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Medical and Nonmedical Use of Prescription Drugs among Secondary School Students

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Abstract

Purpose—The main objective of this study was to assess the prevalence of medical and nonmedical use of four categories of prescription drugs (opioid, stimulant, sleeping, and sedative/anxiety medication) in a racially diverse sample of secondary public school students in the Detroit metropolitan area. A secondary objective was to examine the association between the use of four categories of prescription medications and illicit drug use and probable drug abuse.

Methods—In 2005, a Web-based survey was self-administered by 1086 secondary school students in grades seven through 12.

Results—The sample consisted of 54% female, 52% White, 45% African American, and 3% from other racial categories. Forty-eight percent of the sample reported no lifetime use of four categories of prescription drugs (nonusers), 31.5% reported medically prescribed use only (medical users), 17.5% reported both medical and nonmedical use (medical/nonmedical users) and 3.3% reported nonmedical use only (nonmedical users). Multivariate analyses indicated that medical/nonmedical users and nonmedical users were significantly more likely than nonusers to report illicit drug use and probable drug abuse. Medical users generally reported similar or increased odds of illicit drug use and probable drug abuse than non-users.

Conclusions—These findings provide evidence that nonmedical use of prescription drugs represents a problem behavior among secondary school students.

Keywords

Prescription drugs; Epidemiology; Drug abuse; Adolescents; Survey research; School-based research

The medical and nonmedical use of prescription drugs such as benzodiazepines, opioid analgesics, and stimulants has increased among adolescents and young adults in the United States during the past decade [1–11]. According to the Monitoring the Future Study (MTF), the nonmedical use of several prescription medications by 12th graders in the United States is at its highest level in the past 15 years [1,2]. Because prescription drugs are necessary for the treatment of many pediatric disorders including anxiety, sleep, and attention deficit hyperactivity disorder (ADHD), any examination of the nonmedical use and abuse of prescription drugs should occur within the larger context of proper medical use. With

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appropriate medical use considered, there are at least three studies that have examined nonmedical use among adolescents [12–14]; however, these earlier studies limited their focus to either stimulant or pain medications. To date, there are few (if any) investigations examining secondary students' reports of medical and nonmedical use of all four of the most abused classes of prescription drugs (i.e., opioid, stimulant, sleeping, and sedative/anxiety medications).

In 2001, Poulin reported on a sample of secondary school students and found that nonmedical use of prescription stimulants was directly correlated to the number of prescription users in a particular school class who reported giving away their stimulant medication [14]. Although there were some limitations in the measures used by Poulin, the investigation represented one of the first attempts to examine medical and nonmedical use of prescription stimulants at the school class level [14]. In two subsequent studies, McCabe and colleagues reported that secondary school students who properly use prescription stimulant or pain medications were not at greater risk for substance use than nonusers [12,13]. For example, students who used their prescription stimulants for ADHD (e.g., Ritalin®, Adderall®, etc.) did not report higher rates of alcohol, marijuana, and other illicit drug use than nonstimulant-using peers; however, students who reported nonmedical use of prescription stimulants had significantly higher rates of alcohol, marijuana, and other illicit drug use when compared with students who did not use prescription stimulant medication [13]. These stimulant findings are similar to those reported by Boyd and colleagues for prescription opioid analgesics. Boyd and colleagues found that secondary students who reported medical use of prescription opioids (used as prescribed) were no more likely to use substances than their nonopioid-using counterparts; however, secondary school students who reported nonmedical use had significantly higher rates of alcohol, marijuana, and other illicit drug use than their nonopioid using counterparts [12]. Despite growing evidence suggesting significant associations between prescription medication use and other drugs, there is limited information regarding these associations among secondary students.

The current study builds on earlier studies and assesses medical and nonmedical use of four different classes of abusable prescription drugs (i.e., opioid, stimulant, sleeping, and sedative/anxiety medications) in a probability-based sample of secondary school students in a Detroit-area public school district. The specific objectives of this study were to examine the prevalence of the following: 1) medical use of four classes of prescription drugs, 2) nonmedical use of four classes of prescription drugs, and 3) illicit drug use and probable drug abuse based on use of four classes of prescription drugs.

Methods

The present study was conducted during a one-week period in May 2005, drawing on the entire population of 1594 middle school and high school students from a public school district in the Detroit metropolitan area (seventh through 12th grades). The study received approval from the University of Michigan Institutional Review Board and a Certificate of Confidentiality was obtained from the National Institutes of Health. All parents in the school district were sent letters explaining that their child's participation was voluntary, describing the relevance of the study, and assuring that all responses would be kept confidential. Seventy-three percent of parents gave informed consent. The survey was conducted over the internet from school-based computer labs and students were excused from class to complete the survey. All participants were informed that a private research firm, unaffiliated with the school district, was contracted to set up the Web survey as well as store and maintain data to ensure students' responses were kept completely confidential.

The Web-based survey method was used in part because computer-based approaches have been shown to have certain advantages relative to hardcopy surveys such as faster turnaround time

and improved reporting of highly sensitive and illegal behaviors [15,16]. The Web survey was maintained on a hosted secure Internet site running under the secure sockets layer (SSL) protocol to insure respondent data were safely transmitted between the respondent's browser and the server. Students were given sheets with a unique preassigned PIN number that allowed them to access the Web survey and these sheets were destroyed immediately after the survey administration; school officials and staff were unable to access any personally identifiable information connected with the data of any respondent. The survey took approximately 22 minutes to complete, and survey administration was supervised by staff from the University of Michigan, the public school district, and a private research firm. The project achieved a participation rate of 94% for students in the seventh through 12th grades whose parents gave informed consent, and the main reason for nonresponse was absenteeism on the days of survey administration. The final response rate for this Web-based survey was 68% based on guideline #2 of the American Association for Public Opinion Research (AAPOR); this guideline asserts that the response rate should be calculated by dividing the number of completed and partial cases by the number of all eligible respondents [17].

Measures

Medical use of prescription medication—Medical use of prescription medication was measured using the following question: "Based on a health professional's (e.g., doctor, dentist, nurse) prescription, on how many occasions in your lifetime have you used the following types of drugs?" A separate question was asked for each of the following four classes of prescription drugs: (a) Sleeping medication (e.g., Ambien, Halcion, Restoril, temazepam, triazolam); (b) Sedative/anxiety medication (e.g., Ativan, Xanax, Valium, Klonopin, diazepam, lorazepam); (c) Stimulant medication for ADHD (e.g., Ritalin, Dexedrine, Adderall, Concerta, methlyphenidate); (d) Pain medication (i.e., opioids such as Vicodin, OxyContin, Tylenol 3 with codeine, Percocet, Darvocet, morphine, hydrocodone, oxycodone). The response scale for each question was (1) Never, (2) 1–2 occasions, (3) 3–5 occasions, (4) 6–9 occasions, (5) 10–19 occasions, (6) 20–39 occasions, and (7) 40 or more occasions.

Nonmedical use of prescription medication—Nonmedical use of prescription medication was assessed by asking the following question: "Sometimes people use prescription drugs that were meant for other people, even when their own health professional (e.g., doctor, dentist, nurse) has not prescribed it for them. On how many occasions in your lifetime have you used the following types of drugs, not prescribed to you?" There were separate questions for each of the following four classes of prescription drugs: (a) Sleeping medication (e.g., Ambien, Halcion, Restoril, temazepam, triazolam); (b) Sedative/anxiety medication (e.g., Ativan, Xanax, Valium, Klonopin, diazepam, lorazepam); (c) Stimulant medication for ADHD (e.g., Ritalin, Dexedrine, Adderall, Concerta, methlyphenidate); (d) Pain medication (i.e., opioids such as Vicodin, OxyContin, Tylenol 3 with codeine, Percocet, Darvocet, morphine, hydrocodone, oxycodone). The response scale for each question was the same as for medical use.

Prescription drug use status—Prescription drug use status was assessed by creating four distinct groups of lifetime prescription medication use: (1) individuals who never used one or more of the four classes of prescription medication (nonusers, n = 499); (2) individuals who only used one or more of the four classes of prescription medication as prescribed by their physicians (medical user only, n = 329); (3) individuals who used one or more of the four classes of prescription medication as prescribed by their physicians, as well as prescription medication that was not prescribed to them (both medical and nonmedical user, n = 183); (4) individuals who only used one or more of the four classes of prescription medication that was

not prescribed to them (nonmedical user only, n = 35). Similar four-level indicator variables were developed for each specific drug class.

Drug Abuse Screening Test, Short Form (DAST-10)—The Drug Abuse Screening Test, Short Form (DAST-10) is a self-report instrument that can be used in clinical and non-clinical settings to screen for probable drug abuse or dependence on a wide variety of substances other than alcohol [17]. Respondents who used drugs other than alcohol in the past 12 months were asked whether they had experienced 10 drug-related items in the past 12 months (e.g., inability to stop using drugs, simultaneous polydrug use, illegal activities to obtain drugs, blackouts as a result of drug use, medical problems as a result of drug use, withdrawal symptoms, felt bad or guilty about drug use, family complaints about drug use, and family avoidance due to drug use). Based on the objectives of the present study, we removed the item regarding "non-medical reasons" for drug use resulting in nine DAST items. Based on previous research, if a respondent positively endorsed two or more DAST items, this was considered a "positive" screening test result, denoting risk for probable drug abuse or dependence [18–20]. Cronbach's alpha was .80 for the nine DAST items.

Data analysis

Data analyses included 1086 respondents, and all statistical analyses were performed using SPSS 13.0 (SPSS Inc., Chicago, IL). Chi-square tests were used to compare the prevalence of medical use and nonmedical use according to student characteristics. Chi-square tests and multiple logistic regression models were used to compare illicit drug use and DAST scores across the following four mutually exclusive groups of lifetime and past-year prescription medication users: (1) no use, (2) medical use only, (3) both medical and nonmedical use, and (4) nonmedical use only. Multiple logistic regression models used nonusers as the reference group and were adjusted for gender, race/ethnicity, and grade level. Interactions between demographic characteristics (e.g., gender, race/ethnicity, and grade level) were examined in the multiple logistic regression models. Adjusted odds ratios (AOR) and 95% confidence intervals (95% CI) were reported.

Sample

The final sample consisted of 1086 secondary school students, and the demographic characteristics resembled the characteristics of the overall student population. The grade level distribution did not significantly differ between the final sample (37% in seventh–eighth grade and 63% in ninth–12th grade) and the overall student population (35% in seventh–eighth grade and 65% in ninth–12th grade). The final sample contained a higher proportion of females (54%) than in the overall student population (51%) ($\chi^2 = 10.5$, df = 1, $p < .01$). The racial distribution of the final sample was 52% White, 45% African American, and 3% from other racial categories, whereas the racial distribution of the overall student population was 48% White, 49% African American, and 3% other racial categories ($\chi^2 = 26.7$, df = 2, $p < .01$).

Results

The lifetime prevalence of medical use was 49.0% for any of the four categories of prescription medications. The most common medically used prescription drug class among secondary school students was pain medication (44.9%), followed by sleeping (13.9%), sedative/anxiety (6.1%), and stimulant medications (6.0%). There were notable gender differences; within any of the four classes, females were significantly more likely than males to report lifetime medically prescribed use (56.4% vs. 40.2%, $\chi^2 = 27.4$, df = 1, $p < .001$), pain medication (53.1% vs. 35.0%, $\chi^2 = 34.0$, df = 1, $p < .001$), sleeping medication (16.2% vs. 11.2%, $\chi^2 = 5.5$, df = 1, $p < .05$), and sedative/anxiety medication (7.6% vs. 4.4%, $\chi^2 = 4.5$, df = 1, $p < .05$). There

were also some significant racial differences; White students were significantly more likely than African American students to report medical use of sedative/anxiety medication (8.8% vs. 3.0%, $\chi^2 = 14.2$, df = 1, $p < .001$) and stimulant medication (8.0% vs. 3.5%, $\chi^2 = 9.0$, df = 1, $p < .01$). Older students in grades nine–12 were more likely than students in grades seven to eight to report medical use of sedative/ anxiety medication (7.3% vs. 4.1%, $\chi^2 = 4.2$, df = 1, $p < .05$) and pain medication (48.9% vs. 38.1%, $\chi^2 = 11.4$, df = 1, $p < .01$). The correlations among frequencies of lifetime medical and nonmedical use of prescription drugs ranged from . 14 to .84, with most correlations between .30 and .50 (Table 1).

For any drug category studied, the lifetime prevalence of nonmedical use was 20.9%. The lifetime prevalence of nonmedical use was highest for pain medication (17.7%), followed by sleeping (5.9%), sedative/anxiety (3.5%), and stimulant medications (2.4%). Females were significantly more likely than males to report nonmedical use of pain medication (22.2% vs. 12.3%, $\chi^2 = 17.6$, df = 1, $p < .001$). White students were more likely than African American students to report nonmedical use of prescription sedative/ anxiety (4.5% vs. 2.2%, $\chi^2 = 4.2$, df = 1, $p < .05$) and stimulant medications (3.3% vs. 1.3%, $\chi^2 = 4.2$, df = 1, $p < .05$). Finally, students in grades nine–12 were more likely than students in grades seven to eight to report non-medical use of sedative/anxiety (4.5% vs. 1.8%, $\chi^2 = 5.3$, df = 1, $p < .05$) and pain medications (20.9% vs. 12.1%, $\chi^2 = 12.9$, df = 1, $p < .001$).

As illustrated in Table 2, approximately 48% (n = 499) of students never used an abusable prescription drug (lifetime nonuser), 31.5% (n = 329) used prescription medication as prescribed by their physicians (lifetime medical user only), 17.5% (n = 183) used both prescription medication as prescribed by their physicians as well as used an abusable prescription medication that was not prescribed to them (lifetime medical and nonmedical user), and 3.3% (n = 35) used an abusable prescription medication that was not prescribed to them (lifetime nonmedical user only).

Bivariate analyses indicated significant gender differences in lifetime medical and nonmedical use of four classes of prescription drugs (Table 3). There were no significant racial differences in the lifetime use of prescription medication; predictably, grade level was significantly associated with lifetime use of prescription drugs.

Bivariate analyses were used to examine the associations among lifetime prescription drug use, past-year illicit drug use, and DAST scores. Chi-square analysis revealed significant associations between lifetime prescription drug use status and each measure of past-year illicit drug use and probable drug abuse as measured by the DAST ($p < .001$). Multivariate logistic regression results reinforced the bivariate findings; the odds of reporting illicit drug use and probable drug abuse were considerably higher among individuals who reported lifetime nonmedical use only of prescription drugs after adjusting for gender, race/ethnicity and grade level (Table 4). The heightened risk for illicit drug use and probable drug abuse among lifetime nonmedical users of prescription drugs held steady across each of the four classes of prescription drugs. In addition, illicit drug use and probable drug abuse among individuals who reported both lifetime medical and nonmedical use of prescription drugs were similar to individuals who reported only lifetime non-medical use. Individuals who reported only lifetime medical use generally reported similar or increased odds of illicit drug use and probable drug abuse (DAST score) than individuals who reported no lifetime use of prescription drugs. Finally, we tested for interactions involving gender, racial/ ethnic, and grade level variables and generally found no evidence for interactions between these variables and prescription drug use status in accounting for probable drug abuse.

The past-year use of four classes of prescription drugs was as follows: 59.7% (n = 623) of students never used an abusable prescription drug (past-year nonuser), 26.5% (n = 276) used prescription medication as prescribed (past-year medical user only), 10.6% (n = 111) used both prescription medication as prescribed as well as an abusable prescription medication that was not prescribed (past-year medical and nonmedical user), and 3.2% (n = 28) used an abusable prescription medication that was not prescribed (past-year nonmedical user only). The association between past-year prescription drug use status and probable drug abuse was examined using chi-square analysis that revealed significant associations ($p < .001$). The prevalence of experiencing two or more DAST items was 5.5% among past-year nonusers, 6.9% for past-year medical users only, 29.1% for past-year medical and nonmedical users and 27.3% for past-year nonmedical users only.

The logistic regression results supported the bivariate findings because the odds of experiencing two or more DAST items did not differ significantly between past-year medical users and past-year nonusers after adjusting for gender, race/ethnicity, and grade level. In contrast, past-year medical and nonmedical users were over seven times more likely than past-year nonusers to experience two or more DAST items (AOR = 7.7, 95% CI = 4.3–13.7, $p < .001$). Similarly, past-year nonmedical users were over seven times more likely than past-year nonusers to experience two or more DAST items (AOR = 7.6, 95% CI = 3.2–18.4, $p < .001$).

Finally, we examined whether higher frequencies of non-medical use of each prescription drug class (lifetime and past-year) were positively associated with illicit drug use and probable drug abuse (lifetime and past-year). Bivariate correlations revealed significant positive associations between frequencies of nonmedical use for each class of prescription drugs and illicit drug use and probable drug abuse ($p < .001$).

Discussion

In the present study, the lifetime prevalence rate of non-medical use within the four prescription drug classes was 20.9%; this was higher than the lifetime prevalence of nonmedical use for the same four prescription drug classes (13.5%) among persons 12 to 17 years of age nationally in 2004 [3]. Notably, the prevalence of nonmedical use of prescription opioids was higher than state and national averages, whereas the prevalence of nonmedical use of prescription stimulants was lower [1,3,21,22]. For example, in this study the lifetime prevalence of nonmedical use of prescription opioids was 17.7% and this is contrasted to national and state data that indicate 11.4% of persons 12 to 17 years and 14.3% of Michigan residents (12 years or older) reported lifetime nonmedical use of prescription opioids [1,21].

The lifetime prevalence rates of medical use of prescription drugs reported here were similar to the prevalence rates and increasing prescribing patterns for U.S. youth [11,23–25]. For example, the lifetime prevalence of medical use of prescription stimulants for ADHD was 6.0% in the present study; this is similar to data that suggest 5.0% of youth aged 5 to 17 years in the state of Michigan [23] and 4.3% of U.S. youth between 4 and 17 years of age are prescribed stimulant medication [25]. The gender differences in medical use of prescription drugs resembled national patterns [7,11,26]; adolescent girls were more likely to report medical use of prescription opioids, sedative/anxiety medication, and sleeping medication. We also found boys were more likely to report medical use of prescription stimulants for ADHD, but the difference was not statistically significant. Although these gender differences have been found in prescribing patterns in previous research with secondary school students, these prior studies did not consider the association with nonmedical use.

Seven of every 10 secondary students who reported medical and nonmedical use of prescription drugs were female. The increased rates of nonmedical use among female medical users could be the result of greater medical exposure to medications or, alternatively, it could be due to possible under-treatment of conditions that result in girls obtaining prescription medications from friends, family members, or others to self-treat. After all, the leading sources of prescription drugs among adolescent nonmedical users are peers and family members [12, 27,28], and this suggests that nonmedical use among adolescents should be considered within the larger context of medical availability.

The racial differences in medical and nonmedical use of prescription drugs found here are notable relative to previous research. The higher rates of medical and nonmedical use of stimulant and sedative/anxiety medications among White youth were similar to the racial differences in both prescribing patterns [23–25] and nonmedical use of stimulant medications [1,13,22]. Although we found no difference between White and African American students, national findings indicate lifetime nonmedical use of prescription opioid medications was higher among White 12th grade students (15.9%) than among African American (3.5%) 12th grade students [1]. Furthermore, we did not find any racial differences in lifetime medical and nonmedical use when considering all four classes of prescription drugs. We also did not observe differences by grade level in lifetime medical or nonmedical use of stimulant and sleeping medications; this could be the result of increased prescription rates of these classes of drugs among younger students. Our findings serve as a reminder that secondary school districts should be encouraged to collect data to learn more about drug use behaviors because national results may not hold true in their respective schools.

Our data indicate that nonmedical use of prescription drugs represents a problem behavior among secondary school students. Approximately one in every five secondary school adolescents reported nonmedical use of prescription drugs and these youth were at greater risk for probable drug abuse or dependence than their peers. This study also found that a higher frequency of nonmedical use of prescription drugs is positively associated with probable drug abuse or dependence. The high rates of drug-use-related problems among nonmedical users of prescription medication provide support for targeting prescription drug abuse in prevention and intervention efforts among adolescents.

The present study contained several strengths and limitations that should be considered. A major strength pertains to the diversity of the sample, with 45% of the students identifying as African American. However, based on the racial diversity of the school district, some caution should be used when comparing the findings of the present study to other school districts that are less diverse. An additional strength of the present study was the inclusion of several classes of prescription medications and of screening items to detect probable drug abuse or dependence. Many previous studies focus exclusively on one class of prescription drugs and fail to take into account medical and nonmedical use of other classes of abusable prescription drugs.

Approximately three in every 10 students in the school district failed to complete the survey and this may lead to biased findings; however, concern regarding nonresponse bias was somewhat lessened because the demographic characteristics of the final sample resembled the student population. Some of our analyses were limited by the small number of students who reported medical and nonmedical use of some prescription drugs. Finally, although the DAST has been used in clinical and nonclinical settings, the instrument has not been used widely in adolescent populations. Further validation of the DAST using Web-based survey research and standard clinical interviews is needed to confirm optimal cut-points for sensitivity and specificity among adolescents.

Despite these limitations, the results of the present study indicate that medical users who used their prescription medications as intended were not at the same risk for probable drug abuse as individuals who reported both medical and nonmedical use, or those who reported nonmedical use only. This finding reinforces the importance of proper medical use of prescription drugs and reinforces the need for educational efforts directed at patients and their families. Data from the present study also support the importance of compliance with medication management and suggest that proper medical monitoring may be helpful in reducing non-medical use of prescription drugs by adolescents.

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Table 1

Zero-order correlations between lifetime frequency of medical and nonmedical use of prescription drugs

Variable	1.	2.	3.	4.	5.	6.	7.	8.	M	SD	Range
1. Frequency of lifetime stimulant medical use	—								1.21	.99	1–7
2. Frequency of lifetime stimulant nonmedical use	.34**	—							1.07	.55	1–7
3. Frequency of lifetime pain medical use	.18**	.14**	—						2.12	1.70	1–7
4. Frequency of lifetime pain nonmedical use	.24**	.45**	.38**	—					1.37	1.03	1–7
5. Frequency of lifetime sedative medical use	.46**	.51**	.23**	.33**	—				1.14	.73	1–7
6. Frequency of lifetime sedative nonmedical use	.40**	.84**	.21**	.49**	.62**	—			1.09	.60	1–7
7. Frequency of lifetime sleeping medical use	.34**	.31**	.38**	.36**	.43**	.48**	—		1.33	1.07	1–7
8. Frequency of lifetime sleeping nonmedical use	.33**	.71**	.20**	.52**	.48**	.76**	.45**	—	1.15	.73	1–7

Note: Sample sizes varied due to missing data (range = 1030–1046).

** $p < .01$.

Table 2

Frequency distributions of lifetime prescription drug use

Lifetime prescription drug use status	Sample size (n)	Sample size (%)
Four classes of prescription drugs[a]		
Nonuser	499	47.7
Medical user only	329	31.5
Medical and nonmedical user	183	17.5
Nonmedical user only	35	3.3
Pain medication		
Nonuser	535	51.9
Medical user only	313	30.4
Medical and nonmedical user	147	14.3
Nonmedical use only	35	3.4
Sleeping medication		
Nonuser	872	83.9
Medical user only	106	10.2
Medical and nonmedical user	36	3.5
Nonmedical user only	25	2.4
Sedative/anxiety medication		
Nonuser	964	92.7
Medical user only	39	3.8
Medical and nonmedical user	25	2.4
Nonmedical user only	12	1.2
Stimulant medication		
Nonuser	962	92.9
Medical user only	50	4.8
Medical and nonmedical user	12	1.2
Nonmedical user only	12	1.2

[a] Four classes of prescription drugs include pain, sleeping, sedative/ anxiety and stimulant medications.

Table 3

Demographic characteristics based on lifetime use of four classes of prescription drugs

	Nonuser (n = 499) %	Medical use only (n = 329) %	Medical/nonmedical use (n = 183) %	Nonmedical use only (n = 35) %	Differences based on chi-square χ^2 (df) p-value
Gender					
Female	46.0	58.2	70.5	57.1	35.24 (3) $p < .001$
Male	54.0	41.8	29.5	42.9	
Race/ethnicity					
White	51.2	56.4	50.3	51.4	NS
African American	45.4	41.2	45.4	45.7	
Other	3.4	2.4	4.4	2.9	
Grade level					
7th–8th grade	41.9	36.5	24.0	31.4	18.81 (3) $p < .001$
9th–12th grade	58.1	63.5	76.0	68.6	

Table 4

Prevalence of drug use and misuse based on lifetime use of four classes of prescription drugs

Prescription drug use status	Past-year DAST (positive screening) two or more items		Past-year marijuana use		Past-year illicit drug use other than marijuana[a]	
	%	AOR (95% CI)[b]	%	AOR (95% CI)[b]	%	AOR (95% CI)[b]
Four prescription drug classes[c]						
Nonuser	5.0	—	13.5	—	2.6	—
Medical user only	7.3	1.5 (.8–2.8)	19.9	1.5 (1.0–2.2)*	6.1	2.6 (1.3–5.4)**
Medical and nonmedical user	20.9	5.2 (2.9–9.1)***	33.0	2.6 (1.7–4.0)***	12.0	6.5 (3.1–13.7)***
Nonmedical user only	22.9	6.7 (2.7–16.8)***	21.2	1.7 (.7–4.2)	11.4	5.7 (1.7–19.1)**
Pain medication						
Nonuser	5.2	—	13.7	—	3.0	—
Medical user only	8.0	1.6 (.9–2.8)	21.7	1.6 (1.1–2.4)*	5.8	2.3 (1.1–4.6)*
Medical and nonmedical user	21.8	5.3 (3.0–9.4)***	33.3	2.6 (1.6–4.1)***	12.2	5.9 (2.8–12.4)***
Nonmedical use only	22.9	6.1 (2.5–15.2)***	18.2	1.3 (.5–3.4)	14.3	6.4 (2.1–19.3)**
Sleeping medication						
Nonuser	6.7	—	16.5	—	3.7	—
Medical user only	14.2	2.4 (1.3–4.5)**	30.0	2.5 (1.6–4.2)***	9.4	2.7 (1.3–5.8)*
Medical and nonmedical user	44.4	11.0 (5.3–23.0)***	45.7	4.4 (2.1–9.3)***	30.6	12.4 (5.4–28.2)***
Nonmedical user only	25.0	5.8 (2.1–16.0)**	33.3	3.6 (1.4–9.1)**	24.0	9.0 (3.2–25.0)***
Sedative/anxiety medication						
Nonuser	7.4	—	17.2	—	4.4	—
Medical user only	15.4	2.2 (.9–5.7)	28.9	1.6 (.8–3.5)	7.7	2.1 (.6–7.4)
Medical and nonmedical user	54.2	14.6 (6.0–35.4)***	68.0	8.9 (3.6–22.2)***	44.0	23.3 (9.2–59.1)***
Nonmedical user only	41.7	8.7 (2.6–29.3)***	41.7	3.1 (1.0–10.3)	25.0	7.6 (1.9–31.1)**
Stimulant medication						
Nonuser	6.5	—	17.2	—	4.0	—
Medical user only	30.0	6.0 (3.0–11.8)***	27.1	1.7 (.9–3.5)	14.0	3.5 (1.4–8.4)**
Medical and nonmedical user	72.7	31.0 (7.7–125.1)***	91.7	52.0 (6.1–439.8)***	58.3	36.7 (10.4–130.2)***
Nonmedical user only	75.0	44.5 (11.3–174.9)***	66.7	11.9 (3.4–42.3)***	50.0	22.4 (6.7–74.5)***

– reference group.

[a] Past-year illicit drug index consists of summing annual use of cocaine, LSD, other psychedelics, inhalants, ecstasy, crystal methamphetamine, heroin, and GHB.

[b] Odds ratios (AOR) are adjusted for gender, race/ethnicity and grade level (odds ratios for these variables were not shown).

[c] Four classes of prescription drugs included pain, stimulant, sleeping, and sedative/anxiety medications.

* $p < .05$;

** $p < .01$;

*** $p < .001$ based on logistic regression results.