarone et al., 2001). Barrio et al. (2006) found that while no differences in rates of dependence were observed between IDUs and other routes of administration for heroin, IDUs had a faster progression to dependence. Another consideration is that the different heroin morphologies, such as “black tar” heroin (BTH) and powdered heroin (PH) affect injection practices. In the United States, a study by Ciccarone and Bourgois (2004) observed that the chemical properties of BTH may contribute to safer injection practices (Ciccarone & Bourgois, 2003). Using ethnographic data, they describe how BTH often clogs injection needles, thus limiting the amount of sharing and re-using of needles. Their study did not offer insights into the degree to which individuals switched from injection to non-injection forms of use because of difficulties injecting BTH. However, their study does raise important questions regarding the role of purity, concentration, and morphology in understanding the complex role of consumption practices, addiction severity, and treatment needs.

One of the most striking demographic findings was that people living in rural areas had higher odds of injection route of administration. However, careful inspection of this finding reveals that the largest proportion of illicit drug users remains concentrated in urban areas, where approximately 95% of the approximately 6.6 million past-year users of heroin, methamphetamine, or cocaine reside (SAMHSA, 2008). A higher percentage of the IDU population is likely to be found in metropolitan areas, though a much larger percentage of those users engage in non-injectable forms of use compared to those living in rural areas. Based on our findings, IDUs in rural areas may represent a ‘hidden epidemic’ in need of further study because a significant body of work among IDUs has largely focused on urban areas (Brady et al., 2008).

A key limitation to keep in mind when evaluating results from this paper is that NSDUH excludes institutionalized populations (e.g., military personnel residing on government installations, prisoners, hospital inpatients). One excluded subgroup of particular relevance to this study involves clients receiving inpatient substance abuse treatment, either detoxification services or inpatient residential treatment. This is a relatively small and unique population where clients live in highly monitored environments, which limit their opportunities to use drugs and alcohol. Detoxification is restricted to several days and inpatient substance abuse treatment ranges between 30 and 90 days (Simpson, Hubbard, et al., 2000). Therefore, NSDUH captures these types of individuals after they are discharged from care, thus enabling characterization of their substance use patterns after institutionalization. The NSDUH recently changed from a household (i.e., address-based) design to one that seeks to include high-risk populations through segmented sampling

procedures. To date, there are no studies that have compared the sampling properties between NSDUH and hard-to-reach populations that are traditionally recruited via targeted sampling or respondent driven sampling. The current work provides an important complement to significant community-based designs that study the complexities of injection drug use.

Mindful of these limitations, results from this cross sectional study provides critical information on differences in demographic and risk factor profiles of people who use different routes of administration to consume illicit drugs. While clinical intuition or anecdotal case studies among treatment providers confirms that there are difference in the types of clients based on the route of administration and choice of drug abuse. The current study offers scientific confirmation of these hypotheses. This work may also inform future research that utilizes prospective longitudinal designs to examine the developmental sequencing of the psychosocial factors (e.g., physical health, major depressive episodes), poly-drug use, and treatment utilization. These studies may also highlight salient prevention and treatment points in the usage trajectory that may be used to alter the developmental course from initiation of first illicit use, moderate levels of use to more harmful levels of use, or transitions from regular use to usage patterns involving injection forms of self-administration.

Acknowledgments

The National Survey of Drug Use and Health is funded by the Center for Behavioral Health Statistics and Quality, within the Substance Abuse and Mental Health Services Administration. The current project used the public use files available through the Substance Abuse and Mental Health Data Archive. The current project was supported in part by funding from the National Institute on Mental Health (MH077241, Novak, P.I.) and the National Institute on Drug Abuse (DA023377, Kral, P.I.). The analyses and interpretation of the results are solely those of the authors.

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Table 1
Demographic Characteristics of Heroin, Methamphetamine, and Cocaine Users in Past Year: 2005–2007 NSDUH

Demographic Characteristic	IDU ^a n=396 ^b ; 0.17% ^{b,c} (0.02) ^b	Non-IDU ^a n=6,023 ^b ; 2.52% ^{b,c} (0.05) ^b	IDU versus Non-IDU Routes of Administration ^d (ref)					
	% ^{b,d} (se) ^b	% ^{b,d} (se) ^b	OR ^b	95% CI ^b	P ^b	AOR ^b	95% CI ^b	P ^b
SEX								
Male	6.8 (0.8)	93.2 (0.8)	1.18	(0.83–1.67)	.342	1.18	(0.83–1.69)	.340
Female	5.8 (0.8)	94.2 (0.8)	1.00			1.00		
RACE								
White, non-Hispanic	6.9 (0.7)	93.1 (0.7)	1.00			1.00		
Black, non-Hispanic	4.9 (2.3)	95.1 (2.3)	0.69	(0.25–1.85)	.457	0.41	(0.17–0.99)	.049
Hispanic	6.4 (2.2)	93.6 (2.3)	0.92	(0.40–2.12)	.853	0.97	(0.42–2.24)	.952
Other race	3.5 (1.0)	96.5 (1.0)	0.49	(0.26–0.93)	.031	0.49	(0.25–0.94)	.033
AGE								
12–17	3.8 (2.5)	96.2 (2.5)	0.74	(0.47–1.15)	.183	0.59	(0.23–1.46)	.250
18–25	5.0 (0.4)	95.0 (0.4)	1.00			1.00		
25–34	7.3 (1.1)	92.7 (1.1)	1.48	(1.01–2.17)	.044	1.82	(1.22–2.71)	.003
35 or older	8.1 (1.5)	91.9 (1.5)	1.67	(1.10–2.54)	.016	1.66	(0.92–3.01)	.087
MARITAL (age 18+)								
Married/Living as married	5.3 (1.1)	94.7 (1.1)	0.86	(0.53–1.14)	.556	0.71	(0.37–1.44)	.288
Never married	6.1 (1.1)	93.9 (1.1)	1.00			1.00		
Divorced/separated/widowed	9.8 (2.0)	90.2 (2.0)	1.68	(1.11–2.81)	.035	1.09	(0.54–2.18)	.799
EMPLOYMENT (age 15–65)								
Full time	4.3 (0.5)	95.7 (0.5)	0.39	(0.26–0.58)	<.001	0.36	(0.23–0.55)	<.001
Part time	5.5 (1.3)	94.5 (1.3)	0.50	(0.29–0.86)	.014	0.57	(0.33–0.98)	.043
Unemployed	10.3 (1.5)	89.7 (1.5)	1.00			1.00		
EDUCATION (age 18+)								
Less than High School	10.2 (1.7)	89.8 (1.7)	1.00			1.00		
High school graduate/GED	6.9 (1.0)	93.1 (1.0)	0.65	(0.40–1.04)	.077	0.75	(0.46–1.20)	.229
Some college/tech/college grad	5.0 (0.8)	95.0 (0.8)	0.30	(0.30–0.71)	<.001	0.53	(0.33–0.83)	.006
VETERAN (age 18+)								

Demographic Characteristic	IDU ^a n=396 ^b ; 0.17% ^{b,c} (0.02) ^b	Non-IDU ^a n=6,023 ^b ; 2.52% ^{b,c} (0.05) ^b	IDU versus Non-IDU Routes of Administration ^d (ref)					
	% ^{b,d} (se) ^b	% ^{b,d} (se) ^b	OR ^b	95% CI ^b	p ^b	AOR ^b	95% CI ^b	p ^b
Yes	10.8 (3.4)	89.2 (3.4)	1.00			1.00		
No	6.3 (0.6)	93.7 (0.6)	0.56	(0.27–1.13)	.107	0.63	(0.31–1.27)	.200
METROPOLITAN								
Large Metro (>1 million)	5.9 (0.9)	94.1 (0.9)	0.35	(0.21–0.58)	<.001	0.43	(0.21–0.71)	<.001
Small Metro (<1 million)	6.2 (0.7)	93.8 (0.7)	0.37	(0.24–0.57)	<.001	0.43	(0.26–0.71)	<.001
Rural	15.1 (2.4)	84.9 (2.4)	1.00			1.00		

Notes: n=unweighted sample combined 2005–2007, se=standard error, OR=unadjusted odds ratio, AOR=adjusted odds ratio controlling for listed variables, CI=confidence interval, P=P-value, STD=sexually transmitted disease, ref=reference category (1.00), P<.05 in **BOLD**

^aIDU=Injection use of heroin, methamphetamine, or cocaine; Other routes of administration include snorting and swallowing.

^bUnweighted cell n presented, estimates (%) and SE) and test statistics (chi-square, P-values) adjusted using SUDAAN to accommodate design effect.

^cEstimate percentaged among total population aged 12 or older.

^dEstimate restricted to past year illicit users of heroin, methamphetamine, cocaine and percentaged by demographic characteristics.

Table 2

Substance Use, Mental and Physical Health Characteristics by IDU and Non-IDUs in Past Year: 2005–2007 NSDUH

Substance Use Characteristic	Heroin/Meth/Cocaine n=6,419; 2.07% ^b (0.05) ^b				Heroin n=459; 0.19% ^b (0.02) ^b of Total Pop.			
	IDU ^a n=396 ^b		Non-IDU ^a n=6,023 ^b		IDU ^a n=203 ^b		Non-IDU ^a n=256 ^b	
	% ^b , d (se) ^b	% ^b , d (se) ^b	% ^b , d (se) ^b	% ^b , d (se) ^b	% ^b , d (se) ^b	% ^b , d (se) ^b	% ^b , d (se) ^b	% ^b , d (se) ^b
	0.17% ^b , c (0.02) ^b	0.17% ^b , c (0.02) ^b	2.52% ^b , c (0.01) ^b	2.52% ^b , c (0.01) ^b	0.09% ^b , c (0.01) ^b	0.09% ^b , c (0.01) ^b	0.09% ^b , c (0.01) ^b	0.09% ^b , c (0.01) ^b
	χ^2	χ^2	χ^2	χ^2	χ^2	χ^2	χ^2	χ^2
	p ^b	p ^b	p ^b	p ^b	p ^b	p ^b	p ^b	p ^b
GENERAL HEALTH								
Excellent/very good/good	79.1 (3.2)	86.6 (0.8)	4.9	.030	82.7 (4.9)	79.4 (5.4)	0.2	.642
Fair/poor	20.9 (3.2)	13.4 (0.8)			17.3 (4.9)	20.6 (5.4)		
MAJOR DEPRESSIVE EPISODE, PY	25.8 (3.6)	17.9 (0.8)	4.6	.036	18.2 (5.8)	18.1 (3.7)	0.1	.992
ABUSE/DEPENDENCE ^c	59.5 (4.3)	27.0 (1.2)	41.1	<.001	67.7 (5.4)	38.2 (5.6)	9.8	.003
RECEIVED TREATMENT, PY	42.0 (4.1)	11.5 (0.8)	39.3	<.001	55.8 (5.8)	28.5 (4.6)	14.5	.003
PERCEIVED NEED FOR TREATMENT	18.7 (3.6)	6.6 (0.7)	10.5	.001	16.7 (4.2)	10.6 (3.5)	1.3	.260
UNMET NEED FOR TREATMENT ^f	47.3 (5.6)	75.2 (0.7)	23.5	<.001	38.6 (7.1)	44.1 (8.7)	0.3	.607
ALCOHOL ABUSE/DEPENDENCE	43.6 (4.6)	43.8 (1.1)	0.1	.960	49.9 (6.6)	44.8 (4.9)	0.4	.555
OTHER ILLICIT ABUSE/DEPENDENCE	44.0 (4.7)	24.4 (0.6)	23.5	<.001	42.7 (6.2)	42.7 (6.2)	0.1	.946
STD, PY	11.2 (3.6)	8.3 (0.6)	0.6	.446	7.9 (5.1)	3.1 (0.8)	0.9	.352
ARRESTED/BOOKED, PY	49.6 (4.2)	19.4 (0.7)	37.4	<.001	57.8 (6.3)	49.1 (6.4)	0.7	.407
Substance Use Characteristic	Methamphetamine n=1,319; 0.56% ^b (0.03) ^b				Cocaine n=5,684; 2.36% ^b (0.05) ^b			
	IDU ^a n=186 ^b		Non-IDU ^a n=1,133 ^b		IDU ^a n=162 ^b		Non-IDU ^a n=5,522 ^b	
	% ^b , d (se) ^b	% ^b , d (se) ^b	% ^b , d (se) ^b	% ^b , d (se) ^b	% ^b , d (se) ^b	% ^b , d (se) ^b	% ^b , d (se) ^b	% ^b , d (se) ^b
	0.07% ^b , c (0.01) ^b	0.07% ^b , c (0.01) ^b	0.48% ^b , c (0.07) ^b	0.48% ^b , c (0.07) ^b	0.07% ^b , c (0.02) ^b	0.07% ^b , c (0.02) ^b	2.29% ^b , c (0.05) ^b	2.29% ^b , c (0.05) ^b
	χ^2	χ^2	χ^2	χ^2	χ^2	χ^2	χ^2	χ^2
	p ^b	p ^b	p ^b	p ^b	p ^b	p ^b	p ^b	p ^b
GENERAL HEALTH								
Excellent/very good/good	13.9 (4.9)	86.1 (2.2)	1.9	.175	76.2 (4.8)	86.5 (0.9)	5.3	.025

Substance Use Characteristic	Methamphetamine n=1,319; 0.56% ^b (0.03) ^b				Cocaine n=5,684; 2.36% ^b (0.05) ^b			
	IDU ^a n=186 ^b		Non-IDU ^a n=1,133 ^b		IDU ^a n=162 ^b		Non-IDU ^a n=5,522 ^b	
	% ^b _{b,d} (se) ^b	% ^b _{b,d} (se) ^b	% ^b _{b,d} (se) ^b	% ^b _{b,d} (se) ^b	% ^b _{b,d} (se) ^b	% ^b _{b,d} (se) ^b	% ^b _{b,d} (se) ^b	% ^b _{b,d} (se) ^b
Fair/poor	21.1 (4.9)	13.9 (2.2)	23.8 (4.8)	13.5 (0.9)	23.8 (4.8)	13.5 (0.9)	23.8 (4.8)	13.5 (0.9)
MAJOR DEPRESSIVE EPISODE, PY	32.3 (4.6)	23.1 (2.2)	33.7 (5.8)	17.4 (0.9)	33.7 (5.8)	17.4 (0.9)	33.7 (5.8)	17.4 (0.9)
ABUSE/DEPENDENCE ^e	26.8 (5.9)	16.5 (1.5)	53.5 (5.6)	27.0 (1.3)	53.5 (5.6)	27.0 (1.3)	53.5 (5.6)	27.0 (1.3)
RECEIVED TREATMENT, PY	34.5 (5.1)	14.3 (1.7)	51.3 (6.3)	11.7 (0.9)	51.3 (6.3)	11.7 (0.9)	51.3 (6.3)	11.7 (0.9)
PERCEIVED NEED FOR TREATMENT	73.3 (6.5)	7.4 (1.6)	23.0 (5.9)	7.0 (0.8)	23.0 (5.9)	7.0 (0.8)	23.0 (5.9)	7.0 (0.8)
UNMET NEED FOR TREATMENT ^f	46.6 (11.3)	74.0 (5.5)	27.4 (7.0)	75.6 (2.1)	27.4 (7.0)	75.6 (2.1)	27.4 (7.0)	75.6 (2.1)
ALCOHOL ABUSE/DEPENDENCE	32.5 (5.6)	37.6 (3.1)	47.2 (7.2)	45.7 (1.1)	47.2 (7.2)	45.7 (1.1)	47.2 (7.2)	45.7 (1.1)
OTHER ILLICIT ABUSE/DEPENDENCE	48.8 (6.7)	27.6 (1.8)	48.3 (6.9)	25.3 (0.7)	48.3 (6.9)	25.3 (0.7)	48.3 (6.9)	25.3 (0.7)
STD, PY	13.8 (5.0)	9.8 (1.5)	7.5 (3.0)	8.2 (0.7)	7.5 (3.0)	8.2 (0.7)	7.5 (3.0)	8.2 (0.7)
ARRESTED/BOOKED, PY	43.1 (6.8)	16.1 (1.9)	57.7 (5.9)	19.5 (0.7)	57.7 (5.9)	19.5 (0.7)	57.7 (5.9)	19.5 (0.7)

Notes: n=unweighted sample combined 2005–2007, se=standard error, IDU=injection use of heroin, methamphetamine, or cocaine. P=P-value, PY=past year, STD=sexually transmitted disease. **P<.05 in BOLD.**

^aIDU=Injection use of heroin, methamphetamine, or cocaine; Other routes of administration include snorting and swallowing.

^bUnweighted cell n presented, estimates (%) and test statistics (chi-square, P-values) adjusted using SUDAAN.

^cEstimate percentaged among total population aged 12 or older.

^dEstimate restricted to past year illicit users of heroin, methamphetamine, cocaine and percentaged by route of administration.

^eDefined by DSM-IV abuse/dependence for drug listed in column.

^fUnmet need defined by (a) DSM-IV abuse/dependence and/or (b) perceived need for treatment but did not receive treatment.

^gIncludes marijuana, inhalants, hallucinogens, prescription pain relievers, tranquilizers, and sedatives.

Table 3

Summary Table Comparing Effect Sizes of Significant Differences among IDUs and Non-IDUs

Substance Use Characteristic	IDU % (SE)	Non-IDU % (SE)	Cohen's <i>d</i>
GENERAL HEALTH (FAIR/POOR)	20.9 (3.2)	13.4 (0.8)	2.3
MAJOR DEPRESSIVE EPISODE, PY	25.8 (3.6)	17.9 (0.8)	2.2
ABUSE/DEPENDENCE	59.5 (4.3)	27.0 (1.2)	7.6
RECEIVED TREATMENT, PY	42.0 (4.1)	11.5 (0.8)	7.4
PERCEIVED NEED FOR TREATMENT, PY	18.7 (3.6)	6.6 (0.7)	3.4
UNMET NEED FOR TREATMENT	47.3 (5.6)	75.2 (0.7)	4.9
OTHER ILLICIT ABUSE/DEPENDENCE	44.0 (4.7)	24.4 (0.6)	4.2
ARRESTED/BOOKED, PY	49.6 (4.2)	19.4 (0.7)	7.2

Note: Percentages and standard errors (SE) computed via SUDAAN to account for design effect.

PY=Past year. Cohen's *d* (Cohen, 1988) adjusted for sampling weights and variance.