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Sources of Prescription Medication Misuse among Young Adults in the United States: The Role of Educational Status

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Abstract

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Objectives—This study examined prescription drug misuse (PDM), sources of PDM and substance use disorder (SUD) symptoms as a function of educational status among U.S. young adults based on a large nationally representative sample.

Methods—Data from the 2009–2014 National Survey on Drug Use and Health came from a sample of 106,845 young adults aged 18–25 years. Respondents were categorized by educational status and PDM, sources of PDM, other substance use, and SUD symptoms, with analyses performed separately for prescription opioids, stimulants and sedatives/tranquilizers.

Results—Prescription opioid (past-year: 11.9%) and sedative/tranquilizer (past-year: 5.8%) misuse were most prevalent among young adults not attending college, especially among high school dropouts. In contrast, full-time college students and college graduates had the highest rates of prescription stimulant misuse (past-year: 3.9 and 4.3%, respectively). Obtaining prescription medications from friends/relatives for free was the most common source of PDM, especially among college students/graduates. Prescription drug misusers who obtained medications from theft/fake prescriptions, purchases or multiple sources were more likely to report past-year SUDs and had the most severe overall risk profile of concurrent substance use and SUD. More than 70% of past-month prescription drug misusers who reported multiple sources for PDM had at least one past-year SUD.

Conclusions—Sources of PDM vary by educational status among U.S. young adults and the college environment is associated with sharing prescription medications. Clinicians can help assess an individual's risk for SUD by determining whether the individual engaged in PDM and the source of prescription medication the individual is misusing.

Keywords

prescription drug; diversion; young adult; substance use disorder; epidemiology

INTRODUCTION

Young adults aged 18–25 have the highest rates of prescription drug misuse (PDM) in the U.S.¹ For the present study, PDM is defined as using prescription opioids, stimulants or sedatives/tranquilizers that were not prescribed to the young adult or that were taken only for the experience or feeling they caused. More than one in every seven young adults has misused prescription opioids, stimulants, or sedatives/tranquilizers in the past-year.¹ While there is evidence that the medical and nonmedical use of prescription opioids has declined in recent years among adolescents and young adults, opioid-related adverse consequences such as emergency department visits and overdose deaths continue to rise.^{2–4}

Prescription stimulant misuse is more prevalent among traditional-aged college students than their non-college peers.^{5–7} For instance, more than one in every seven (14.8%) U.S. college males reported nonmedical use of Adderall® relative to 7.4% of same-age young adult males not attending college.⁶ In contrast, young adults not attending college have higher prevalence rates of opioid and sedative/tranquilizer misuse than college students.⁶ Adult college graduates have lower rates of opioid use disorder, and, in those with treated ADHD, lower prescription stimulant misuse rates.^{7–9} Despite differences in the prevalence of PDM

between young adult student and non-student populations, the majority of research has focused on student samples.

Young adults often assume greater responsibility for their own medication management during the transition from adolescence to young adulthood, and this leads to greater availability of prescription drugs and diversion involving peers.^{6,10–12} Prescription medication diversion is most prevalent among young adults prescribed stimulant medications followed by prescription opioids and prescription sedatives/tranquilizers.^{12–14} At least one college-based study found that the majority of prescribed users of stimulant medications had been approached to share their medication¹⁴ while another college-based study found that 62% of prescribed users of stimulant medications had shared their medications at least once in their lifetimes.¹³

There are a few studies that examined sources of PDM among young adults,^{10,13,15–17} and there is growing evidence that PDM differs by geographical region and educational attainment.^{5–7,16} Regional college-based studies have found the most common source of PDM across all prescription drug classes was from a friend or peer.^{10,15,17} Moreover, no research has assessed whether sources of PDM differ by educational status among young adults. This lack of knowledge significantly limits the potential for targeted prevention and treatment program development, especially for those not currently in school.

Based on previous studies, we hypothesized the following: (1) prescription opioid and sedative/tranquilizer misuse would be most prevalent among young adults not in college while prescription stimulant misuse would be most prevalent among young adults in college; (2) obtaining prescription medications from friends/relatives for free would be most prevalent among young adults in college; and (3) young adults who had multiple sources for PDM would have the most severe risk profile of concurrent substance use and substance use disorders.

METHODS

Design and sample

This study examined data collected between 2009 and 2014 as part of the National Survey on Drug Use and Health (NSDUH). The NSDUH used an independent, multistage area probability sample for all states and DC to produce nationally representative data. Interviews began with audio computer-assisted self-interviewing questions on sensitive variables such as PDM; audio computer-assisted self-interviewing was employed to ensure privacy and promote honest reporting and data completeness. The weighted screening and weighted full interview response rates for the NSDUH were both consistently above 80% and 70%, respectively. This study was deemed exempt by an institutional review board. Details regarding NSDUH methodology are available elsewhere.¹⁸

For 2009–2014, a total of 106,845 unweighted young adults completed the NSDUH. The weighted sample was 50.3% male, 50.3% White, 14.2% African-American, and 20.2% Hispanic/Latino.

Measures

Educational status among young adults aged 18–25 years of age were categorized as follows: (1) still in high school (HS); (2) in college (full-time or part-time); (3) college graduate; (4) not in college (HS graduate or HS drop-out).

Prescription drug misuse (PDM) was assessed by asking respondents a series of questions regarding misuse of prescription opioids, stimulants, and sedatives/tranquilizers in their lifetime that was not prescribed to the respondent (e.g., nonmedical misuse) or that they took only for the experience or feeling it caused (e.g., medical misuse). These questions were preceded by definitional information explaining to respondents that the study was not interested in their use of over-the-counter medications such as aspirin, Tylenol®, or Advil® that can be bought in drug stores or grocery stores without a doctor's prescription. To aid recall, individual drug names were used, and respondents were shown pill cards containing pictures of common medications. Respondents who reported lifetime PDM were asked a series of follow-up questions regarding past-year and past-month PDM.

Sources of PDM was assessed by asking respondents who endorsed PDM within the opioids, stimulants and sedative/tranquilizer drug classes several follow-up questions regarding the most recent source for the medication they misused. Only those who endorsed past 30-day PDM were queried as to their most recent source of medication for PDM. The response options for most recent source for PDM were categorized as follows: (1) physician (“got from one doctor” or “got from more than one doctor”), (2) stole/fake prescription (“took from friend or relative without asking,” “wrote fake prescription,” or “stole from doctor's office, clinic, hospital, or pharmacy”), (3) free from friend or relative (“got from friend or relative for free”), (4) purchased (“bought from friend or relative,” “bought from drug dealer or other stranger,” or “bought on the internet”), and (5) other source (“got some other way”).

Concurrent substance use included past-month binge drinking (i.e., 5 or more drinks on the same occasion at the same time or within a couple of hours of each other) and past-month marijuana use. The frequency of past-month binge drinking and marijuana use ranged from 0 days to 30 days.

Substance use disorder (SUD) was assessed using past-year DSM-IV symptoms for substance abuse and substance dependence for each of the prescription drug classes separately (prescription opioids, stimulants, and sedatives/tranquilizers) as well as each of the other substances separately alcohol, cannabis, cocaine, methamphetamine, heroin, hallucinogens, and inhalants.^{19,20} For this study, “any SUD” was defined as respondents who met substance abuse or dependence criteria for at least one of the above-mentioned substances.

Data Analysis

The NSDUH data were weighted, clustered on primary sampling units, and stratified appropriately. The Taylor series approximation was used, with adjusted degrees of freedom, to create robust variance estimates. Also, all analyses occurred separately by medication class, with prescription sedatives and tranquilizers aggregated, per previous studies^{21,22} due

to low base rates of sedative PDM, shared pharmacological agents between sedative and tranquilizer classes, and to be consistent with the DSM classification.^{19,20} Initial analyses employed weighted cross-tabulations to estimate prevalence and 95% confidence intervals (95% CIs) of any lifetime and past-year PDM (by class) and the sources of PDM variables of interest by educational status. Primary analyses used design-based Rao-Scott chi-square tests of homogeneity to analyze differences by educational status characteristics in young adults.²³ When the initial chi-square test was significant, post-hoc pairwise comparisons using design-based logistic regression were employed adjusting for age, sex and race, with p-values Bonferroni corrected for multiple comparisons. Analyses were performed in Stata 15.0 (StataCorp, 2017).

RESULTS

As shown in Table 1, PDM and SUD among young adults differed as a function of educational status, and varied by prescription drug class. For prescription opioids and prescription sedatives/tranquilizers, misuse was most prevalent among young adults not in high school or college. Similarly, past-year prescription opioid use disorder and sedative/tranquilizer use disorder were most prevalent in those not in college, with significant differences as compared to either college graduates or those in college full-time after controlling for age, sex and race/ethnicity.

For prescription stimulants, college graduates and full-time college students had the highest rates of lifetime and past-year prescription stimulant misuse, respectively. However, past-year prescription stimulant use disorder was significantly more prevalent in those not in college, after controlling for age, sex and race/ethnicity. For *any* past-year prescription drug use disorder, college graduates reported the lowest rates while high school dropouts or non-college students reported the highest rates. Similarly, young adults neither in high school nor college reported the highest rates of any SUD, prescription drug dependence, and any substance dependence.

We conducted additional analyses and found that past-month prescription drug misusers were significantly more likely to report any past-year SUD than those who did not report past-month PDM (PDM=59.6% [95% CI=57.8%–61.3%] vs. non-PDM=16.4% [16.1%–16.7%], $p<0.0001$). Additional analyses revealed high school dropouts reported the highest rates for any past-year SUD while young adults attending high school reported the lowest rates.

As illustrated in Table 2, the most prevalent individual mutually exclusive sources of PDM was friends or relatives who gave them for free, followed by purchased. There were some important differences in sources of PDM as a function of educational status. Most notably, prescription drug misusers in college were generally more likely to obtain medications for free from friends/relatives than those not in college, and college graduates and young adults in high school were less likely to make purchases than those not in college. We conducted additional analyses examining non-mutually exclusive sources across six categories of young adults and also found the most prevalent source of PDM were friends or relatives who

gave them for free while the lowest prevalence (1% or less) were purchased on the Internet and fake a prescription (see Supplementary eTable 1).

As illustrated in Table 3, prescription drug misusers who obtained medications from multiple sources, purchased them, or used theft/fake prescriptions had the highest prevalence rates of substance-specific SUDs, any SUDs, and any substance dependence. In addition, prescription drug misusers who only obtained medications from a friend/relative for free tended to have the lowest prevalence rates of substance-specific SUDs, any SUDs, and any substance dependence. Notably, more than 70% of past-month prescription drug misusers who reported multiple sources for PDM had a past-year SUD.

As shown in Table 4, we examined binge drinking, marijuana use, drug-specific SUD, any SUD, and any substance dependence as a function of source of PDM. Prescription drug misusers who purchased medications had significantly elevated odds of past-month binge drinking across medication classes and those who purchased opioids or sedative/tranquilizers also had elevated odds of past-month marijuana use and a past-year substance dependence diagnosis, relative to those who obtained from a physician. Finally, opioid purchasers were more likely than those using physician sources to have a past-year opioid use disorder or any SUD. In addition, prescription opioid misusers who *only* obtained from a friend/relative for free or who had multiple sources had significantly greater odds of binge drinking and marijuana use, relative to those who obtained from a physician. Users of multiple sedative/tranquilizer sources also had higher odds of any SUD or substance dependence than those who only obtained from a physician. Finally, prescription opioid and sedative/tranquilizer misusers who obtained medications from any non-physician sources had significantly greater odds of recent marijuana use. Across medication classes, misusers who *only* obtained medications from a friend/relative for free had significantly *lower* odds of the medication class-related SUD as compared to those who obtained only from a physician.

DISCUSSION

The present study indicated that prescription stimulant misuse was more prevalent among full-time college students and college graduates while prescription opioid and sedative/tranquilizer misuse was more prevalent among young adults not in college, especially high school dropouts. The prevalence rate of prescription opioid misuse among U.S. college students in the present study is higher than other national studies such as the Monitoring the Future (MTF) study while rates of prescription stimulant misuse was higher among college students in the MTF study.⁶ Such differences are due in part to important measurement and methodological differences between the NSDUH and other national studies such as the MTF study.^{6,16} Nevertheless, national studies have found similar differences in PDM among college versus non-college young adults.^{6,7,16} It is plausible that motivations could play an important role in these differences because at least one prior college study found that over 70% of young adult prescription stimulant misusers reported study/productivity-related motives.¹⁵ More research is needed to investigate the potential causes for higher rates of prescription opioid and sedative/tranquilizer misuse among young adults not in college, including motives for PDM.

The findings of this study provides new evidence that sources of PDM differ among U.S. young adults based on educational status. The findings reinforce that developmental changes during the transition from adolescence to young adulthood place individuals in social contexts such as colleges that directly impact sources of PDM. Prescription drug misusers enrolled full-time in college and recent college graduates were more likely to obtain medications for free from friends/relatives than those not in college across all three medication classes. These findings lend support to the notion that greater responsibility of one's own medication management during young adulthood could lead to increased availability and willingness to share with peers, especially among college students and college graduates.^{6,10–12}

Previous studies indicate the influence of educational status on PDM appears to extend beyond adolescence and young adulthood into adulthood with lower PDM prevalence in college graduates^{7–9} and lower rates of opioid overdose in those who at least completed high school.²⁴ Regional and national studies have demonstrated PDM involving each drug class is associated with short-term and long-term consequences, including neuropsychological functioning, depressed mood, sleep problems and higher rates of SUD symptoms in adulthood.^{25–29} Clinicians can easily assess educational status when screening for PDM among young adults and make their patients aware of the growing evidence for adverse consequences associated with PDM.

To date, the majority of research focusing on PDM has focused on college students and the current study indicates young adults not in college are at heightened risk for PDM-related SUD and substance dependence. Despite lower rates of past-year prescription stimulant misuse, the present study found that non-college young adults had increased rates of prescription stimulant use disorder and prescription drug use disorders relative to their same-age peers in college. While clinicians treating college students/graduates may want to screen for prescription stimulant misuse, it is important that clinicians be aware that young adults not in college/school have increased rates of SUDs involving prescription drugs and substance dependence.

The findings of the present study indicate that the most prevalent source of PDM among young adults were friends or relatives given for free in most instances. However, the assessment of sources of PDM in the NSDUH does not distinguish between friend/peer versus family/relative sources, and prior studies indicate important differences between friend/peer and family/relative PDM sources among adolescents and young adults.^{10,17,30} For instance, previous studies found (1) notable gender differences between family/relative and friend/peer sources (e.g., women were more likely to report family/relative sources), (2) family/relative sources were associated with self-treatment motives for NMUPD (e.g., prescription opioids for physical pain relief) while friend/peer sources were associated with recreational motives (e.g., prescription opioids to get high), and (3) friend/peer sources were associated with significantly higher rates of SUD symptoms as compared to family/relative sources.^{10,17,30} Therefore, the limitation of combining these sources in the NSDUH is that the increased risk for SUD associated with friend/peer sources is diminished by the influence of family/relative sources.

The findings of the present study indicate that more than 7 in every 10 past-month prescription drug misusers who reported multiple sources for PDM had a past-year SUD, the majority involving substance dependence. To place these findings in context, less than one in every five young adults in the overall sample had a past-year SUD. Individuals with substance dependence are more likely to expend effort and time to obtain drugs than occasional or experimental substance users.^{19,20} Seeking multiple PDM sources aligns with these findings and suggests clinicians should conduct comprehensive SUD assessments with young adults who report multiple sources for prescription opioid or sedative/tranquilizer misuse because these individuals are more likely to have severe SUDs. Consistent with prior studies, there were other sources of PDM associated with lower (e.g., free from friends/relatives) or greater (e.g., purchased) risk for SUD and substance dependence.^{31–34} PDM source can predict treatment outcome among those with prescription opioid dependence.³¹ Taken together, these findings indicate the importance of screening for PDM, and if positive, ascertain if multiple PDM sources are involved and conduct a more comprehensive SUD assessment to identify young adults who are at the greatest risk for developing substance-related consequences.

The findings from the current study should be interpreted within context of some notable limitations. First, the cross-sectional study design precludes any causal determinations regarding the relationships between sources of PDM and educational status. Second, all measures were based on self-reports, and while prior work has found that self-report measures are reliable and valid, studies suggest that misclassification and under-reporting of sensitive behaviors such as substance use can occur.^{16,35,36} Finally, the present study was constrained by the NSDUH measures such as PDM that did not differentiate between prescription drugs that were not prescribed for the individual (i.e., nonmedical misuse) or that was taken only for the experience or feeling they caused (i.e., medical use or misuse).

Despite these limitations, the findings of this study offer some notable clinical implications. First, greater attention is needed to address PDM among young adults not in college/school based on the higher rates of PDM and SUDs in this vulnerable population, especially high school dropouts. Second, the majority of PDM did not come directly from physicians/prescribers and the findings indicate greater sharing of prescription medications among full-time college students and recent college graduates. Prescribers can help young adults understand potential health and legal consequences associated with PDM and diversion of controlled medications, including breaking the treatment contract and potentially losing their preferred clinician. Finally, the findings of this study indicate the importance of assessing PDM and educational status among young adults when devising treatment plans for young adult patients. Among those who report PDM, a more comprehensive SUD diagnostic assessment is recommended especially for misusers with multiple sources for PDM based on the increased risk of SUDs in these young adults.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Table 1

School and non-school differences in prescription drug misuse and substance use disorders among young adults aged 18–25

	In HS (a) % (95% CI)	College graduate (b) % (95% CI)	In college (c) % (95% CI)	No college (d) % (95% CI)	Pairwise Comparisons ^f
Prescription Opioids					
Lifetime misuse	16.4 (15.4–17.5)	19.6 (18.3–20.9)	19.5 (18.9–20.0)	26.8 (26.2–27.4)	a, b, c < d
Past-year misuse	9.0 (8.1–9.9)	7.1 (6.3–8.0)	8.6 (8.3–8.9)	11.9 (11.5–12.3)	a, b, c < d
Prescription Stimulants					
Lifetime misuse	4.7 (4.0–5.5)	12.7 (11.6–13.8)	9.2 (8.8–9.6)	9.3 (9.0–9.7)	a < b, c, d
Past-year misuse	2.6 (2.1–3.1)	3.9 (3.3–4.5)	4.3 (4.1–4.6)	2.9 (2.7–3.1)	a < b, c; d < c
Prescription Sedatives/Tranquilizers					
Lifetime misuse	7.4 (6.6–8.2)	12.9 (11.9–13.9)	11.1 (10.8–11.5)	16.3 (15.8–16.9)	a < c, d; b, c < d
Past-year misuse	3.5 (2.9–4.1)	4.6 (4.0–5.2)	4.5 (4.3–4.8)	5.8 (5.5–6.2)	a < c, d; b, c < d
Substance Use Disorder					
Past-year Rx opioid use disorder	1.4 (1.0–1.7)	0.5 (0.3–0.7)	1.0 (0.9–1.1)	2.5 (2.3–2.7)	b < a, c < d
Past-year Rx stimulant use disorder	0.4 (0.3–0.6)	0.3 (0.2–0.5)	0.3 (0.2–0.4)	0.5 (0.4–0.7)	c < d
Past-year Rx sedative/tranquilizer use disorder	0.5 (0.3–0.7)	0.2 (0.1–0.3)	0.3 (0.2–0.4)	0.7 (0.6–0.8)	b, c < d
Past-year Rx drug use disorder ²	1.8 (1.4–2.3)	0.8 (0.6–1.1)	1.4 (1.2–1.6)	3.1 (2.9–3.3)	b < a, c < d
Past-year any substance use disorder ³	14.3 (13.2–15.4)	19.0 (18.0–20.1)	18.5 (18.0–19.2)	19.3 (18.9–19.8)	a < b, c, d
Past-year Rx drug dependence ⁴	1.1 (0.8–1.4)	0.6 (0.4–0.8)	1.1 (0.9–1.2)	2.4 (2.2–2.7)	b < a, c < d
Past-year any substance dependence ⁵	7.1 (6.3–8.0)	9.0 (8.3–9.7)	9.7 (9.3–10.2)	11.3 (10.9–11.7)	a < c, d; b, c < d

Source: NSDUH, 2009–2014 cohorts.

¹ All pairwise comparisons were Bonferroni-corrected for multiple comparisons, with comparisons only noted when they differ at a p -level of 0.05 or less. The post-hoc comparisons were based on logistic models adjusted for age, sex and race.

² Past-year Rx drug use disorder refers to individuals who self-reported symptoms consistent with DSM-IV substance abuse or dependence involving prescription opioids, stimulants, or sedatives/tranquilizers.

³ Past-year any substance use disorder refers to individuals who self-reported symptoms consistent with DSM-IV substance abuse or dependence involving alcohol, cannabis, heroin, cocaine, methamphetamine, hallucinogen, inhalant, prescription opioids, prescription stimulants, or prescription sedatives/tranquilizers based on the NSDUH instrument.

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⁴ Rx drug dependence refers to individuals who self-reported symptoms consistent with DSM-IV substance dependence involving prescription opioids, prescription stimulants, or prescription sedatives/ tranquilizers based on the NSDUH instrument.

⁵ Any substance dependence refers to individuals who self-reported symptoms consistent with DSM-IV substance dependence involving alcohol, cannabis, heroin, cocaine, methamphetamine, hallucinogen, inhalant, prescription opioids, prescription stimulants, or prescription sedatives/tranquilizers based on the NSDUH instrument.

School and non-school differences in diversion sources among young adult prescription drug misusers

Table 2

Diversion Sources ¹	In HS (a) % (95% CI)	College graduate (b) % (95% CI)	In college (c) % (95% CI)	No college (d) % (95% CI)	Post-hoc comparison ²
Prescription Opioids					
Physician only	18.8 (11.2–29.8)	15.4 (9.7–23.6)	10.2 (8.1–12.9)	11.2 (9.7–12.9)	no differences
Theft/fake prescription only	4.9 (2.3–10.3)	0.5 (0.1–3.5)	3.7 (2.5–5.5)	2.8 (1.9–4.2)	no differences
Free from friend/relative only	38.0 (30.0–46.7)	40.6 (31.3–50.6)	37.7 (34.2–41.3)	31.5 (29.2–34.0)	d < b, c
Purchased only	7.9 (4.6–13.5)	10.8 (6.1–18.5)	11.8 (9.7–14.4)	17.2 (14.9–19.7)	a, b, c < d
Other source only	4.5 (2.0–10.0)	3.0 (1.1–7.7)	3.6 (2.5–5.1)	6.0 (4.7–7.6)	no differences
Multiple sources	25.8 (19.3–33.7)	29.7 (21.1–40.1)	33.0 (29.6–36.5)	31.3 (28.9–33.8)	no differences
Prescription Stimulants					
Physician only	18.1 (8.2–35.3)	10.2 (4.5–21.4)	7.2 (5.0–10.4)	12.6 (8.1–19.2)	no differences
Theft/fake prescription only	3.1 (0.4–18.7)	0.6 (0.1–3.9)	2.3 (1.1–4.8)	3.3 (1.5–7.2)	no differences
Free from friend/relative only	40.4 (21.3–63.0)	49.3 (33.3–65.4)	37.0 (32.2–42.1)	30.5 (24.8–36.8)	d, c < b
Purchased only	17.7 (8.2–34.0)	23.5 (12.4–40.1)	28.6 (24.4–33.2)	31.7 (25.5–38.6)	a < c
Other source only	2.9 (0.7–11.1)	7.1 (1.7–25.5)	2.5 (1.2–5.0)	5.9 (3.7–9.3)	no differences
Multiple sources	17.9 (8.4–34.2)	9.3 (3.3–23.5)	22.4 (17.4–28.4)	16.0 (11.4–22.1)	no differences
Prescription Sedatives/Tranquilizers					
Physician only	6.3 (2.4–15.5)	13.4 (6.2–26.5)	9.7 (7.1–13.2)	9.9 (7.5–13.0)	no differences
Theft/fake prescription only	6.7 (2.7–15.6)	7.1 (2.9–16.5)	4.1 (2.5–6.9)	5.8 (3.6–9.4)	no differences
Free from friend/relative only	46.8 (32.3–61.8)	56.0 (43.6–67.6)	45.0 (40.0–50.1)	38.1 (33.8–42.7)	no differences
Purchased only	25.7 (15.5–39.5)	8.0 (3.5–17.6)	23.7 (19.1–29.0)	29.5 (25.7–33.7)	b < d
Other source only	2.7 (0.5–13.8)	3.4 (0.8–13.3)	3.5 (1.7–6.8)	4.6 (2.9–7.1)	no differences
Multiple sources	11.9 (5.5–23.8)	12.1 (5.5–24.7)	14.0 (10.8–17.9)	12.1 (9.5–15.3)	no differences

Source: NSDUH, 2009–2014 cohorts.

¹ Diversion sources are mutually exclusive from one another.² All pairwise comparisons were Bonferroni-corrected for multiple comparisons, with comparisons only noted when they differ at a *p*-level of 0.05 or less. The post-hoc comparisons were based on logistic models adjusted for age, sex and race.

Table 3

Prevalence of substance use disorders as a function of prescription drug misuse sources

Diversion Sources¹	Substance-Specific Use Disorder²	Any Substance Use Disorder³	Any Substance Dependence⁴
	% (95% CI)⁵	% (95% CI)⁵	% (95% CI)⁵
Prescription Opioids			
Physician only	20.0 (15.3–25.7)	46.3 (40.6–52.2)	31.8 (27.1–37.0)
Theft/fake prescription only	20.6 (12.7–31.7)	64.3 (51.4–75.4)	41.6 (30.7–53.5)
Free from friend/relative only	9.5 (7.5–12.0)	49.6 (45.7–53.6)	30.3 (26.7–34.1)
Purchased only	40.5 (35.3–46.0)	70.4 (65.4–75.0)	57.5 (52.5–62.4)
Other source only	17.3 (12.3–23.9)	60.3 (51.1–68.9)	38.0 (29.2–47.7)
Multiple sources	43.2 (39.4–47.1)	75.6 (72.3–78.7)	61.7 (57.9–65.3)
Pairwise comparisons ⁵	Free < Other, Dr, Theft < Purchased, MS	Free, Dr < Purchased, MS; Other < MS	Free, Dr, Other < Purchased, MS; Theft < MS
Prescription Stimulants			
Physician only	35.5 (22.2–51.5)	63.4 (48.1–76.3)	51.8 (36.8–66.5)
Theft/fake prescription only	35.0 (16.5–59.6)	82.2 (61.6–93.1)	63.7 (39.3–82.7)
Free from friend/relative only	9.3 (5.9–14.3)	56.4 (49.1–63.4)	35.5 (29.7–41.7)
Purchased only	19.0 (14.3–24.7)	71.8 (63.6–78.7)	57.2 (50.6–63.6)
Other source only	25.0 (11.1–47.1)	64.2 (42.3–81.4)	49.7 (27.2–72.3)
Multiple sources	25.5 (18.1–34.7)	71.3 (60.1–80.3)	46.9 (36.7–57.4)
Pairwise comparisons ⁵	Free < Dr, MS	no differences	Free < Purchased
Prescription Sedatives/Tranquilizers			
Physician only	25.8 (18.2–35.3)	64.9 (54.8–73.9)	45.6 (36.3–55.2)
Theft/fake prescription only	31.7 (17.6–50.2)	77.8 (65.1–86.8)	59.8 (45.7–72.5)
Free from friend/relative only	5.2 (3.2–8.4)	56.1 (51.0–61.1)	39.8 (34.9–44.9)
Purchased only	18.0 (13.9–23.0)	74.7 (68.2–80.2)	62.9 (56.3–69.0)
Other source only	11.2 (4.3–26.3)	69.6 (52.2–82.8)	59.0 (43.3–73.2)
Multiple sources	26.9 (19.7–35.4)	81.0 (73.2–86.9)	67.5 (58.2–75.7)
Pairwise comparisons ⁵	Free < Dr, Theft, Purchased, MS	Free < Theft, Purchased, MS	Dr < MS; Free < Purchased, MS

Source: NSDUH, 2009–2014 cohorts.

¹ Diversion sources are mutually exclusive from one another.² Substance-specific use disorder refers to individuals who self-reported symptoms consistent with DSM-IV substance abuse or dependence for each prescription drug class based on the NSDUH instrument (e.g., 20.0% of prescription opioid misusers who endorsed “physician only” had prescription opioid abuse or dependence).³ Any substance use disorder refers to individuals who self-reported symptoms consistent with DSM-IV substance abuse or dependence involving alcohol, cannabis, heroin, cocaine, methamphetamine, hallucinogen, inhalant, prescription opioids, prescription stimulants, or prescription sedatives/tranquilizers based on the NSDUH instrument.

⁴ Any substance dependence refers to individuals who self-reported symptoms consistent with DSM-IV substance dependence involving alcohol, cannabis, heroin, cocaine, methamphetamine, hallucinogen, inhalant, prescription opioids, prescription stimulants, or prescription sedatives/ tranquilizers based on the NSDUH instrument.

⁵ All pairwise comparisons were Bonferroni-corrected for multiple comparisons, with comparisons only noted when they differ at a p -level of 0.05 or less. The post-hoc comparisons were based on logistic models adjusted for age, sex and race.

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Table 4

Prescription drug misuse sources and substance-related correlates

Prescription Drug Misuse Sources ¹	Past-Month Binge Drinking	Past-Month Marijuana Use	Past-Year Drug-Specific Use Disorder ²	Past-Year Substance Use Disorder ³	Past-Year Substance Dependence ⁴
Prescription Opioids					
Physician only	1.00 (Ref)	1.00 (Ref)	1.00 (Ref)	1.00 (Ref)	1.00 (Ref)
Theft/fake prescription only	1.25 (0.67–2.33)	2.36 (1.32–4.23)**	1.02 (0.52–2.01)	2.17 (1.27–3.73)**	1.52 (0.94–2.47)
Free from friend/relative only	1.73 (1.30–2.30)***	1.86 (1.38–2.49)***	0.41 (0.27–0.63)***	1.19 (0.91–1.55)	0.93 (0.72–1.20)
Purchased only	1.72 (1.22–2.45)**	3.68 (2.51–5.40)***	2.54 (1.70–3.80)***	2.52 (1.79–3.55)***	2.70 (1.96–3.72)***
Other source only	1.16 (0.74–1.82)	1.67 (1.11–2.49)*	0.76 (0.46–1.27)	1.65 (1.11–2.47)*	1.24 (0.82–1.89)
Multiple sources	2.43 (1.78–3.32)***	2.96 (2.07–4.23)***	2.96 (2.04–4.29)***	3.70 (2.79–4.90)***	3.39 (2.69–4.28)***
Prescription Stimulants					
Physician only	1.00 (Ref)	1.00 (Ref)	1.00 (Ref)	1.00 (Ref)	1.00 (Ref)
Theft/fake prescription only	0.78 (0.19–3.26)	0.99 (0.26–3.75)	0.95 (0.29–3.17)	2.75 (0.74–10.25)	1.61 (0.50–5.20)
Free from friend/relative only	2.08 (0.96–4.53)	1.39 (0.69–2.80)	0.19 (0.09–0.43)***	0.76 (0.38–1.52)	0.53 (0.27–1.02)
Purchased only	2.33 (1.06–5.14)*	1.84 (0.85–3.98)	0.42 (0.21–0.86)*	1.48 (0.73–3.02)	1.23 (0.65–2.35)
Other source only	0.51 (0.17–1.58)	1.14 (0.41–3.20)	0.57 (0.15–2.11)	1.03 (0.36–2.97)	0.88 (0.29–2.66)
Multiple sources	2.06 (1.03–4.11)*	1.10 (0.50–2.39)	0.63 (0.30–1.33)	1.51 (0.62–3.63)	0.84 (0.42–1.68)
Prescription Sedatives/Tranquilizers					
Physician only	1.00 (Ref)	1.00 (Ref)	1.00 (Ref)	1.00 (Ref)	1.00 (Ref)
Theft/fake prescription only	0.76 (0.35–1.66)	3.76 (1.69–8.34)***	1.33 (0.55–3.56)	1.91 (0.86–4.25)	1.79 (0.89–3.60)
Free from friend/relative only	1.62 (0.95–2.76)	2.29 (1.43–3.67)***	0.16 (0.08–0.32)***	0.73 (0.45–1.16)	0.81 (0.52–1.28)
Purchased only	2.02 (1.22–3.33)**	5.57 (3.40–9.13)***	0.61 (0.34–1.08)	1.53 (0.91–2.58)	1.97 (1.23–3.15)**
Other source only	2.52 (1.06–6.00)*	6.76 (2.78–16.44)***	0.35 (0.11–1.16)	1.19 (0.51–2.78)	1.68 (0.81–3.49)
Multiple sources	1.51 (0.83–2.74)	3.40 (1.97–5.88)***	1.08 (0.58–2.03)	2.37 (1.25–4.51)**	2.52 (1.47–4.32)***

Source: NSDUH, 2009–2014 cohorts.

Notes: Ref = Reference group.

¹ Diversion sources are mutually exclusive from one another.

² Substance-specific use disorder refers to individuals who self-reported symptoms consistent with DSM-IV substance abuse or dependence for each prescription drug class based on the NSDUH instrument.

³ Any substance use disorder refers to individuals who self-reported symptoms consistent with DSM-IV substance abuse or dependence involving alcohol, cannabis, heroin, cocaine, methamphetamine, hallucinogen, inhalant, prescription opioids, prescription stimulants, or prescription sedatives/tranquilizers based on the NSDUH instrument.

⁴ Any substance dependence refers to individuals who self-reported symptoms consistent with DSM-IV substance dependence involving alcohol, cannabis, heroin, cocaine, methamphetamine, hallucinogen, inhalant, prescription opioids, prescription stimulants, or prescription sedatives/tranquilizers based on the NSDUH instrument.

⁵ AORs controlled for age, sex and educational status; all categories, except for the multiple sources group, include individuals who used only that source in the past 30 days.

* denotes significantly different from physician source group at a $p = 0.05$ level;

** denotes significantly different from physician source group at a $p = 0.01$ level;

*** denotes significantly different from physician source group at a $p = 0.001$ level.