

Prescription Drug Abuse and Diversion Among Adolescents in a Southeast Michigan School District

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Objectives: To determine the prevalence of medical use of 4 classes of prescription medications relative to non-medical use (illicit use), to examine the relative rates among the 4 drug classes, and to assess whether gender differences exist in the trading, selling, loaning, or giving away of medications.

Design: A Web-based survey was administered to 7th- to 12th-grade students residing in 1 ethnically diverse school district; a 68% response rate was achieved.

Setting: During a 3-week period in May 2005, teachers brought students to their schools' computing center where students took the survey using a unique personal identification number to sign on to the survey.

Participants: There were 1086 secondary students, including 586 girls, 498 boys, 484 black students, and 565 white students.

Main Outcome Measures: Students were asked about their medical and nonmedical use of sleeping, sedative

or anxiety, stimulant, and pain medications. Diversion of prescription medication was assessed by determining who asked the student to divert his or her prescription and who received it.

Results: Thirty-six percent of students reported having a recent prescription for 1 of the 4 drug classes. A higher percentage of girls reported giving away their medications than boys (27.5% vs 17.4%, respectively; $\chi^2=6.7$; $P=.01$); girls were significantly more likely than boys to divert to female friends (64.0% vs 21.2%, respectively; $\chi^2=17.5$; $P<.001$) whereas boys were more likely than girls to divert to male friends (45.5% vs 25.6%, respectively; $\chi^2=4.4$; $P=.04$). Ten percent diverted their drugs to parents.

Conclusion: Physicians should discuss the proper use of prescription medications with their patients and their patients' families.

Arch Pediatr Adolesc Med. 2007;161:276-281

THE NONMEDICAL USE OF PRESCRIPTION drugs—which ranges from medication noncompliance to compulsive abuse—represents an increasing problem among adolescents in the United States.¹⁻⁸ According to the 2004 National Survey on Drug Use and Health data,⁷ approximately 8.8% of adolescents aged 12 to 17 years used prescription drugs for nonmedical purposes in the past year, including approximately 7% who used pain medication, 2% stimulant medication, 2% tranquilizers, and 0.5% sedatives. However, the medical use of prescription medications and the diversion of these prescription medications were not fully addressed.

The aims of this descriptive, exploratory study were 2-fold. The first aim was to determine the prevalence of medical use of 4 classes of prescription medications relative to nonmedical use in an adolescent, ethnically diverse, school-based sample and to compare these relative rates among the 4 drug classes. The second aim was to exam-

ine whether gender differences exist in the trading, selling, loaning, or giving away of one's medications, that is, who received the students' diverted medications?

BACKGROUND

Data from the National Ambulatory Medical Care Survey⁹ reveal that for 14- to 18-year-olds, there was a 209% growth in the number of stimulant prescriptions and a 385% growth in the number of anxiety or sedative medications prescribed between 1994 and 2001. Poulin¹⁰ found that non-medical stimulant use was directly associated with the number of prescription users in the students' classroom or grade level. In a self-report study of 13 549 Canadian students (between 7th and 12th grades), Poulin¹⁰ found that of the students with prescribed stimulants, approximately 15% reported giving away their medications, 7% reported selling their stimulant medications, 4% experienced theft, and 3% were forced to give someone their medications.

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Daniel et al¹¹ observed gender differences in diversion patterns (n=210), reporting that approximately 20% of the girls and 13% of the boys borrowed and/or shared prescribed medications, representing a statistically significant gender difference in lifetime use. Of the girls, 16% borrowed and 15% shared their prescription medications; 7% of the older girls had shared prescription medications more than 3 times. Fifty-eight percent of the youth acknowledged at least 1 motivation for sharing drugs: 40% of the girls and 27% of the boys shared because the receiving person had a prescription for the drug but had run out. Thirty-three percent of the girls and 27% of the boys received their diverted drugs from a family member. In a study of stimulant use conducted by Musser et al,¹² children diagnosed with attention-deficit disorder or attention-deficit/hyperactivity disorder (n=161) and their school administrators were surveyed regarding stimulant use and abuse; 16% of the students had been approached to sell, give, or trade their stimulant medication.

In an earlier study of 10- to 18-year-olds, we found that when students reported the source of diverted opioid analgesics, more than 33% were from family and approximately 17% were from friends.² However, McCabe and Boyd¹³ found that college students were most likely to get diverted drugs from peers, and women were significantly more likely than men to get diverted prescription sedative or anxiety, sleeping, and pain medications from family members.

DEFINITIONS

One problem with existing research is that the terms *use*, *misuse*, and *abuse* are used in particularized ways depending on the author's discipline. In response to the idiosyncratic use of these terms, Compton and Volkow¹⁴ have called for authors to clearly specify their definitions.¹⁵ In this article, we assume the following: *nonmedical use*, *prescription drug abuse*, and *illegal use of prescription medications (drugs)* refer to the same phenomenon and are defined as the use of prescription medication to "get high," to create an altered state, or for reasons (or by routes) other than what the prescribing clinician intended. The use of someone else's prescription medication is illegal. *Diversion of prescription medications (drugs)* is defined as the exchange of prescription medications that leads to the use of these drugs by people other than for whom the prescribing clinician intended or under conditions associated with "doctor shopping," misrepresentation of medical problems, or theft.

METHODS

PROCEDURE

As part of a larger longitudinal project, this study received human subjects review board approval and a certificate of confidentiality. The public school district requires active consent before students are allowed to participate. Seventy-three percent of the parents returned the consent forms and agreed to let their children participate. Of the eligible students (with returned consent forms), 94% completed the survey. The final response rate was calculated using the American Association for Public Opin-

ion Research guideline 2; our response rate was 68% for the 2005 data collection used for this study.

The survey took approximately 22 minutes and was conducted over the Internet from school computer laboratories. Students were given a preassigned personal identification number that allowed them to sign on to the Web survey; this survey method was used because similar computer-based approaches have been found to improve the reporting of sensitive information.¹⁶⁻¹⁹ The Web survey was maintained on a hosted secure Internet site running under the Secure Sockets Layer protocol.

SAMPLE

During a 3-week period in May 2005, we drew on a population of 1594 students in 7th through 12th grades and obtained a sample of 1086 secondary students. Fifty-two percent of respondents were white, 45% were black, and 3% were from other racial groups. Sex was not quite equally distributed in the student sample: 54% of the students were girls and 46% were boys. Students included approximately 18% in 7th grade, 18% in 8th grade, 23% in 9th grade, 16% in 10th grade, 12% in 11th grade, and 12% in 12th grade.

MEASUREMENT

Many of the standard demographic, drug, and alcohol questions used in this study have been described in earlier publications.^{2,3} The following questions pertain directly to the aims of this study.

Medical use of prescription medication was measured using 2 questions, one that requested the number of lifetime occasions and the other the number of occasions during the previous year. We asked, "Based on a health professional's prescription, on how many occasions in your lifetime (or past 12 months) have you used the following types of drugs: (1) sleeping medication (eg, Ambien [Sanofi-aventis, Bridgewater, NJ], Halcion [Pharmacia and Upjohn Co, Kalamazoo, Mich], Restoril [Mallinckrodt Pharmaceuticals, Hazelwood, Mo], etc); (2) sedative or anxiety medication (eg, Ativan [Biovail Pharmaceuticals, Inc, Mississauga, Ontario], Xanax [Pfizer, Inc, New York, NY], Valium [Roche Laboratories, Inc, Nutley, NJ], Klonopin [Hoffmann-La Roche, Inc, Nutley], etc); (3) stimulant medication for attention-deficit/hyperactivity disorder (eg, Ritalin [Novartis Pharmaceuticals Corp, East Hanover, NJ], Adderall [Shire US, Inc, Wayne, Pa], Concerta [ALZA Corp, Mountain View, Calif], etc); and (4) pain medication (eg, Vicodin [Abbott Laboratories, Abbott Park, Ill], OxyContin [Purdue Pharma LP, Stamford, Conn], Tylenol 3 with codeine [Johnson & Johnson, New Brunswick, NJ], etc)?" The ordinal response scale provided a range from no occasions to 40 or more occasions. An index of medical use of prescription medication was created by summing the medically prescribed use of the 4 classes of prescription medication. A recent prescription was defined as having a legal prescription for a given medication within the past 12 months.

Nonmedical use of prescription medication was assessed by asking 2 questions, one for lifetime use and the other for use in the past 12 months. We asked, "Sometimes people use prescription drugs that were meant for other people, even when their own doctor has not prescribed it for them. On how many occasions in your lifetime (or past 12 months) have you used the following types of drugs, not prescribed to you?" There were separate questions for each of the following prescription drugs: (1) sleeping medication (eg, Ambien, Halcion, Restoril, etc); (2) sedative or anxiety medication (eg, Ativan, Xanax, Valium, Klonopin, etc); (3) stimulant medication for attention-deficit/hyperactivity disorder (eg, Ritalin, Adderall, Concerta, etc); and (4) pain medication (eg, Vicodin, OxyContin, Tylenol 3 with

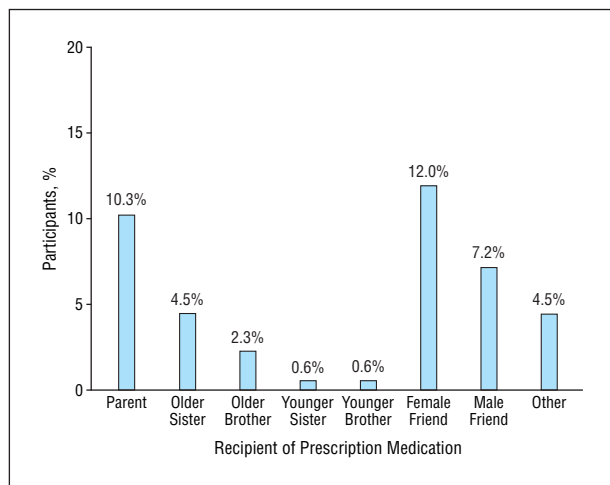


Figure 1. Percentages of participants (n=504 lifetime medication users) who gave or loaned their prescription medications to other individuals in the most recent episode.

codeine, etc). The response scale was the same as for the medical use of prescription medications. An index of nonmedical use of prescription medication was created by summing the nonmedical use of the 4 classes of prescription medication.

Requests to divert prescription medication were assessed using the following item: "On how many occasions in your lifetime (or past 12 months) have you been approached to sell, trade, or give away your prescription medication?" There were separate questions for each of the 4 drug classes mentioned in the previous questions. The response scale was the same as for the medical use of prescription medication. Students were also asked whether their pills had been taken against their will by force or threat.

Recipients of diverted medications were assessed using the following items (each was asked as a separate question): "In the most recent time that you (1) sold your pills, (2) traded any of your pills, or (3) loaned or gave away your medication to someone, who did you provide the medication to?" The list of possible recipients was based on our earlier work² (see **Figure 1** for a complete listing).

RESULTS

All of the statistical analyses were carried out using SPSS statistical software version 14.0 (SPSS, Inc, Chicago, Ill). Thirty-six percent of the students reported having a recent prescription for 1 of the 4 classes of prescription medications and 49% had received a prescription in their lifetimes. Opioid analgesic pain medications were the most widely used of the 4 drug classes, with approximately 45% of students having a prescription for them in their lifetimes and 33% having a prescription for them in the past 12 months. Results showed that 235 (41%) of the 586 girls and 110 (22%) of the 498 boys reported medical use of pain medications in the past year; this compares with 15% of girls and 9% of boys who had used prescription pain medication nonmedically. Girls were significantly more likely to have a prescription for these pain medications in the past year ($\chi^2=39.8$; $P<.001$) and were more likely to use them nonmedically in the past year as well ($\chi^2=9.9$; $P=.002$). When we considered the relationship between nonmedical and medical use, there were

disproportionately more nonmedical users of stimulant and sedative medications when compared with the other 2 prescription drug classes. Within the previous 12 months, 91 students had a prescription for sleeping medications and 36 had engaged in nonmedical use of sleeping medications; 35 students had a prescription for sedative medications and 17 had engaged in nonmedical use of sedatives; 36 students had a prescription for stimulant medications and 18 had engaged in nonmedical use of stimulants; and 348 students had a prescription for pain medications and 126 had engaged in nonmedical use of pain medications (**Table 1** and **Table 2**).

Current medical users (that is, students with legal prescriptions in the past 12 months) were statistically more likely ($P<.001$) to report being approached to divert their medications within the past year than students who had an earlier prescription (but not a current one). This relationship was supported even after controlling for sex, age, and race (odds ratio=2.9; 95% confidence interval=1.57-5.47; $P<.001$). In fact, there was some evidence of trading medications by the students; for instance, 465 students (10%) reported trading pain medications, 94 (15%) reported trading stimulant medications, 144 (10%) reported trading sleeping medications, and 94 (10%) reported trading sedative or anxiety medications, although the numbers were relatively low. Many fewer students reported selling their medications. However, students were most likely to give away or loan their medications rather than trade or sell: 466 students (25%) gave away or loaned their pain medications, 62 (21%) gave away or loaned their stimulant medications, 64 (20%) gave away or loaned their sleeping medications, and 64 (15%) gave away or loaned their sedative medications. Overall, 24% of students (with a legal prescription) gave away or loaned their prescription drugs to someone else, often a family member (eg, parents and siblings). A higher percentage of girls as compared with boys reported lifetime giving or loaning their sedative, stimulant, pain, and/or sleeping medications (27.5% vs 17.4%, respectively; $\chi^2=6.7$; $P=.01$). They also were significantly more likely than boys to divert to their female friends (64.0% vs 21.2%, respectively; $\chi^2=17.5$; $P<.001$) whereas boys were statistically more likely than girls to divert their prescription medications to their male friends (45.5% vs 25.6%, respectively; $\chi^2=4.4$; $P=.04$) (**Figure 2**).

We also asked students with prescription medications whether they had their pills taken away from them against their will or by force or threat. A relatively small number of students had experienced this type of event. We found that 145 (12%) of the students had their sleeping medications taken, 64 (14%) had their sedatives taken, 62 (11%) had their stimulants taken, and 13 (3%) had their pain medications taken.

COMMENT

Earlier this year, Markel,¹⁶ a pediatrician, noted that his colleagues are all too ready to blame parents, the Internet, and doctor shopping for the increased use of diverted prescription medications. According to Markel, these sources are not at the problem's root; rather, it is

Table 1. Prevalence of Medical and Illicit Use of Prescription Medications in the Previous 12 Months in 1086 Students*

Characteristic	Students Receiving Sleeping Medication, No. (%)		Students Receiving Sedative or Anxiety Medication, No. (%)		Students Receiving Stimulant Medication for ADHD, No. (%)		Students Receiving Pain Medication, No. (%)	
	Medical Use	Illicit Use	Medical Use	Illicit Use	Medical Use	Illicit Use	Medical Use	Illicit Use
Sex								
Female (n = 586)	59 (10)	21 (4)	23 (4)	10 (2)	13 (2)	10 (2)	235 (42)	85 (15)
Male (n = 498)	32 (7)	15 (3)	12 (2)	7 (1)	23 (5)	8 (1)	110 (23)	41 (9)
Age, y								
11-13 (n = 290)	26 (9)	6 (2)	6 (2)	3 (1)	9 (3)	4 (1)	77 (27)	20 (7)
14-16 (n = 580)	48 (8)	19 (3)	14 (2)	7 (1)	15 (3)	5 (<1)	196 (22)	74 (13)
≥17 (n = 214)	17 (8)	10 (5)	15 (7)	7 (3)	12 (6)	9 (4)	72 (34)	32 (15)
Overall	91 (9)	36 (3)	35 (3)	17 (2)	36 (3)	18 (2)	345 (33)	126 (12)

Abbreviation: ADHD, attention-deficit/hyperactivity disorder.

*There were 390 students who received prescription drugs for medical use in the past 12 months and 145 students who engaged in nonmedical use in the past 12 months. There were 2 cases with missing data on sex and race or ethnicity. Owing to missing data, the denominator for the overall prevalence rates was not always 1086.

Table 2. Students Approached to Sell, Trade, or Give Away Their Prescription Medications in Their Lifetime and in the Previous 12 Months

Approached for Medication	Students Overall, No. (%)	Girls, No. (%)	Boys, No. (%)	χ^2 Value
Sleeping medication				
Lifetime (n = 145; 92 girls)	25 (18)	16 (18)	9 (17)	0.03
Previous 12 mo (n = 25; 16 girls)*	14 (58)	8 (53)	6 (67)	0.04
Sedative or anxiety medication				
Lifetime (n = 64; 43 girls)	14 (23)	6 (15)	8 (38)	4.4†
Previous 12 mo (n = 14; 6 girls)*	12 (86)	5 (83)	7 (87)	0.05
Stimulant medication				
Lifetime (n = 62; 28 girls)	14 (23)	7 (26)	7 (21)	0.2
Previous 12 mo (n = 14; 7 girls)*	12 (86)	6 (86)	6 (86)	0.0
Pain medication				
Lifetime (n = 466; 299 girls)	104 (23)	71 (24)	32 (19)	1.4
Previous 12 mo (n = 104; 71 girls)*	65 (64)	49 (70)	16 (53)	2.6

*Indicates the total number of prescription medication users in the past 12 months who also reported being approached to sell, trade, or give away their prescription medications in their lifetime.

† $P < .05$.

physicians who too quickly write prescriptions for Schedule II and III medications. Although Markel raises an important point, there is another aspect to the problem—physicians are uncomfortable talking about potential medication abuse with their patients. Indeed, 47% of physicians report that it is difficult for them to discuss prescription drug abuse with their patients; this is in contrast to 41% who have difficulty discussing alcohol abuse and 18% who have difficulty discussing depression.¹⁷ Our data, albeit preliminary, indicate that physicians, nurses, and dentists must discuss the proper use of abusable medications; it appears that many middle school and high school students engage in exchanges that challenge traditional ways of educating about drug abuse. Physicians, nurses, and dentists should be at the forefront of any educational effort to combat this problem.

In this descriptive study of 1086 public school students, we found that almost half had received a prescription for a scheduled medication in their lifetimes; 1 in 3 students had a prescription in the previous year. Opioid analgesics were the most widely prescribed and the most

widely abused. Stimulant and sedative or anxiety medications had the highest illicit-medical use ratios. Diversion of prescription medication was common; between 29% and 62% of 390 students with legal prescriptions were approached to divert their medications within the previous year.

Our prevalence rates of nonmedical use of prescription drugs were higher than those in the 2004 National Survey on Drug Use and Health study,⁷ and unlike Johnston et al⁴, we found that girls often had higher rates of nonmedical prescription use, particularly of the opioid analgesics. The differences between these studies could be attributed to differences in question wording, data collection modality, and study population.¹⁸⁻²²

Similarly to Daniel et al,¹¹ we also found that girls were more likely to divert their medications. A higher percentage of girls reported lifetime giving or loaning of their sedative, stimulant, pain, and/or sleeping medications. Girls were also more likely to divert to their female friends whereas boys diverted to their male friends. We believe that these gender differences may have implications for

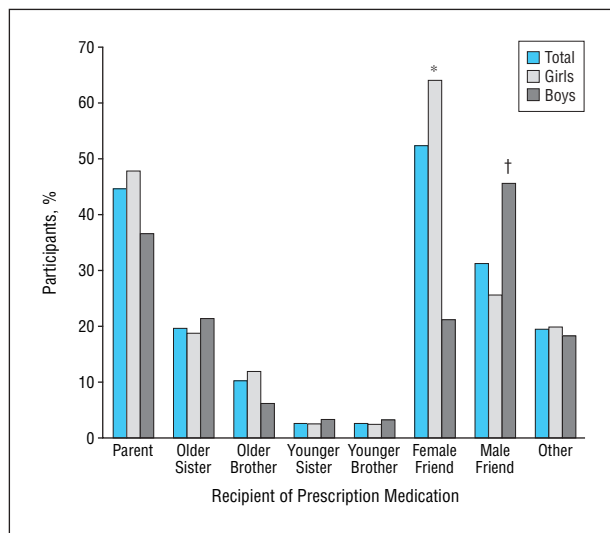


Figure 2. Sex comparison of percentages of participants (n=119 lifetime medication users who reported diversion) who diverted medications to different recipients. * $P < .01$. † $P < .05$.

drug prevention and education; thus, further investigation is needed into the possible reasons for and consequences of these same-sex exchanges. We were also intrigued by the students' willingness to give or loan their medications rather than to trade or sell them. Clearly, further research is needed to examine the motivations for the various types of diversion (giving away vs trading) and the context in which they occur.

There were no statistically significant gender, age, or race or ethnic differences in the likelihood of being approached to divert one's medications, although those with current prescriptions were more likely to be approached than those with previous prescriptions. This difference may be interpreted in 1 of 2 ways: (1) as prescription medications become more popular and abused, acquaintances are getting bolder about asking for them (either to buy or borrow); or (2) a recall bias is operating. Either way, more research is needed to explore whether requests to divert these abusable medications are increasing among adolescents.

To our knowledge, this is one of the few studies to examine the medical and nonmedical use of prescription drugs in the context of drug diversion and one of the first to use a random sample from an ethnically diverse student population. It is notable that so many in our sample engaged in the nonmedical use and diversion of prescription medications; in fact, given their propensity to divert their medications, availability appears high. A 16-year-old student speaking with one of us (C.J.B.) noted, "Pills are so easy to get; I can get Vicodin, Adderall, or Ritalin anytime I want at school." These controlled medications can be found everywhere—in medicine cabinets, on kitchen countertops, and in student backpacks. In earlier work,² we found that many students reported using diverted opioid medications they received from friends and family; they used the diverted drugs to relieve pain, help with sleep, and decrease anxiety. This raises the question about students' motivations to both nonmedically use and give away medications.

The findings of our study have several implications for professionals working with secondary school students. Physicians, nurses, and parents should be educated and should closely monitor the medical use, illicit use, and diversion of abusable prescription medications among secondary school students. In particular, parents can serve as gatekeepers in monitoring the dosage and frequency of use to detect possible signs of diversion. School teachers and other professionals can play an important role in monitoring whether students who are prescribed abusable medications are diverting or being approached to divert their medications. Finally, school administrators must enforce policies that require centralized medication monitoring. Too often, parents and students fail to report the medications they have been prescribed. School districts are encouraged to collect their own data to learn more about the drug use behaviors at their schools and to design appropriate practices and policies.

We believe that the findings from this descriptive study are timely and warrant further research, particularly because the nonmedical use of prescription medications is strongly associated with other forms of substance abuse,^{1-3,5,6} including selling drugs. However, our conclusions are constrained by several factors. Generalizations are limited because the sample was drawn from 1 school district. Also, the survey relied on the self-report of students and thus may have resulted in underestimates because students who are absent or drop out of school tend to report higher rates of illicit substance use.¹⁹ This study relies on survey data collected for a larger study; therefore, the items in the original questionnaire present some limitations. For instance, we never assessed the quantity and frequency of the prescribed medications, nor did we ask students about their medical diagnoses or who wrote the prescription (eg, a dentist or physician); this information would have provided an important context. Future research is needed to examine whether the findings from this study generalize to other school districts in the United States and to student populations in other countries.

Accepted for Publication: October 1, 2006.

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Author Contributions: Dr Boyd had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis. *Study concept and design:* Boyd and McCabe. *Acquisition of data:* Boyd and Young. *Analysis and interpretation of data:* Boyd, McCabe, Cranford, and Young. *Drafting of the manuscript:* Boyd and McCabe. *Critical revision of the manuscript for important intellectual content:* Boyd, McCabe, Cranford, and Young. *Statistical analysis:* McCabe and Cranford. *Obtained funding:* Boyd and Young.

Financial Disclosure: None reported.

Funding/Support: This study was supported by research grants R03 DA018272-01 (Dr Boyd) from the National Institute on Drug Abuse and R03 AA014601-01A1 (Dr Young) from the National Institute on Alcohol Abuse and Alcoholism, National Institutes of Health. The

anonymous school district provided computer and staff support as well as general support for the study.

Acknowledgment: We are very grateful for the anonymous school district's support.

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“Asthma is a disease that has practically the same symptoms as passion except that with asthma it lasts longer.”

—Anonymous, from *JAMA*. 1964;190:364.