

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

Li-Tzy Wu, ScD, George E. Woody, MD, Chongming Yang, PhD, and Dan G. Blazer, MD, PhD

Objectives: To study substance use and psychiatric disorders among prescription opioid users, heroin users, and nonopioid drug users in a national sample of adults.

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

Results: Four groups were identified among 9140 illicit or nonprescribed 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 nonopioid 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 (SUDs; cocaine, hallucinogen, sedative, amphetamine, and tranquilizer) when compared with the other groups; heroin-only users had reduced odds of sedative and tranquilizer use disorders when compared with other opioid-only users. Nonopioid drug users had reduced odds of all SUDs and other mental disorders (mood, anxiety, pathologic gambling, and person-

ality) when compared with other opioid-only users. Past-year other opioid-only users also reported slightly lower scores on quality of life than past-year nonopioid drug users.

Conclusions: All opioid users had higher rates of SUDs than nonopioid drug users, and these rates were particularly increased among heroin-other opioid users. The findings suggest the need to distinguish between these 4 groups in research and treatment as they may have different natural histories and treatment needs.

Key Words: comorbidity, heroin use disorders, opioid use disorders, prescription opioid abuse

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From the Department of Psychiatry and Behavioral Sciences (L.-T.W., D.G.B.), School of Medicine, Duke Clinical Research Institute, Duke University Medical Center, Durham, NC; Department of Psychiatry (G.E.W.), School of Medicine, University of Pennsylvania and Treatment Research Institute, Philadelphia, PA; and Social Science Research Institute (C.Y.), Duke University, Durham, NC.

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Send correspondence and reprint requests to Li-Tzy Wu, ScD, Department of Psychiatry and Behavioral Sciences, Duke University School of Medicine, Duke University Medical Center, Box 3419, Durham, NC 27710. e-mail: litzy.wu@duke.edu

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Although heroin use has been the central target for opioid addiction treatment, the emerging use of nonprescribed 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], 2009b). 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 increase in treatment admissions related to abuse and addiction to prescription opioids (SAMHSA, 2009b) 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 nonprescribed drugs (Tetrault et al., 2008), as seen in recent data that estimated that 80% of all past-year nonprescribed users of prescription drugs (opioids, sedatives, stimulants, and tranquilizers) used nonprescribed opioids and that, after cannabinoids, prescription opioid use disorders comprise the second most prevalent drug use disorder among 9 illicit and prescription-type drug classes (SAMHSA, 2009a).

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 when compared with users of prescription opioids and have important implications for the research, prevention, treatment, and 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 2 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 the 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 to 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 or 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, the 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 versus other opioid users in prior studies is typically based on the "primary" drug of abuse at treatment entry over a short period of time (eg, 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, by utilizing the information from

lifetime use of all drug classes to identify 4 mutually exclusive groups (heroin-other opioid users, heroin-only users, other opioid-only users, and nonopioid 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 3 questions: (1) are heroin-other opioid users, heroin-only users, and other opioid-only users differ 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 nonopioid drug users in quality of life and patterns of other substance use and psychiatric disorders?

METHODS

Study Sample

From 2001 to 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 noninstitutionalized population aged ≥ 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, nontransient 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 to 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 the problems and disorders related to substance use (tobacco or 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 or 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 or solvents, cocaine or crack, hallucinogens, heroin, opioid analgesics, sedatives, amphetamines, and tranquilizers. Respondents who reported any lifetime use of the given substance were assessed for DSM-IV abuse and dependence symptoms of the substance.

Other opioid use included nonprescribed 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 other drugs, 4 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 nonopioid 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 et al., 2008). Familial substance abuse included any self-reported, positive family history of alcohol or drug use problems among any of the respondent's biologic family members (natural parents, sons, daughters, grandparents, full brothers, and full sisters; Wu et al., 2009).

Finally, the measures of quality of life were compared between opioid groups. Self-rated quality of life was assessed by SF-12 version 2 (Ware et al., 2002) and was examined because of its association with opioid abuse (Cicero et al., 2008). The 12 items reflect 2 summary disability measures (physical vs mental disability) and 8 subdomains: physical functioning (engagement in moderate activities and ability to climb a flight of stairs), physical role (accomplishment and limitation), body pain, general health, vitality, social functioning, emotional role (accomplishment and limitation), and mental health (feeling calm and peaceful and feeling downhearted and depressed). Norm-based standardized scores (range: 0 to 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 nonopioid drug users ($n = 1766$). Finally, quality of life among past-year opioid users was compared with past-year nonopioid 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

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 nonopioid 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 nonopioid drug users (Table 1).

Heroin-other opioid users and heroin-only users were more likely than the other groups to be older (≥ 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 nonopioid 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. Nonopioid 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

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) when compared with 28.8% of other opioid-only users (21.9%, abuse; 6.9%, dependence; Table 2). Two thirds (66.6%) of heroin-other

TABLE 1. Selected Characteristics of Lifetime Opioid Users Compared With Nonopioid Drug Users Among Adults Aged 18 yr 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	Nonopioid Drugs	χ^2 (df) P
Sample size	98	1717	52	7273	
Age group					
18–29 yr	20.4	34.5	10.3	26.4	
30–44 yr	31.8	37.4	35.9	42.6	40.5 (6)
45 yr 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					
Yes	88.3	82.0	86.1	74.6	36.5 (3)
No	11.7	18.0	13.9	25.4	<0.001
Lifetime marijuana use					
Yes	100	78.4	97.4	93.0	90.2 (3)
No	0.0	21.6	2.6	7.0	<0.001
Lifetime cocaine use					
Yes	90.6	43.3	69.6	21.8	124.0 (3)
No	9.4	56.7	30.4	78.2	<0.001
Lifetime inhalant use					
Yes	46.3	18.0	24.1	4.4	87.3 (3)
No	53.7	82.0	75.9	95.6	<0.001
Lifetime hallucinogen use					
Yes	97.4	46.1	68.0	19.2	128.5 (3)
No	2.6	53.9	32.1	80.8	<0.001
Lifetime stimulant use					
Yes	81.4	41.9	42.7	14.1	139.4 (3)
No	18.6	58.1	57.3	85.9	<0.001
Lifetime tranquilizer use					
Yes	88.3	44.7	14.3	6.6	151.8 (3)
No	11.7	55.3	85.7	93.4	<0.001
Lifetime sedative use					
Yes	88.0	43.3	16.1	10.7	121.3 (3)
No	12.0	56.7	83.9	89.3	<0.001

NESARC, National Epidemiologic Survey on Alcohol and Related Conditions.

TABLE 2. Prevalence of Lifetime Psychiatric Disorders Among Lifetime Adult Drug Users Aged 18 yr 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	Nonopioid Drugs	χ^2 (df = 3) P
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†	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
Pathologic 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

* χ^2 test, df = 1.

†Any drug use disorder included any of the 9 drug use disorders: inhalant, marijuana, cocaine, heroin, hallucinogen, opioid, sedative, amphetamine, and tranquilizer.

SE, standard error; NA, estimates not available; NESARC, National Epidemiologic Survey on Alcohol and Related Conditions.

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, whereas nonopioid 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

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. Nonopioid drug users exhibited reduced odds of all SUDs and mental disorders (mood, anxiety, pathologic gambling, and personality) than other opioid-only users. In addition, heroin-only users had reduced odds of several SUDs (cocaine, hallucinogen, sedative, amphetamine, and tranquilizer) than heroin-other opioid users, whereas both groups had

higher odds of several SUDs (inhalant, cocaine, hallucinogen, and amphetamine) than nonopioid drug users.

Adjusted Odds Ratios of Past-Year Psychiatric Disorders by Past-Year Opioid Use

Psychiatric disorders were examined further by focusing on past-year disorders among past-year opioid users, but because of the small number of past-year heroin-other opioid (n = 2) and heroin-only users (n = 9), they were not examined (Table 4). 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 nonopioid 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

Finally, the indicators of quality of life (SF-12) among past-year other opioid-only users were determined (Table 5). Compared with past-year nonopioid drug users, they reported slightly lower scores of quality of life in physical disability, physical functioning, physical role, body pain, general health, vitality, and emotional role.

TABLE 3. AOR and 95% Confidence Intervals of Lifetime Psychiatric Disorders Among Lifetime Adult Drug Users Aged 18 yr or Older in NESARC (n = 9140)

AOR of Disorder* by Lifetime Opioid Use Status (Regardless of Other Drug Use)	Heroin–Other Opioids vs Other Opioid Only	Heroin Only vs Other Opioid Only	Nonopioid Drugs vs Other Opioid Only	Heroin–Other Opioids vs Nonopioid Drugs	Heroin Only vs Nonopioid Drugs	Heroin Only vs Heroin–Other Opioids
Any opioid use disorders	1.82 (1.07–3.11)	NA	NA	NA	NA	0.55 (0.32–0.93)
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)	0.63 (0.54–0.75)	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)	0.59 (0.51–0.68)	2.87 (1.69–4.88)	2.16 (4.02–1.59)	0.59 (0.34–1.03)
Any drug use disorders	4.82 (1.57–14.74)	1.34 (0.50–3.57)	0.47 (0.40–0.55)	10.24 (3.35–31.31)	2.85 (1.08–7.54)	0.21 (0.07–0.64)
Inhalant use disorders	1.87 (0.90–3.89)	2.38 (0.79–7.20)	0.22 (0.13–0.37)	8.52 (3.87–18.80)	10.86 (3.46–34.05)	0.54 (0.26–1.12)
Marijuana use disorders	1.64 (0.90–2.99)	0.51 (0.24–1.11)	0.63 (0.55–0.72)	2.63 (1.45–4.76)	0.82 (0.38–1.75)	0.61 (0.33–1.11)
Cocaine use disorders	2.59 (1.43–4.70)	1.82 (0.90–3.71)	0.35 (0.29–0.41)	7.51 (4.20–13.43)	5.28 (2.59–10.76)	0.39 (0.21–0.70)
Hallucinogen use disorders	3.96 (2.32–6.74)	1.56 (0.69–3.51)	0.26 (0.21–0.32)	15.37 (8.78–26.90)	6.05 (2.69–13.62)	0.25 (0.15–0.43)
Sedative use disorders	3.04 (1.79–5.19)	0.18 (0.06–0.62)	0.16 (0.12–0.22)	18.49 (10.45–32.72)	1.12 (0.33–3.78)	0.33 (0.19–0.56)
Amphetamine use disorders	2.33 (1.34–4.03)	0.93 (0.41–2.10)	0.28 (0.23–0.35)	8.21 (4.67–14.44)	3.29 (1.46–7.40)	0.43 (0.25–0.74)
Tranquilizer use disorders	2.37 (1.38–4.07)	0.27 (0.08–0.97)	0.09 (0.07–0.13)	25.04 (13.92–45.04)	2.89 (0.80–10.41)	0.42 (0.25–0.73)
Any mood disorders	1.21 (0.70–2.09)	0.95 (0.46–1.97)	0.64 (0.55–0.75)	1.89 (1.09–3.26)	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)	0.76 (0.65–0.90)	1.39 (0.87–2.22)	0.82 (0.39–1.74)	0.94 (0.58–1.54)
Pathologic gambling	1.53 (0.38–6.22)	NA	0.34 (0.18–0.64)	4.45 (1.15–17.19)	NA	0.65 (0.16–2.65)
Any personality disorders	0.91 (0.52–1.58)	0.66 (0.35–1.25)	0.58 (0.50–0.68)	1.55 (0.90–2.68)	1.13 (0.61–2.12)	1.10 (0.63–1.92)

Values given in boldface indicate $P < 0.05$.

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

AOR, adjusted odds ratios; NA, estimates either not available or unstable due to a small sample size; NESARC, National Epidemiologic Survey on Alcohol and Related Conditions.

DISCUSSION

This study reveals considerable heterogeneity between various groups of opioid users in a nationally representative sample of American adults. First, the 4 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 nonopioid 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, nonopioid drug users exhibited lower rates of several SUDs than all the opioid-using groups and lower rates of mental disorders (mood, anxiety, pathologic 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 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%; and personality, 48%). They were distinct from the 2 other opioid use groups in having higher rates of various SUDs (cocaine, hallucinogen, amphetamine, sedative, and tranquilizer) and from nonopioid 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).

Although 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 (Khantjian, 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 3 distinct groups of opioid users when compared with nonopioid drug users. It also suggests that the 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

TABLE 4. Prevalence of Current (Past-Year) Psychiatric Disorders Among Current Adult Drug Users Aged 18 yr or Older in NESARC (n = 2450)

Current Opioid Use Status, Current Prevalence: Column %	Users of Other Opioid Only* (n = 684), % (SE)	Users of Nonopioid Drugs† (n = 1766), % (SE)	Users of Other Opioid Only vs Users of Nonopioid Drugs‡
Any opioid use disorders	19.5 (2.12)	NA	NA
Alcohol use disorders	44.3 (2.41)	37.2 (1.47)	1.46 (1.16–1.84)
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)	1.31 (1.02–1.69)
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)	2.10 (1.14–3.86)
Amphetamine use disorders	4.4 (0.89)	1.9 (0.43)	2.00 (1.12–3.57)
Tranquilizer use disorders	4.4 (0.99)	1.0 (0.26)	4.03 (1.93–8.41)
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)

Values given in boldface indicate $P < 0.05$.

*Past-year opioid users who had not used heroin, regardless of other drug use.

†Past-year drug users who had not used heroin and other opioids.

‡Data are presented as adjusted odds ratio (95% confidence interval); odds ratios adjusted for sex, age, race/ethnicity, education, total family income, lifetime use of substance abuse treatment, and family history of substance abuse.

SE, standard error; NA, estimates not available; NESARC, National Epidemiologic Survey on Alcohol and Related Conditions.

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, whereas 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 (eg, 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 seem 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

TABLE 5. Quality of Life Scores From SF-12 Version 2 by Past-Year Opioid Use Status Among Adults Aged 18 yr or Older in NESARC (n = 2450)

Quality of Life Scores	Users of Other Opioid Only*	Users of Nonopioid Drugs†	T Test P
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

Data are presented as mean (95% confidence interval).

*Past-year opioid users who had not used heroin, regardless of other drug use.

†Past-year drug users who had not used heroin and other opioids.

NESARC, National Epidemiologic Survey on Alcohol and Related Conditions.

patients in addiction treatment programs (eg, 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 Nonopioid Drug Users

Finally, prior adult studies of opioid users have not included a comparison group of nonopioid drug users. This gap was addressed here by focusing the analysis on past-year disorders and quality of life among past-year drug users. The 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 nonopioid drug users but also reported slightly lower scores on indicators of quality of life in multiple domains (physical disability, physical functioning, physical role, body 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. In addition, the NESARC relies on self-reports, which may be influenced by underreporting and memory errors. Further, the 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 the 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 3 groups based on heroin use status and that these 3 groups have different clinical features. Heroin-other opioid users comprise the most severe subset, whereas 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). In addition, all groups of opioid users have higher rates of several SUDs than nonopioid 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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