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## How do prescription opioid users differ from users of heroin or other drugs in psychopathology: Results from the National Epidemiologic Survey on Alcohol and Related Conditions

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### Abstract

**Objectives**—To study substance use and psychiatric disorders among prescription opioid users, heroin users, and non-opioid drug users in a national sample of adults.

**Methods**—Analyses of data from the 2001–2002 National Epidemiologic Survey on Alcohol and Related Conditions (N=43,093).

**Results**—Four groups were identified among 9140 illicit or non-prescribed drug users: *heroin-other opioid users* (1.0%; used heroin and other opioids), *other opioid-only users* (19.8%; used other opioids but never heroin), *heroin-only users* (0.5%; used heroin but never other opioids), and *non-opioid drug users* (78.7%; used drugs but never heroin or other opioids). After adjusting for variations in socioeconomic characteristics, history of substance abuse treatment, and familial substance abuse, heroin-other opioid users had greater odds of several substance use disorders (cocaine, hallucinogen, sedative, amphetamine, and tranquilizer) as compared with the other groups; heroin-only users had reduced odds of sedative and tranquilizer use disorders as compared with other opioid-only users. Non-opioid drug users had reduced odds of all substance use disorders and other mental disorders (mood, anxiety, pathological gambling, and personality) as compared with other opioid-only users. Past-year other opioid-only users also reported slightly lower scores on quality of life than past-year non-opioid drug users.

**Conclusions**—All opioid use groups had higher rates of substance use disorders than non-opioid drug users, and these rates were particularly elevated among heroin-other opioid users.

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**ETHICAL APPROVAL** The study was exempt from Duke Institutional Review Board Review due to the data being available in the public domain at the time of the study.

**DECLARATION OF INTEREST** Dr. Woody is a member of the RADARS post-marketing study external advisory group whose job is to assess abuse of prescription medications. Denver Health administers RADARS, and nine pharmaceutical companies currently support its work. The other authors have no conflicts of interest to disclose.

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Findings suggest the need to distinguish between these four groups in research and treatment as they may have different natural histories and treatment needs.

### Keywords

Comorbidity; Heroin use disorders; Opioid use disorders; Prescription opioid abuse

While *heroin use* has been the central target for opioid addiction treatment, the emerging use of non-prescribed prescription opioids (“other opioid use”) has changed the picture of opioid use in North America (Zacny et al., 2003; Fischer et al., 2007; Substance Abuse and Mental Health Services Administration [SAMHSA], 2009a). Recent research in Canada suggests that prescription opioids are the predominant drug of abuse among opioid users (Fischer et al., 2007). Similarly, data from admissions to substance abuse treatment in the United States reveal a significant rise in treatment admissions related to abuse and addiction to prescription opioids (SAMHSA, 2009a) and that prescription opioids have replaced heroin and cocaine as the most frequently reported drug class associated with drug-related deaths (Paulozzi et al., 2006; Manchikanti, 2007). In addition, prescription opioids are often used along with other non-prescribed drugs (Tetrault et al., 2008), as seen in recent data that estimated that 80% of all past-year non-prescribed users of prescription drugs (opioids, sedatives, stimulants, tranquilizers) used non-prescribed opioids and that, after cannabinoids, prescription opioid use disorders comprise the second most prevalent drug use disorder among nine illicit and prescription-type drug classes (SAMHSA, 2009b).

Prescription opioids have been broadly marketed to the public, are sometimes considered by opioid users to be safer or less addictive than illicit drugs such as heroin, and are often available from family members or friends (Manchikanti, 2007; Office of National Drug Control Policy, 2007; Schepis and Krishnan-Sarin, 2009). These differences in drug source with shifting patterns of opioid use and abuse could be associated with different psychiatric and drug use patterns among users of heroin as compared with users of prescription opioids and have important implications for research, prevention, treatment, and the development of drug control policies (Fischer et al., 2007).

Recent evidence shows that most new opioid users are adults (SAMHSA, 2009a; SAMHSA, 2009b); however, only a few studies have compared heroin users with other opioid users, and these have focused on treatment-seekers. For example, Sigmon (2006) investigated 75 methadone maintenance (MMT) patients, found a more severe pattern of drug use and lower social stability among primary heroin users compared with primary users of other opioids, and concluded that the two groups may have distinct treatment responses warranting further research. In a study of 178 MMT patients, those using heroin and other opioids were more likely than users of heroin alone to report problems with alcohol and pain, have more psychiatric problems, and have a low rate of remaining in treatment (Brands et al., 2004).

Recently, Moore et al. (2007) examined 200 opioid-dependent patients who enrolled in a study of buprenorphine treatment. Compared with users of heroin only, users of other opioids only were more likely to be white, had a higher income, had fewer drug abuse treatment episodes, but remained in treatment longer. Likewise, Rosenblum et al. (2007) analyzed data from a survey of 5663 opioid-dependent patients in 72 MMT programs. Use of other opioids was associated with being white, young (18–29 years of age), not injecting drugs or having prior methadone treatment, having chronic pain, and endorsing pain as a reason for enrollment. Another study found that adults seeking treatment for prescription opioid abuse/dependence reported low quality of life in multiple domains (Cicero et al., 2008).

Together, these studies of treatment-seeking patients suggest that heroin users differ from persons using other opioids in demographics, drug use, self-rated health, and psychiatric problems, and suggest several reasons to differentiate psychiatric profiles of heroin users from other opioid users in treatment-seeking and population-based samples (Brands et al., 2004; Sigmon, 2006; Moore et al., 2007; Rosenblum et al., 2007). *First*, findings from studies of treatment-seeking opioid users (MMT patients) may not be applicable to community opioid users in general. *Second*, with one exception (Brands et al., 2004), the categorization for heroin users vs. other opioid users in prior studies is typically based on the “primary” drug of abuse at treatment entry over a short period of time (e.g., past 30 days) and thus likely includes patients who had ever used both heroin and other opioids. Hence, the category of primary heroin users includes users of other opioids and vice-versa. *Third*, none of these studies examined specific substance use disorders (SUDs) and other psychiatric disorders.

This study aims to build on findings from prior studies by, *first*, enhancing the generalizability of results using data from a national study of psychiatric comorbidity (the National Epidemiologic Survey on Alcohol and Related Conditions; NESARC); *second*, utilizing the information from lifetime use of all drug classes to identify four mutually exclusive groups (heroin-other opioid users, heroin-only users, other opioid-only users, and non-opioid drug users) and comparing their demographic and clinical profiles; and *third*, examining psychiatric disorders and indicators of quality of life according to type of opioid used. We address three questions: (1) Are heroin-other opioid users, heroin-only users, and other opioid-only users different in demographic characteristics, substance abuse treatment use, familial substance abuse history, and patterns of drug use? (2) Are heroin-other opioid users and heroin-only users more likely than other opioid-only users to have SUDs and other psychiatric disorders? (3) Do opioid users differ from non-opioid drug users in quality of life and patterns of other substance use and psychiatric disorders?

## METHODS

### Study Sample

From 2001–2002, the National Institute on Alcohol Abuse and Alcoholism conducted the largest and most ambitious comorbidity study done to date (NESARC; Grant et al., 2004). NESARC provides prevalence rates for the Diagnostic and Statistical Manual of Mental Disorders, Fourth Revision (DSM-IV) Axis I (substance use, mood, and anxiety disorders) and Axis II (personality) disorders within the general population using a multistage cluster sampling design. The target population was the civilian non-institutionalized population aged  $\geq 18$  years who resided in the United States or the District of Columbia, including Alaska and Hawaii. Eligible respondents included persons living in households, military personnel living off base, and residents of group quarters (boarding houses, rooming houses, non-transient hotels and motels, shelters, facilities for housing workers, college quarters, and group homes).

Professional lay interviewers from the Bureau of the Census administered face-to-face personal interviews using computer-assisted personal interviewing methods that protected confidentiality (Grant and Dawson, 2006). All respondents provided written informed consent and were assured that their participation was voluntary. To increase the accuracy of national estimates for demographic subgroups, Hispanics (N=8308), non-Hispanic blacks (N=8245), and respondents aged 18–24 years (N=5199) were oversampled. Of the 43,093 respondents, 18,518 were male and 24,575 were female. The household and individual response rates were 89% and 93%, respectively. The overall survey response rate was 82%. Details of the survey designs are reported elsewhere (Grant et al., 2004).

## Study Variables

*Substance use and psychiatric disorders* were assessed with the Alcohol Use Disorders and Associated Disabilities Interview Schedule–DSM-IV, an instrument of demonstrated reliability and validity (Grant et al., 2003). It assesses problems and disorders related to *substance use* (tobacco/nicotine, alcohol, inhalants, marijuana, cocaine, hallucinogens, sedatives, amphetamines, tranquilizers, opioid analgesics, and heroin), *mood* (major depression, dysthymia, mania, and hypomania), *anxiety* (panic disorder, social phobia, specific phobia, and generalized anxiety disorder), and *personality* (avoidant, dependent, obsessive-compulsive, paranoid, schizoid, histrionic, and antisocial).

For *substance use*, respondents were assessed for lifetime use of alcohol, tobacco/nicotine, and other drug classes. *Drug use* was defined as the use of substance(s) either without a doctor's prescription; in greater amounts, more often, or longer than prescribed; or for a reason other than prescribed by a doctor. Respondents were asked to indicate whether they have ever used the following drug classes: marijuana, inhalants/solvents, cocaine/crack, hallucinogens, heroin, opioid analgesics, sedatives, amphetamines, and tranquilizers. Respondents who reported any lifetime use of the given substance then were assessed for DSM-IV abuse and dependence symptoms of the substance.

*Other opioid use* included non-prescribed use of prescription opioid analgesics such as codeine, Darvon®, Percodan®, Dilaudid®, or Demerol®. *Heroin use* was not counted because it is a Schedule I controlled substance, and was assessed separately. Based on lifetime use of opioids, heroin, and the other drugs, four mutually exclusive groups were defined: *heroin-other opioid users* (users of heroin and other opioids, regardless other drug use), *other opioid-only users* (opioid users who had never used heroin), *heroin-only users* (heroin users who had never used other opioids), and *non-opioid drug users* (drug users who had never used heroin and other opioids).

In addition to psychiatric disorders, personal history of substance abuse treatment and familial history of substance abuse were examined as correlates for opioid use. A *personal history of substance abuse treatment* was defined as having ever received any treatment services for problems related to alcohol or drug use at any location (an inpatient ward, outpatient clinic, emergency room, addiction treatment program, mental health treatment program, jail, or self-help groups) (Grant et al., 2004; Wu, Howard, and Pilowsky, 2008). *Familial substance abuse* included any self-reported, positive family history of alcohol or drug use problems among any of the respondent's biological family members (natural parents, sons, daughters, grandparents, full brothers, and full sisters) (Wu et al., 2009).

Finally, measures of quality of life were compared between opioid groups. *Self-rated quality of life* was assessed by SF-12 V2 (Ware et al., 2002) and was examined due to its association with opioid abuse (Cicero et al., 2008). The 12 items reflect two summary disability measures (physical vs. mental disability) and eight sub-domains: physical functioning (engagement in moderate activities and ability to climb a flight of stairs); physical role (accomplishment and limitation); bodily pain; general health; vitality; social functioning; emotional role (accomplishment and limitation); and mental health (feeling calm and peaceful, feeling downhearted and depressed). Norm-based standardized scores (range: 0–100) were used to facilitate comparisons across groups.

*Socioeconomic variables* (age, gender, race/ethnicity, educational level, and total annual family income) were examined to elucidate demographic disparities by opioid use status.

## Data Analysis

Because NESARC used a complex multistage survey design, data were weighted and analyzed with SUDAAN (Research Triangle Institute, 2006). Prevalence rates of opioid use among all respondents (N=43,093) were examined. Within the subsample of lifetime drug users (n=9140), demographic characteristics, substance use, and psychiatric disorders were compared by opioid use status. To control for the potential confounding influences of gender, age, race/ethnicity, education, annual family income, substance abuse treatment use, and familial substance abuse, logistic regression procedures were applied to estimate the association between lifetime opioid use status and each psychiatric disorder.

Further, past-year psychiatric disorders were determined among past-year opioid users (n=684), and their rates were compared with those of past-year non-opioid drug users (n=1766). Finally, quality of life among past-year opioid users was compared with past-year non-opioid drug users. All results presented here are weighted estimates taking into account complex survey designs (clustering and weighting), except for sample sizes, which are unweighted.

## RESULTS

### Selected Characteristics of Opioid Users (Table 1)

Approximately 23% (n=9140) of all NESARC respondents (N=43,093) were lifetime drug users (0.3% used heroin, 5% used other opioids, and 18% used other, non-opioid drugs). Of this subsample, 1.0% (n=98) were heroin-other opioid users, 0.5% (n=52) were heroin-only users, 19.8% (n=1717) were other opioid-only users, and 78.7% (n=7273) were non-opioid drug users.

Heroin-other opioid users and heroin-only users were more likely than the other groups to be older ( $\geq 45$  years), black, have a history of substance abuse treatment, and use marijuana, cocaine, inhalants, and hallucinogens (Table 1). Heroin-other opioid users and other opioid-only users were more likely than non-opioid drug users to be male, lack a high school education, and have a low family income ( $< \$35,000$ ). Heroin-other opioid users had the highest proportions of use of other drugs (cocaine, inhalants, hallucinogens, stimulants, tranquilizers, and sedatives). Other opioid-only users had a lower prevalence of use of other drugs than heroin-only users, except for tranquilizers and sedatives, the use of which was higher among the former than the latter group. Non-opioid drug users had the lowest prevalence of drug use except for marijuana, the use of which was higher among this group than in the other opioid-only use group.

### Prevalence of Psychiatric Disorders by Opioid Use (Table 2)

More than half (55%) of heroin-other opioid users met criteria for a lifetime DSM-IV prescription opioid use disorder (41.7%, abuse; 13.5%, dependence) as compared with 28.8% of other opioid-only users (21.9%, abuse; 6.9%, dependence). Two thirds (66.6%) of heroin-other opioid users had a lifetime heroin use disorder (38.0%, abuse; 28.6%, dependence) compared with 56.2% of heroin-only users (28.9%, abuse; 27.3%, dependence).

As shown in Table 2, heroin-other opioid users had a higher prevalence of various SUDs (marijuana, sedative, amphetamine, and tranquilizer) than the other opioid groups, while non-opioid drug users had the lowest prevalence of disorders (alcohol, nicotine, cocaine, hallucinogen, and amphetamine).

### Adjusted Odds Ratios of Lifetime Psychiatric Disorders by Lifetime Opioid Use (Table 3)

Odds ratios of specific lifetime disorders adjusting for gender, age, race/ethnicity, education, family income, history of substance abuse treatment, and familial substance abuse are summarized in Table 3. Relative to other opioid-only users, heroin-other opioid users had greater odds of several SUDs (opioid, cocaine, hallucinogen, sedative, amphetamine, and tranquilizer). Heroin-only users had reduced odds of prescription SUDs (sedative and tranquilizer) than other opioid-only users. Non-opioid drug users exhibited reduced odds of all SUDs and mental disorders (mood, anxiety, pathological gambling, and personality) than other opioid-only users. Additionally, heroin-only users had reduced odds of several SUDs (cocaine, hallucinogen, sedative, amphetamine, and tranquilizer) than heroin-other opioid users, while both groups had higher odds of several SUDs (inhalant, cocaine, hallucinogen, and amphetamine) than non-opioid drug users.

### Adjusted Odds Ratios of Past-Year Psychiatric Disorders by Past-Year Opioid Use (Table 4)

Psychiatric disorders were examined further by focusing on past-year disorders among past-year opioid users, but due to the small number of past-year heroin-other opioid ( $n=2$ ) and heroin-only users ( $n=9$ ), they were not examined. Odds ratios of past-year psychiatric disorders adjusting for gender, age, race/ethnicity, education, family income, history of substance abuse treatment, and familial substance abuse are summarized in Table 4. Relative to past-year non-opioid drug users, past-year other opioid-only users had greater odds of past-year SUDs (alcohol, sedative, amphetamine, and tranquilizer).

### Quality of Life by Past-Year Opioid Use (Table 5)

Finally, indicators of quality of life (SF-12) among past-year other opioid-only users were determined. Compared with past-year non-opioid drug users, they reported slightly lower scores of quality of life in physical disability, physical functioning, physical role, bodily pain, general health, vitality, and emotional role.

## DISCUSSION

This study reveals considerable heterogeneity between various groups of opioid users in a nationally representative sample of American adults. *First*, the four groups differed in key socioeconomic characteristics, types of other substances used, and history of substance abuse treatment; and all opioid use groups exhibited more pervasive use of substances than non-opioid drug users. *Second*, even after adjusting for variations in socioeconomic characteristics, history of substance abuse treatment, and familial substance abuse, heroin-other opioid users had higher odds of various SUDs (cocaine, hallucinogen, sedative, amphetamine, and tranquilizer) than the other opioid-using groups. Other opioid-only users had higher rates of prescription SUDs (sedative and tranquilizer) than heroin-only users. *Third*, non-opioid drug users exhibited lower rates of several SUDs than all of the opioid-using groups and lower rates of mental disorders (mood, anxiety, pathological gambling, and personality) than other opioid-only users. This diversity in psychopathology supports the need to distinguish heroin users from other opioid users in research and clinical settings in order to better characterize prognosis and, hopefully, optimize treatment response (Brands et al., 2004; Moore et al., 2007).

### Heroin-other Opioid Users Comprising the Most Severe Subset of Opioid Users

The most salient findings concern patterns of psychiatric profiles as a function of opioid use status, where heroin-other opioid users displayed the most severe pattern of psychopathology. The majority of individuals in this group not only had an opioid use



disorder (opioid, 55%; heroin, 67%) or other SUDs (alcohol, 87%; tobacco, 72%; marijuana, 71%; cocaine, 61%; hallucinogen, 52%; amphetamine, 47%; sedative, 46%; and tranquilizer, 41%), but also met criteria for several other mental disorders (mood, 57%; anxiety, 39%; personality, 48%). They were distinct from the two other opioid use groups in having higher rates of various SUDs (cocaine, hallucinogen, amphetamine, sedative, and tranquilizer), and from non-opioid drug users in having higher rates of almost all SUDs (except for alcohol) and mood disorders. This profile of comorbidity tends to be consistent with results from adults in treatment for heroin or other opioid abuse, suggesting that these individuals are likely to be in particular need of psychiatric and substance abuse treatment services (Strain and Stitzer, 2006; Cicero et al., 2008).

While this study cannot determine causality, research has suggested that comorbid disorders are explained in part by common risk factors, genetic characteristics, or self-medication of negative mood states or health conditions such as anxiety, depression, and chronic pain (Khantzian, 1997; Tsuang et al., 1998; Brands et al., 2004; Cicero et al., 2008). This study extends prior research by identifying the extent of specific substance use and psychiatric disorders in three distinct groups of opioid users as compared with non-opioid drug users. It also suggests that use of heroin and other opioids is a marker for persons with high rates of substance use and psychiatric disorders that can present special treatment challenges (Brick, 2004).

### **Other Opioid Users Abusing More Prescription Drugs than Heroin Users**

This study also provides new findings about other opioid-only users versus heroin-only users. Contrary to studies of treatment-seeking patients that have found a relatively small proportion of primary users of other opioids (Brands et al., 2004; Moore et al., 2007; Banta-Green et al., 2009), these findings show that 93% of opioid users had never used heroin. Of particular interest is that this large group of other opioid-only users is not necessarily less severe than heroin-only users in substance abuse. These data suggest that other opioid-only users abuse more prescription drugs than heroin-only users, while heroin-only users have more problems with illicit drug use such as dependence on heroin, injection drug use, and cocaine use (Brands et al., 2004; Sigmon, 2006; Rosenblum et al., 2007). Because these groups differ in demographic profiles (e.g., more blacks and older adults among heroin-only users), treatment outcomes might be improved by tailoring interventions to meet the needs of these different patient groups (Brands et al., 2004; Sigmon, 2006; Moore et al., 2007). A second finding of interest was that, despite the high rate of psychiatric disorders among other opioid-only users, they appear to have a low likelihood of using substance abuse treatment (Moore et al., 2007; Rosenblum et al., 2007). This finding shows that results seen in patients in addiction treatment programs (e.g., MMT) may not be replicated in the largest group (93%) of other opioid-only users, and implies that outreach efforts may be especially important for engaging abusers of other opioids in treatment.

### **Other Opioid Users Exhibiting Lower Quality of Life than Non-opioid Drug Users**

Finally, prior adult studies of opioid users have not included a comparison group of non-opioid drug users. This gap was addressed here by focusing the analysis on past-year disorders and quality of life among past-year drug users. Findings were that past-year other opioid-only users not only had higher rates of several past-year SUDs (alcohol, sedative, amphetamine, and tranquilizer) than past-year non-opioid drug users, but also reported slightly lower scores on indicators of quality of life in multiple domains (physical disability, physical functioning, physical role, bodily pain, general health, vitality, and emotional role). This finding is consistent with the findings of Brands et al. (2004), who found higher rates of psychiatric treatment and chronic pain among other opioid-only users compared with heroin-only users (Brands et al., 2004).

## Study Limitations and Strengths

These findings should be interpreted in light of their limitations. A very small percentage of institutionalized adults (homeless, hospitalized, or incarcerated individuals) were not included in the NESARC; thus, these results cannot be applied to them. Additionally, the NESARC relies on self-reports, which may be influenced by under-reporting and memory errors. Further, reasons for opioid use and their sources were not examined because the survey did not assess them.

However, because the NESARC includes the most comprehensive assessment of psychiatric disorders available, this is the first and largest study to identify distinct patterns of substance use and psychiatric disorders among mutually exclusive groups of opioid users in the general population. We addressed previously understudied issues from studies of clinical patients, and our findings are likely to have a high level of generalizability.

## CONCLUSIONS

This study using data from the largest national study of psychiatric disorders conducted to date suggests that opioid users can be categorized into three groups based on heroin use status, and that these three groups have different clinical features. Heroin-other opioid users comprise the most severe subset, while other opioid-only users abuse more prescription drugs than heroin-only users. Other opioid-only users also differ from heroin-only users in age (younger) and race/ethnicity (primarily white). Additionally, all opioid use groups have higher rates of other SUDs than non-opioid drug users, and the largest group of other opioid-only users resembles heroin-only users in the proportion with psychiatric disorders. These findings underscore the need for continued monitoring of trends in opioid abuse, distinguishing heroin users from other opioid users in research and treatment, and developing tailored prevention and treatment programs in response to changing profiles within the opioid-using population.

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Table 1

Selected characteristics of lifetime opioid users compared with non-opioid drug users among adults aged 18 years or older in NESARC (N=9140)

Characteristics by lifetime opioid use status (regardless of other drug use): column %	Heroin-other opioids	Other opioid only	Heroin only	Non-opioid drugs	$\chi^2$ (df) p-value
Sample size	98	1717	52	7273	
Age group					
18–29 years	20.4	34.5	10.3	26.4	
30–44 years	31.8	37.4	35.9	42.6	40.5 (6)
45 years or older	47.8	28.1	53.8	31.0	<0.001
Gender					
Male	78.3	60.5	67.0	55.4	24.1 (3)
Female	21.7	39.5	33.0	44.6	<0.001
Race/ethnicity					
White	73.7	80.1	68.1	76.2	
Black	13.5	5.8	16.4	10.4	
Hispanic	8.6	7.4	10.2	8.3	54.4 (9)
Others	4.1	6.7	5.3	5.2	<0.001
Educational level					
Less than high school	19.5	14.8	18.2	10.1	
High school	37.2	28.3	28.1	25.3	27.6 (6)
College or more	43.3	56.9	53.7	64.6	<0.001
Total family income					
<\$35,000	63.0	47.7	52.3	36.0	
\$35,000–\$69,999	20.6	32.7	37.5	32.3	70.4 (6)
\$70,000+	16.4	19.5	10.2	31.7	<0.001
History of substance abuse treatment					
Yes	72.1	27.4	62.1	12.8	105.8 (3)
No	27.9	72.6	37.9	87.2	<0.001
Familial substance abuse					

Characteristics by lifetime opioid use status (regardless of other drug use): column %							$\chi^2$ (df) <i>p</i> -value
	Heroin-other opioids	Other opioid only	Heroin only	Non-opioid drugs			
<b>Lifetime marijuana use</b>							
Yes	88.3	82.0	86.1	74.6		36.5 (3)	
No	11.7	18.0	13.9	25.4		<0.001	
<b>Lifetime cocaine use</b>							
Yes	100	78.4	97.4	93.0		90.2 (3)	
No	0.0	21.6	2.6	7.0		<0.001	
<b>Lifetime inhalant use</b>							
Yes	90.6	43.3	69.6	21.8		124.0 (3)	
No	9.4	56.7	30.4	78.2		<0.001	
<b>Lifetime hallucinogen use</b>							
Yes	46.3	18.0	24.1	4.4		87.3 (3)	
No	53.7	82.0	75.9	95.6		<0.001	
<b>Lifetime stimulant use</b>							
Yes	97.4	46.1	68.0	19.2		128.5 (3)	
No	2.6	53.9	32.1	80.8		<0.001	
<b>Lifetime tranquilizer use</b>							
Yes	81.4	41.9	42.7	14.1		139.4 (3)	
No	18.6	58.1	57.3	85.9		<0.001	
<b>Lifetime sedative use</b>							
Yes	88.3	44.7	14.3	6.6		151.8 (3)	
No	11.7	55.3	85.7	93.4		<0.001	
<b>Lifetime stimulant use</b>							
Yes	88.0	43.3	16.1	10.7		121.3 (3)	
No	12.0	56.7	83.9	89.3		<0.001	

Table 2

Prevalence of lifetime psychiatric disorders among lifetime adult drug users aged 18 years or older in NESARC (N=9140)

Prevalence of disorders, column % (SE), by lifetime opioid use status (regardless of other drug use)	Heroin-other opioids	Other opioid only	Heroin only	Non-opioid drugs	$\chi^2$ (df=3) p-value
Sample size	98	1717	52	7273	
Any opioid use disorder	55.1 (6.08)	28.8 (1.47)	NA	NA	<0.001*
Opioid abuse (without dependence)	41.7 (6.12)	21.9 (1.26)	NA	NA	<0.01*
Opioid dependence (regardless of abuse)	13.5 (4.25)	6.9 (0.82)	NA	NA	>0.05*
Any heroin use disorder	66.6 (5.81)	NA	56.2 (8.52)	NA	>0.05*
Heroin abuse (without dependence)	38.0 (6.00)	NA	28.9 (7.26)	NA	>0.05*
Heroin dependence (regardless of abuse)	28.6 (4.78)	NA	27.3 (6.46)	NA	>0.05*
Alcohol use disorder	88.6 (3.81)	76.2 (1.52)	85.1 (6.23)	62.6 (0.91)	<0.001
Nicotine dependence	72.4 (5.00)	52.5 (1.60)	62.9 (8.10)	33.8 (0.92)	<0.001
Any drug use disorder <sup>†</sup>	93.7 (3.19)	63.9 (1.51)	76.9 (7.99)	40.2 (0.82)	<0.001
Inhalant/solvent use disorder	15.0 (3.55)	4.1 (0.66)	10.4 (4.80)	0.6 (0.10)	<0.001
Marijuana use disorder	71.0 (5.81)	49.4 (1.46)	40.1 (8.69)	33.5 (0.76)	<0.001
Cocaine use disorder	60.9 (5.90)	24.8 (1.28)	49.6 (8.18)	8.4 (0.40)	<0.001
Hallucinogen use disorder	52.2 (5.97)	18.2 (1.16)	28.0 (7.55)	4.1 (0.30)	<0.001
Sedative use disorder	46.0 (5.76)	13.5 (1.08)	5.4 (2.82)	2.0 (0.19)	<0.001
Amphetamine use disorder	47.3 (5.89)	20.2 (1.22)	26.4 (7.27)	5.3 (0.43)	<0.001
Tranquilizer use disorder	41.4 (5.66)	14.7 (1.24)	7.7 (3.92)	1.2 (0.14)	<0.001
Any mood disorders	57.1 (5.91)	47.7 (1.55)	47.4 (8.39)	31.9 (0.69)	<0.001
Any anxiety disorders	38.5 (5.38)	33.2 (1.53)	28.3 (7.25)	25.6 (0.72)	<0.001
Pathological gambling	5.4 (3.34)	2.2 (0.49)	0	0.7 (0.10)	<0.001
Any personality disorders	48.3 (6.17)	39.8 (1.48)	38.6 (7.84)	23.6 (0.72)	<0.001

SE: standard error.

NA: estimates not available.

<sup>†</sup> Any drug use disorder included any of the nine drug use disorders: inhalant, marijuana, cocaine, heroin, hallucinogen, opioid, sedative, amphetamine, and tranquilizer.\*  $\chi^2$  test, df=1.



**Table 3**

Adjusted odds ratios (AOR) and 95% confidence intervals of lifetime psychiatric disorders among lifetime adult drug users aged 18 years or older in NESARC (N=9140)

AOR of disorder <sup>J</sup> by lifetime opioid use status (regardless of other drug use)	Heroin-other opioids vs. other opioid only	Heroin only vs. other opioid only	Non-opioid drugs vs. other opioid only	Heroin-other opioids vs. non-opioid drugs	Heroin only vs. non-opioid drugs	Heroin only vs. heroin-other opioids
Any opioid use disorders	<b>1.82 (1.07–3.11)</b>	NA	NA	NA	NA	<b>0.55 (0.32–0.93)</b>
Any heroin use disorders	NA	NA	NA	NA	NA	NA
Alcohol use disorders	1.17 (0.50–2.75)	1.16 (0.38–3.55)	<b>0.63 (0.54–0.75)</b>	1.86 (0.80–4.33)	1.83 (0.60–5.56)	0.85 (0.36–2.00)
Nicotine dependence	1.68 (0.97–2.92)	1.26 (0.58–2.76)	<b>0.59 (0.51–0.68)</b>	<b>2.87 (1.69–4.88)</b>	<b>2.16 (4.02–1.59)</b>	0.59 (0.34–1.03)
Any drug use disorders	<b>4.82 (1.57–14.74)</b>	1.34 (0.50–3.57)	<b>0.47 (0.40–0.55)</b>	<b>10.24 (3.35–31.31)</b>	<b>2.85 (1.08–7.54)</b>	<b>0.21 (0.07–0.64)</b>
Inhalant use disorders	1.87 (0.90–3.89)	2.38 (0.79–7.20)	<b>0.22 (0.13–0.37)</b>	<b>8.52 (3.87–18.80)</b>	<b>10.86 (3.46–34.05)</b>	0.54 (0.26–1.12)
Marijuana use disorders	1.64 (0.90–2.99)	0.51 (0.24–1.11)	<b>0.63 (0.55–0.72)</b>	<b>2.63 (1.45–4.76)</b>	0.82 (0.38–1.75)	0.61 (0.33–1.11)
Cocaine use disorders	<b>2.59 (1.43–4.70)</b>	1.82 (0.90–3.71)	<b>0.35 (0.29–0.41)</b>	<b>7.51 (4.20–13.43)</b>	<b>5.28 (2.59–10.76)</b>	<b>0.39 (0.21–0.70)</b>
Hallucinogen use disorders	<b>3.96 (2.32–6.74)</b>	1.56 (0.69–3.51)	<b>0.26 (0.21–0.32)</b>	<b>15.37 (8.78–26.90)</b>	<b>6.05 (2.69–13.62)</b>	<b>0.25 (0.15–0.43)</b>
Sedative use disorders	<b>3.04 (1.79–5.19)</b>	<b>0.18 (0.06–0.62)</b>	<b>0.16 (0.12–0.22)</b>	<b>18.49 (10.45–32.72)</b>	1.12 (0.33–3.78)	<b>0.33 (0.19–0.56)</b>
Amphetamine use disorders	<b>2.33 (1.34–4.03)</b>	0.93 (0.41–2.10)	<b>0.28 (0.23–0.35)</b>	<b>8.21 (4.67–14.44)</b>	<b>3.29 (1.46–7.40)</b>	<b>0.43 (0.25–0.74)</b>
Tranquilizer use disorders	<b>2.37 (1.38–4.07)</b>	<b>0.27 (0.08–0.97)</b>	<b>0.09 (0.07–0.13)</b>	<b>25.04 (13.92–45.04)</b>	2.89 (0.80–10.41)	<b>0.42 (0.25–0.73)</b>
Any mood disorders	1.21 (0.70–2.09)	0.95 (0.46–1.97)	<b>0.64 (0.55–0.75)</b>	<b>1.89 (1.09–3.26)</b>	1.49 (0.73–3.06)	0.83 (0.48–1.44)
Any anxiety disorders	1.06 (0.65–1.73)	0.63 (0.29–1.35)	<b>0.76 (0.65–0.90)</b>	1.39 (0.87–2.22)	0.82 (0.39–1.74)	0.94 (0.58–1.54)
Pathological gambling	1.53 (0.38–6.22)	NA	<b>0.34 (0.18–0.64)</b>	<b>4.45 (1.15–17.19)</b>	NA	0.65 (0.16–2.65)
Any personality disorders	0.91 (0.52–1.58)	0.66 (0.35–1.25)	<b>0.58 (0.50–0.68)</b>	1.55 (0.90–2.68)	1.13 (0.61–2.12)	1.10 (0.63–1.92)

<sup>J</sup> Odds ratios adjusted for sex, age, race/ethnicity, education, total family income, lifetime use of substance abuse treatment, and family history of substance abuse. NA: estimates either not available or unstable due to a small sample size. Boldface:  $p < 0.05$ .

**Table 4**

Prevalence of current (past-year) psychiatric disorders among current adult drug users aged 18 years or older in NESARC (N=2450)

Current opioid use status	Users of other opioid only <sup>1</sup> (N=684)	Users of non-opioid drugs <sup>2</sup> (N=1766)	Users of other opioid only vs. users of non-opioid drugs
Current prevalence: column %	% (SE)	% (SE)	Adjusted odds ratio (95% confidence interval) <sup>3</sup>
Any opioid use disorders	19.5 (2.12)	NA	NA
Alcohol use disorders	44.3 (2.41)	37.2 (1.47)	<b>1.46 (1.16–1.84)</b>
Nicotine dependence	45.1 (2.62)	38.4 (1.51)	1.24 (0.96–1.59)
Any drug use disorders	35.8 (2.39)	30.3 (1.26)	<b>1.31 (1.02–1.69)</b>
Inhalant use disorders	0.5 (0.33)	0.4 (0.18)	1.32 (0.26–6.85)
Marijuana use disorders	18.7 (1.71)	25.2 (1.19)	0.67 (0.51–0.88)
Cocaine use disorders	5.7 (1.13)	3.7 (0.56)	1.63 (0.98–2.72)
Hallucinogen use disorders	3.3 (0.81)	1.8 (0.37)	1.85 (0.99–3.47)
Sedative use disorders	4.3 (0.90)	1.9 (0.38)	<b>2.10 (1.14–3.86)</b>
Amphetamine use disorders	4.4 (0.89)	1.9 (0.43)	<b>2.00 (1.12–3.57)</b>
Tranquilizer use disorders	4.4 (0.99)	1.0 (0.26)	<b>4.03 (1.93–8.41)</b>
Any mood disorders	27.3 (2.13)	24.3 (1.21)	1.07 (0.82–1.40)
Any anxiety disorders	25.2 (2.09)	19.4 (1.11)	1.28 (0.98–1.66)
Pathological gambling	1.0 (0.42)	0.3 (0.14)	3.20 (0.91–11.31)

SE: standard error

NA: estimates not available.

Boldface:  $p < 0.05$ .

<sup>1</sup> Past-year opioid users who had not used heroin, regardless of other drug use.

<sup>2</sup> Past-year drug users who had not used heroin and other opioids.

<sup>3</sup> Odds ratios adjusted for sex, age, race/ethnicity, education, total family income, lifetime use of substance abuse treatment, and family history of substance abuse.

**Table 5**

Quality of life scores from SF-12 version 2 by past-year opioid use status among adults aged 18 years or older in NESARC (N=2450)

Quality of life scores: mean (95% CI)	Users of other opioid only <sup>1</sup>	Users of non-opioid drugs <sup>2</sup>	T-test <i>p</i> -value
Sample size	684	1766	
Physical disability	49.8 (48.71–50.87)	52.5 (52.00–53.03)	<0.001
Mental disability	48.0 (46.98–49.08)	48.9 (48.29–49.41)	0.163
Physical functioning	51.0 (50.07–51.94)	52.8 (52.29–53.26)	<0.001
Physical role	49.5 (48.44–50.49)	51.9 (51.39–52.37)	<0.001
Bodily pain	47.1 (45.94–48.31)	49.9 (49.20–50.51)	<0.001
General health	47.9 (46.70–49.12)	50.8 (50.10–51.43)	<0.001
Vitality	51.4 (50.45–52.38)	53.1 (52.47–53.67)	<0.001
Social functioning	48.8 (47.69–49.81)	50.0 (49.32–50.59)	0.054
Emotional role	47.5 (46.31–48.74)	49.4 (48.83–50.02)	0.008
Mental health	47.9 (46.74–48.97)	48.5 (47.88–49.04)	0.335

95% CI: 95 percent confidence interval.

<sup>1</sup>Past-year opioid users who had not used heroin, regardless of other drug use.

<sup>2</sup>Past-year drug users who had not used heroin and other opioids.