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Comparing Characteristics of Prescription Painkiller Misusers and Heroin Users in the United States

Khary K. Rigg, Ph.D. and

Department of Mental Health Law & Policy Louis de la Parte Florida Mental Health Institute University of South Florida

Shannon M. Monnat, Ph.D.

Department of Agricultural Economics, Sociology, and Education Population Research Institute The Pennsylvania State University

Abstract

Introduction—Prescription painkiller misuse (PPM) is a major U.S. public health concern. However, as prescribing practices have tightened and prescription painkillers have become less accessible, many users have turned to heroin as a substitute. This trend suggests the face of heroin users has likely changed over the past several years. Understanding the demographic, socioeconomic, psychosocial, and substance use characteristics of different groups of opiate users is important for properly tailoring interventions.

Methods—This study uses data from the 2010-2013 National Survey on Drug Use and Health to examine differences in characteristics of U.S. adults in three mutually exclusive categories of past-year opiate use: heroin-only (H-O, N=179), prescription painkiller-only (PP-O, N=9,516), and heroin and prescription painkiller (H-PP, N=506).

Results—Socioeconomic disadvantage, older age, disconnection from social institutions, criminal justice involvement, and easy access to heroin were associated with greater odds of being in the H-O group. HH-P users were more likely to be young white males with poor physical and mental health who also misuse other prescription medications and began such misuse as adolescents. PP-O users were the most economically stable, most connected to social institutions, least likely to have criminal justice involvement, and had the least access to heroin.

Conclusions—Results suggest the socio-demographic characteristics of heroin users versus PP misusers vary widely, and the conditions leading to heroin use versus PPM versus both may be different. Ultimately, a one-size-fits-all approach to opiate prevention and treatment is likely to fail. Interventions must account for the unique needs of different user groups.

corresponding author Khary K. Rigg, Ph.D., 13301 Bruce B. Downs Blvd., Tampa, FL 33612, United States, Phone: 813-974-5476, Fax: 813-974-9327, rigg@usf.edu.

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Keywords

heroin; prescription painkiller misuse; opiates; prevention; treatment

Prescription painkiller misuse (PPM) has been rising in the United States (U.S.), becoming an annual economic burden of over $55 billion (Birnbaum et al., 2011). This has led to myriad initiatives aimed at curbing this trend, resulting in small but significant decreases in PPM in recent years (Dart et al., 2015). This drop in PPM, however, has been accompanied by increases in heroin use (Kuehn, 2014), and new heroin initiates have significantly changed the profile of heroin users in the U.S. Compared with previous generations of heroin users, newer initiates are more likely to be white, live in rural areas, and report prior PPM (Cicero et al., 2014). There is also evidence PPM may serve as a gateway to heroin use (Inciardi et al., 2009) with some prescription painkiller (PP) misusers transitioning to heroin once painkillers become too expensive or difficult to acquire (Kuehn, 2013).

In a study of Canadian opiate users, Fischer et al (2008) found prescription painkiller only (PP-O) and mixed heroin/PP (H-PP) users were older than heroin users and more likely to use other illicit and prescription drugs, and PP-O users were more likely than heroin users to be white, employed, non-injectors, and to have physical health problems. However, no similar study has been conducted among opiate users in the U.S.

Given the changing demographics of opiate users and recent increases in opiate use and overdoses in the U.S., more research is needed to understand the psychosocial and demographic profiles of users in order to appropriately inform tailored interventions. This study compared demographic, socioeconomic, criminal justice, clinical, and substance use characteristics between heroin-only (H-O), PP-O, and mixed H-PP users in a nationally representative sample of U.S. adults.

Data and Methods

Data are from the 2010-2013 National Survey on Drug Use and Health (NSDUH). We restricted analyses to respondents who reported past-year PPM and/or heroin use. We grouped adult respondents (18 and older) into three mutually exclusive categories: H-O (N=179), PP-O (N=9,516), and H-PP (N=506) for a total sample of 10,201 adults. The NSDUH defined PPM as use without a prescription from a doctor or use for the feeling or experience caused by the drug. We examined differences in several demographic, socioeconomic, criminal justice, medical/clinical, perceptions of risk, and other substance use characteristics across these groups of users. All variables in the analyses are presented in Table 1.

Analysis

We conducted adjusted Wald tests to determine whether characteristics of H-O users are significantly different from PP-O and H-PP users. We then present results from multinomial logistic regression models predicting associations between each characteristic and odds of being in the PP-O group or H-PP group versus the H-O group. We controlled for all demographic characteristics and other past-year substance use. To account for the NSDUH's

complex sampling design, we used appropriate survey commands in SAS 9.4 that account for survey design effects, including stratification and weight variables.

Results

PP-O was most common, with 4.4% of respondents indicating past-year PPM, but no heroin use. Less than 0.25% reported both past-year PPM and heroin use, and less than 0.10% reported past-year heroin use without PPM. Differences in sample characteristics are presented in Table 1.

Results of multinomial logistic regression analyses are presented in Table 2. The first column (PP-O) compares the odds of being in the PP-O group versus the H-O group as a function of each characteristic. The second column (PP-H) compares the odds of being in the PP-H group versus the H-O group as a function of each characteristic.

First, comparing odds of being in the PP-O versus H-O group, we find PP-O users are younger than H-O users. Hispanics are less likely than whites but Native Americans are more likely than whites to be in the PP-O group. There are no marital status differences between the PP-O and H-O groups, but individuals with children in the household, and those who attend multiple religious services have greater odds of being in the PP-O group versus the H-O group. There are no differences in odds of group membership between rural versus large urban respondents, but small urban respondents are more likely than large urban respondents to be in the PP-O group versus the H-O group. In terms of socioeconomic status, higher education and income, and full-time employment are associated with greater odds of being in the PP-O group versus the H-O group. Among employed respondents, employment in manual labor or sales/service occupation is associated with lower odds of being in the PP-O group. Criminal justice involvement and the perception that heroin is easy to obtain are associated with lower odds of being in the PP-O group. Those who perceive heroin use as risky have over twice the odds of being in the PP-O group. Only one of the medical/clinical characteristics was significant: those who received past-year inpatient mental health treatment had significantly lower odds of being in the PP-O group. Finally, use of tobacco or illicit drugs (other than heroin and marijuana), adolescent initiation of marijuana use, and lifetime injection of heroin or PPs were associated with lower odds of being in the PP-O group, but alcohol consumption and use of other prescription medications were associated with significantly greater odds of being in the PP-O group rather than the H-O group.

There were far fewer differences when comparing odds of being in the H-PP group versus the H-O group. Men were significantly more likely than women, and Hispanics were significantly less likely than whites, to be in the H-PP group. There were no marital status differences, but having children in the household was associated with greater odds of being in the H-PP group. Higher education was associated with greater odds of being in the H-PP group, but there were almost no income or employment status differences between the two groups. The one income category that demonstrated statistical significance ($30,000-39,999) represents a “working-poor” category that is below the median U.S. household income but above poverty thresholds (U.S. Census Bureau, 2014). This group had nearly five times

greater odds of being in the H-PP group. Manual laborers had significantly lower odds than professional/white collar workers of being in the H-PP group. In terms of clinical characteristics, individuals who were treated in the ED and those who experienced psychological distress were more likely to be in the H-PP group. Finally, individuals who reported any prescription medication misuse (other than PP) and those who reported adolescent initiation of prescription medication misuse or heroin use had significantly greater odds of being in the H-PP group versus the H-O group.

Discussion

This is the first study to use nationally representative data to compare characteristics of distinct categories of opiate users in the U.S. Consistent with steep increases in PPM prevalence across the U.S. over the past 20 years, the PP-O group (n=9,516) was much larger than the H-O (n=179) and H-PP (n=506) groups. The large size of the PP-O group suggests a very small proportion of illicit opiate users concurrently use street and pharmaceutical-grade opiates. Rather, the vast majority of persons who use opiates illicitly use *either* heroin or PP but show a strong preference for PP. This is consistent with other studies suggesting users favor PP over heroin because pills are perceived to be safer, less stigmatized, and are of known potency and purity (Rigg & Murphy, 2013).

The profiles of these user groups were distinct in several important ways. First, the H-O group was the most marginalized and disconnected from social institutions, mirroring the traditional urban street-based profile of heroin users (Richardson et al., 2015). H-O users were the most socioeconomically disadvantaged, least likely to be white, least likely to have children living with them, least connected to religious services, least physically healthy, and most likely to live in large urban communities where heroin is easily accessible. Although we are unable to establish the mechanisms for these associations, treatment providers should be mindful of this institutional disconnectedness among H-O users. Strong bonds to social institutions (i.e., religion, work, family) decrease substance use risk and are linked to favorable treatment outcomes (Ford, 2009; Richard, Bell & Carson, 2000). Clinicians should assess whether their clients are H-O only users as this may signal a greater degree of social isolation and disconnectedness.

Next, the H-PP group performed the worst on several health-related indicators. This group was particularly burdened by mental health problems and had the highest rates of ED usage. They are also heavy poly-substance users and the group mostly likely to be intravenous drug users. Importantly, the H-PP group was most likely to have started using all substances as adolescents. This is consistent with prior research demonstrating when substance use is initiated in adolescence, the likelihood of more serious substance abuse problems increases dramatically (McCabe et al., 2007). Accordingly, it is not sufficient for clinicians to inquire about only one type of opiate use. Monitoring concurrent heroin and PPM is clinically warranted. Indeed, our results suggest concurrent use of heroin and PP may signal a more serious substance abuse problem with potentially worse health outcomes than H-O and PP-O, including greater risk of having a co-occurring mental disorder, an overdose, and/or HIV due to administering opiates intravenously.

Additionally, our analyses revealed that the heroin groups (both H-O and PP-H) had the most criminal justice system involvement. This is consistent with Fischer et al. (2008) who suggest illicit activities (e.g., drug sales, theft) may be motivated by the desire to purchase heroin. Our results also suggest criminality among the heroin groups may be driven by less opportunity for legitimate income generation due to poor education and unemployment. This is important as it highlights which groups may have the greatest societal impact and burden on criminal justice resources.

Our findings related to characteristics of H-PP users are consistent with those of Cicero et al. (2014), who found the sociodemographic composition of heroin users has shifted from an inner-city, minority-centered problem to one that has a more widespread geographic and demographic distribution involving young white men living in small urban and rural areas. These consistencies are important given that Cicero et al. relied on a sample of individuals seeking treatment for heroin use, and our sample includes users who may or may not have sought treatment for heroin.

Finally, the PP-O group is the most connected to social institutions (marriage, religion, employment). They are also the least socioeconomically disadvantaged, have the least criminal justice involvement, and best physical and mental health indicators. They are the least likely to engage in poly-substance use and the least likely to have initiated substance use as adolescents. Future research employing panel study designs should examine whether PP-O (without heroin) leads to less adverse outcomes among users, or if PPM simply attracts users who are healthier and less marginalized. Lack of access to heroin may play a role in engaging in PPM only (Rigg & Murphy, 2013); we found the PP-O group is the least likely to live in large urban areas where heroin is most accessible and the least likely to report that heroin was easy to obtain. As the flow of heroin into small cities and rural areas increases, it is important to monitor whether there are increases in concurrent heroin and PP use among previous PP-O users.

Results should be considered in light of some methodological limitations. First, given the cross-sectional nature of the data, we cannot draw causal inferences about the mechanisms leading individuals to engage in one type of substance abuse versus another. Second, the self-report may be subject to under-reporting and/or recall bias. Finally, research suggests a growing proportion of persons who engage in PPM transition to heroin (Keuhn, 2014). Therefore, it is possible that the H-PP group may represent users in a “transition phase” of opiate use. Future data collection should include heroin and PP items in longitudinal studies, enabling the tracking of individuals and their patterns of use over time.

We hope the results of this study serve as a starting point for examining pathways into both heroin use and PPM. Though correlational, our results suggest not all opiate use is created equal, and a one-size-fits-all approach to the opiate abuse problem is likely to fail. Depending on the combination of opiates taken, user characteristics and outcomes can vary widely. Interventions must account for the unique needs of these different user groups to enhance effectiveness.

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Highlights

- We compared the characteristics of three distinct types of illicit opiate users
- Depending on the types of opiates taken, user characteristics/outcomes vary widely
- Interventions must account for the unique needs of these groups to enhance effectiveness
- This study serves as a starting point for examining pathways into heroin/painkiller use

Table 1

Sample Characteristics and Differences in Proportions between H-O users, PP-O users and H-PP users, N=10,201

	H-O N=179	PP-O N=9,516	p[a]	H-PP N=506	p[b]
Demographic Characteristics					
Age					
18-25	27.3 (3.9)	32.8 (0.8)	0.167	**42.4 (3.5)**	**0.005**
26-34	31.5 (5.9)	26.4 (0.8)	0.394	32.7 (3.7)	0.864
35-49	24.2 (4.3)	24.4 (0.9)	0.974	17.2 (3.1)	0.188
50 or older	17.0 (5.5)	16.4 (0.9)	0.919	7.7 (3.1)	0.133
Sex = Male	57.8 (5.8)	55.3 (1.1)	0.681	**74.7 (2.6)**	**0.010**
Race/Ethnicity					
Non-Hispanic White	57.8 (5.9)	**69.6 (0.9)**	**0.049**	**83.5 (2.8)**	**<.001**
Non-Hispanic Black	16.0 (3.8)	9.9 (0.7)	0.098	**6.7 (2.0)**	**0.038**
Hispanic	22.2 (5.6)	15.3 (0.7)	0.224	**7.3 (1.9)**	**0.016**
Native American/Alaskan Native	0.1 (0.01)	**0.9 (0.1)**	**<.001**	0.5 (0.3)	0.238
Asian	0.2 (0.2)	**2.2 (0.3)**	**<.001**	0.2 (0.2)	0.986
Mixed Race and Other	3.8 (3.2)	2.0 (0.2)	0.575	1.8 (0.8)	0.549
Marital Status					
Married	15.3 (4.6)	**31.6 (1.0)**	**<.001**	10.9 (2.4)	0.374
Divorced, Separated, Widowed	17.1 (4.7)	15.7 (0.8)	0.781	16.1 (2.6)	0.833
Never Married	67.7 (5.5)	**52.6 (1.0)**	**0.009**	73.0 (2.7)	0.362
Number of People in Household	3.3 (0.03)	3.3 (0.02)	0.144	**3.5 (0.13)**	**0.015**
Children in Household	18.8 (3.8)	**43.3 (0.9)**	**<.001**	**33.6 (3.5)**	**0.005**
Religious Service Attendance					
No religious services in past 12 mths	59.7 (5.7)	**47.5 (0.9)**	**0.047**	56.1 (3.7)	0.591
1-5 religious services in past 12 mths	21.6 (4.1)	26.1 (0.6)	0.270	32.2 (3.8)	0.065
6-24 religious services in past 12 mths	16.0 (4.6)	11.6 (0.5)	0.338	**5.4 (1.5)**	**0.029**
more than 24 rel. svcs in past 12 mths	2.7 (1.2)	**14.8 (0.7)**	**<.001**	**6.4 (1.9)**	**0.073**
Population Density					
Large Urban	69.7 (5.3)	**51.8 (0.9)**	**0.001**	**55.0 (3.5)**	**0.017**
Small Urban	26.1 (4.5)	**43.1 (0.9)**	**<.001**	**41.9 (3.3)**	**0.004**
Rural	4.3 (1.7)	5.1 (0.5)	0.597	3.1 (1.2)	0.568
Socioeconomic Status					
Educational Attainment					
Less than high school	39.7 (5.9)	**16.8 (0.6)**	**<.001**	**17.8 (2.1)**	**<.001**
High school graduate/some college	58.0 (6.0)	61.3 (1.0)	0.593	**76.1 (2.6)**	**0.003**
Bachelor's degree or higher	2.4 (1.4)	**21.9 (0.8)**	**<.001**	6.1 (1.6)	0.075
Family Income					
Less than $10,000	32.6 (6.3)	**10.2 (0.5)**	**<.001**	18.4 (3.1)	0.056
$10,000-19,999	25.1 (5.3)	14.3 (0.7)	0.051	16.7 (2.5)	0.159
$20,000-29,999	11.3 (2.8)	13.5 (0.8)	0.433	13.8 (3.2)	0.553

	H-O N=179	PP-O N=9,516	p[a]	H-PP N=506	p[b]
$30,000-39,999	2.4 (0.8)	**11.7 (0.7)**	**<.001**	**8.4 (2.2)**	**0.010**
$40,000-49,999	7.9 (2.6)	10.5 (0.5)	0.332	10.7 (2.9)	0.499
$50,000-74,999	9.0 (2.1)	**15.6 (0.6)**	**0.003**	12.5 (2.0)	0.242
$75,000 or more	11.7 (4.1)	**24.3 (0.8)**	**0.004**	19.6 (2.8)	0.109
SNAP/TANF in past year	59.6 (5.7)	**29.0 (0.7)**	**<.001**	47.9 (3.4)	0.072
Employment Status					
Employed full time	27.3 (5.2)	**52.4 (0.9)**	**<.001**	33.3 (4.2)	0.416
Employed part time	22.1 (4.5)	16.9 (0.6)	0.255	22.4 (3.3)	0.954
Unemployed	21.1 (4.9)	13.4 (0.6)	0.129	26.4 (3.2)	0.372
Disabled	20.9 (5.0)	6.2 (0.6)	0.006	**9.5 (2.6)**	**0.027**
In school	4.2 (1.7)	4.1 (0.3)	0.961	4.8 (1.6)	0.834
Retired, homemaker, or other	4.5 (2.2)	6.9 (0.6)	0.299	3.6 (1.3)	0.749
Type of Occupation					
Manual Labor	25.4 (5.6)	16.8 (0.8)	0.131	16.5 (2.5)	0.154
Sales and service	14.8 (3.3)	**21.4 (0.6)**	**0.050**	**23.7 (3.1)**	**0.046**
Professional/white collar	2.1 (1.6)	**17.5 (0.9)**	**<.001**	7.0 (2.1)	0.080
Office work - support/technician	8.0 (4.2)	11.2 (0.6)	0.467	7.5 (2.1)	0.903
Not employed	49.7 (6.3)	**30.0 (0.9)**	**0.003**	43.9 (3.6)	0.466
Criminal Justice Involvement					
Ever arrested and booked	67.1 (4.8)	**38.3 (1.0)**	**<.001**	71.4 (3.4)	0.506
Currently on probation or parole	22.2 (5.0)	**7.7 (0.3)**	**0.005**	29.9 (3.5)	0.212
Perceptions of Access and Risk					
Very/fairly easy to get heroin	82.3 (4.6)	**21.4 (0.7)**	**<.001**	81.0 (2.4)	0.784
Approached by someone selling illicit drugs in past 30 days	46.5 (5.3)	**26.6 (0.8)**	**<.001**	**66.2 (3.8)**	**0.004**
Great risk to trying heroin once or twice	53.9 (5.3)	**75.7 (0.8)**	**<.001**	54.0 (3.9)	0.995
Medical/Clinical					
Has health insurance	60.5 (5.7)	**73.7 (0.8)**	**0.025**	60.0 (3.5)	0.945
Poor/fair self-rated health	31.9 (6.2)	**14.5 (0.7)**	**0.007**	**16.6 (2.7)**	**0.021**
Treated in ED at least once in past year	40.1 (5.0)	40.8 (0.9)	0.893	**51.9 (3.8)**	**0.047**
Overnight hospitalization in past year	21.4 (4.8)	**11.4 (0.6)**	**0.039**	21.7 (3.1)	0.953
Inpatient MH treatment in past year	11.9 (4.3)	**2.0 (0.2)**	**0.027**	9.6 (2.7)	0.653
Outpatient MH treatment in past year	16.9 (4.3)	12.1 (0.6)	0.278	18.6 (2.7)	0.752
Major depressive episode in past year	23.8 (5.3)	15.8 (0.6)	0.138	28.9 (3.3)	0.365
Received treatment, counseling, or Rx for depression in past year	22.3 (4.8)	15.0 (0.7)	0.120	27.3 (3.8)	0.382
Took Rx to treat mental/emotional problem in past year	25.1 (4.8)	21.1 (0.7)	0.420	32.6 (3.9)	0.232
Psychological distress in past year	38.4 (6.3)	27.7 (0.7)	0.086	**58.7 (3.3)**	**0.009**
Suicide ideation/attempt in past year	13.3 (3.1)	11.9 (0.6)	0.639	**27.4 (3.6)**	**0.006**
Other Substance use in Past Year					
Tobacco	96.0 (1.9)	**66.6 (1.1)**	**<.001**	96.8 (0.9)	0.722
Alcohol	69.3 (6.6)	**88.3 (0.7)**	**0.005**	**91.4 (2.4)**	**0.003**

	H-O N=179	PP-O N=9,516	p[a]	H-PP N=506	p[b]
Marijuana	63.4 (5.7)	**50.3 (1.0)**	**0.027**	**82.4 (2.2)**	**0.002**
Any illicit drugs except heroin and marijuana	62.2 (5.0)	**25.2 (0.7)**	**<.001**	**79.4 (3.1)**	**0.005**
Any prescription drugs except painkillers	31.1 (6.0)	33.3 (0.9)	0.704	**72.5 (3.4)**	**<.001**
Age of First Substance Use					
Cigarettes					
Non-user or non-daily user	12.5 (2.7)	**43.1 (0.8)**	**<.001**	11.3 (2.1)	0.737
Daily use started at age 18 or older	21.5 (4.7)	24.2 (0.8)	0.560	26.0 (3.2)	0.377
Daily use started before age 18	66.0 (4.9)	**32.7 (0.8)**	**<.001**	62.7 (3.3)	0.545
Alcohol					
Never used	8.5 (5.0)	4.1 (0.4)	0.377	1.4 (1.2)	0.177
Use started at age 18 or older	8.4 (2.6)	**19.7 (0.9)**	**<.001**	3.4 (1.3)	0.112
Use started before age 18	83.1 (5.3)	76.2 (0.9)	0.186	**95.2 (1.8)**	**0.046**
Marijuana					
Never used	4.6 (2.5)	**19.5 (0.7)**	**<.001**	1.2 (0.8)	0.215
Use started at age 18 or older	7.0 (2.5)	**21.1 (0.8)**	**<.001**	7.4 (1.5)	0.891
Use started before age 18	88.4 (3.4)	**59.4 (1.0)**	**<.001**	91.4 (1.7)	0.432
Illicit Drugs other than Heroin and Marijuana					
Never used	2.9 (1.2)	**36.7 (0.9)**	**<.001**	1.6 (0.6)	0.336
Use started at age 18 or older	38.3 (5.8)	28.5 (0.8)	0.102	**22.0 (2.4)**	**0.011**
Use started before age 18	58.7 (5.8)	**34.8 (0.9)**	**<.001**	**76.4 (2.5)**	**0.006**
Prescription Drugs except Painkillers					
Never used	29.8 (5.4)	40.4 (0.8)	0.052	**10.5 (2.3)**	**0.001**
Use started at age 18 or older	36.3 (5.6)	39.1 (0.8)	0.618	33.2 (3.5)	0.634
Use started before age 18	33.9 (4.9)	**20.6 (0.7)**	**0.008**	**56.3 (3.5)**	**<.001**
Prescription Painkiller or Heroin Use					
Use started before age 18	39.3 (5.6)	30.3 (0.7)	0.121	**59.4 (3.7)**	**0.001**
Drug Injection					
Ever injected heroin	51.7 (6.1)	**3.6 (0.4)**	**<.001**	59.3 (3.6)	0.303
Ever injected prescription painkiller	14.0 (3.0)	**2.3 (0.3)**	**<.001**	**27.3 (3.3)**	**0.006**
Ever inject either heroin or Rx painkiller	51.8 (6.1)	**4.7 (0.4)**	**<.001**	61.0 (3.5)	0.211

Two-tailed difference of proportions/means Wald tests; weighted

[a] p-value for difference between H-O and PP-O

[b] p-value for difference between H-O and H-PP

bolded values indicate statistically significant difference from H-O at p<.05

Table 2

Unadjusted Odds Ratios and 95% CIs from Multinomial Logistic Regression for Factors Associated with H-O use vs. PP-O use and H-PP use (N=10,201)

	PP-O vs. H-O				H-PP vs. H-O			
	OR	**95% CIs**		**p-values**	**OR**	**95% CIs**		**p-values**
Demographic Characteristics								
Age								
18-25 (ref)								
26-34	**0.485**	**0.260**	**0.905**	**0.023**	0.694	0.339	1.421	0.318
35-49	**0.354**	**0.203**	**0.617**	**<.001**	0.538	0.269	1.074	0.079
50 or older	0.359	0.105	1.226	0.102	0.534	0.112	2.544	0.431
Sex (female=ref)	1.279	0.804	2.037	0.299	**2.287**	**1.337**	**3.909**	**0.003**
Race/Ethnicity								
Non-Hispanic White (ref)								
Non-Hispanic Black	0.644	0.332	1.249	0.193	0.493	0.188	1.290	0.150
Hispanic	**0.510**	**0.289**	**0.900**	**0.020**	**0.235**	**0.106**	**0.520**	**<.001**
Native American/Alaskan Native	**10.258**	**2.060**	**51.080**	**0.005**	3.457	0.409	29.200	0.255
Asian	7.755	0.804	74.763	0.076	0.809	0.045	14.438	0.885
Mixed Race and Other	1.008	0.324	3.138	0.988	0.653	0.152	2.806	0.567
Marital Status								
Married (ref)								
Divorced, Separated, Widowed	0.779	0.322	1.884	0.580	1.692	0.641	4.471	0.289
Never Married	0.668	0.302	1.476	0.319	1.173	0.446	3.084	0.747
Number of People in Household	0.825	0.663	1.027	0.086	1.028	0.812	1.301	0.817
Children in Household	**3.491**	**1.654**	**7.367**	**0.001**	**2.745**	**1.229**	**6.127**	**0.014**
Religious Service Attendance in past 12 months								
No religious services (ref)								
1-5 religious services	1.727	0.952	3.133	0.072	1.925	0.951	3.898	0.069
Attended 6-24 religious services	0.699	0.384	1.271	0.240	**0.389**	**0.175**	**0.864**	**0.020**
Attended more than 24 religious services	**3.512**	**1.218**	**10.127**	**0.020**	2.656	0.863	8.175	0.089
Population Density								
Large Urban (large)								

	PP-O vs. H-O				H-PP vs. H-O			
	OR	**95% CIs**		**p-values**	**OR**	**95% CIs**		**p-values**
Small Urban	**1.891**	**1.160**	**3.083**	**0.011**	1.663	0.990	2.793	0.055
Rural	1.658	0.752	3.658	0.210	0.839	0.296	2.375	0.740
Socioeconomic Status								
Educational Attainment								
Less than high school (ref)								
High school graduate/some college	**1.858**	**1.062**	**3.252**	**0.030**	**2.536**	**1.440**	**4.465**	**0.001**
Bachelor's degree or higher	**15.355**	**4.225**	**55.798**	**<.001**	**4.956**	**1.228**	**19.995**	**0.025**
Family Income								
Less than $10,000 (ref)								
$10,000-19,999	1.740	0.798	3.793	0.164	1.242	0.499	3.093	0.642
$20,000-29,999	**3.144**	**1.408**	**7.019**	**0.005**	1.957	0.725	5.281	0.185
$30,000-39,999	**9.593**	**3.956**	**23.261**	**<.001**	**4.807**	**1.680**	**13.757**	**0.003**
$40,000-49,999	**3.511**	**1.436**	**8.586**	**0.006**	2.381	0.770	7.365	0.132
$50,000-74,999	**3.277**	**1.590**	**6.753**	**0.001**	2.144	0.829	5.544	0.116
$75,000 or more	**4.341**	**1.664**	**11.326**	**0.003**	2.239	0.758	6.611	0.145
Government assistance in past year	**0.324**	**0.182**	**0.576**	**<.001**	0.783	0.404	1.516	0.467
Employment Status								
Employed full time (ref)								
Employed part time	**0.498**	**0.272**	**0.912**	**0.024**	0.737	0.324	1.673	0.465
Unemployed	**0.470**	**0.236**	**0.939**	**0.032**	1.002	0.429	2.341	0.997
Disabled	**0.346**	**0.124**	**0.962**	**0.042**	0.851	0.291	2.490	0.768
In school	0.534	0.222	1.288	0.163	0.673	0.185	2.448	0.548
Retired, homemaker, or other	0.565	0.222	1.288	0.397	1.159	0.192	6.985	0.872
Type of Occupation								
Professional/white collar (ref)								
Manual Labor	**0.077**	**0.016**	**0.381**	**0.002**	**0.128**	**0.024**	**0.697**	**0.017**
Sales and service	**0.194**	**0.038**	**0.990**	**0.049**	0.352	0.057	2.179	0.262
Office work - support/technician	0.150	0.019	1.186	0.072	0.225	0.024	2.072	0.188
No Job	**0.093**	**0.018**	**0.477**	**0.004**	0.259	0.042	1.573	0.142
Criminal Justice Involvement								

	PP-O vs. H-O				H-PP vs. H-O			
	OR	95% CIs		p-values	OR	95% CIs		p-values
Ever arrested and booked	**0.405**	**0.272**	**0.604**	**<.001**	0.881	0.489	1.587	0.673
Currently on probation or parole	**0.418**	**0.242**	**0.720**	**0.002**	1.087	0.546	2.164	0.813
Perceptions of Access and Risk								
Very/fairly easy to get heroin	**0.067**	**0.039**	**0.114**	**<.001**	0.869	0.475	1.591	0.650
Approached by someone selling illicit drugs in past 30 days	0.685	0.416	1.129	0.138	1.615	0.884	2.951	0.119
Great risk to trying heroin once or twice	**2.316**	**1.502**	**3.572**	**<.001**	1.114	0.656	1.894	0.689
Medical/Clinical								
Has health insurance	1.545	0.999	2.389	0.050	1.106	0.626	1.954	0.728
Poor/fair self-rated health	0.548	0.265	1.132	0.104	0.709	0.353	1.424	0.334
Treated in ED at least once in past year	1.239	0.819	1.876	0.310	**1.856**	**1.130**	**3.046**	**0.015**
Overnight inpatient treatment in hospital in past year	0.660	0.373	1.169	0.154	1.413	0.729	2.740	0.306
Inpatient mental health treatment in past year	**0.307**	**0.146**	**0.644**	**0.002**	1.005	0.456	2.216	0.990
Outpatient mental health treatment in past year	0.737	0.452	1.201	0.220	1.164	0.634	2.138	0.624
Major depressive episode in past year	0.774	0.441	1.360	0.373	1.460	0.792	2.692	0.226
Received treatment, counseling, or Rx for depression in past year	0.705	0.421	1.178	0.182	1.627	0.837	3.160	0.151
Took Rx to treat mental/emotional problem in past year	0.731	0.423	1.263	0.262	1.359	0.717	2.576	0.348
Psychological distress in past year	0.876	0.537	1.428	0.596	**2.668**	**1.495**	**4.759**	**<.001**
Suicide ideation/attempt in past year	0.959	0.539	1.706	0.887	1.942	0.976	3.862	0.059
Other Substance use in Past Year								
Tobacco	**0.087**	**0.028**	**0.264**	**<.001**	0.591	0.164	2.130	0.421
Alcohol	**6.923**	**3.394**	**14.122**	**<.001**	2.290	0.852	6.159	0.106
Marijuana	0.719	0.414	1.246	0.240	0.974	0.544	1.742	0.928
Any illicit drugs except heroin and marijuana	0.190	0.110	0.329	<.001	1.112	0.552	2.242	0.766
Any prescription drugs except painkillers	1.904	1.107	3.274	0.020	**4.915**	**2.519**	**9.591**	**<.001**
Age of First Substance Use								
Cigarettes								
Non-user or non-daily user (ref)								
Daily use started at age 18 or older	**0.345**	**0.190**	**0.625**	**<.001**	0.997	0.462	2.155	0.995
Daily use started before age 18	**0.132**	**0.079**	**0.222**	**<.001**	0.580	0.280	1.198	0.141
Alcohol								

	PP-O vs. H-O				H-PP vs. H-O			
	OR	**95% CIs**		**p-values**	**OR**	**95% CIs**		**p-values**
Never used (ref)								
Use started at age 18 or older	**5.337**	**1.118**	**25.481**	**0.036**	1.245	0.163	9.521	0.833
Use started before age 18	2.646	0.625	11.198	0.186	2.002	0.248	16.145	0.514
Marijuana								
Never used (ref)								
Use started at age 18 or older	0.440	0.095	2.037	0.294	1.125	0.139	9.107	0.912
Use started before age 18	**0.117**	**0.031**	**0.441**	**0.002**	0.690	0.097	4.898	0.711
Illicit Drugs exc. marijuana and heroin								
Never used (ref)								
Use started at age 18 or older	**0.042**	**0.015**	**0.116**	**<.001**	0.346	0.101	1.187	0.092
Use started before age 18	**0.029**	**0.011**	**0.074**	**<.001**	0.577	0.174	1.912	0.368
Prescription Drugs exc. Painkillers								
Never used (ref)								
Use started at age 18 or older	1.083	0.631	1.858	0.773	1.722	0.776	3.820	0.181
Use started before age 18	0.759	0.414	1.392	0.373	**2.950**	**1.399**	**6.029**	**0.004**
Prescription Painkiller or Heroin use before age 18	0.784	0.497	1.236	0.295	**1.799**	**1.060**	**3.054**	**0.030**
Drug Injection								
Ever injected heroin	**0.033**	**0.018**	**0.059**	**<.001**	1.101	0.535	2.268	0.794
Ever injected prescription painkiller	**0.202**	**0.106**	**0.385**	**<.001**	1.905	0.876	4.143	0.104
Ever inject either heroin or prescription painkiller	**0.041**	**0.023**	**0.074**	**<.001**	1.106	0.534	2.291	0.786

Note: Two-tailed tests; bolded values indicate statistical significant at p<0.05

All models control for socioeconomic status characteristics and other substance use in the past year