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Sources of prescription drugs for illicit use

Sean Esteban McCabe^{*} and Carol J. Boyd

University of Michigan, Substance Abuse Research Center, 2025 Traverwood Dr., Suite C, Ann Arbor, MI 48105-2194, United States

Abstract

Objectives—This exploratory study investigated the sources of four classes of abusable prescription medications (sleeping, sedative/anxiety, stimulant, and pain medications) that were used illicitly by undergraduate students in the past year. The relationship between these sources and other substance use was examined.

Methods—In the spring of 2003, a random sample of 9,161 undergraduate students attending a large public Midwestern research university is selected to self-administer a Web-based survey.

Results—The respondents identified 18 sources of prescription drugs that were classified into three broad categories: *peer*, *family*, and *other* sources. The majority of respondents who were illicit users obtained their prescription drugs from *peer* sources. Undergraduate students who obtained prescription medication from *peer* sources reported significantly higher rates of alcohol and other drug use than students who did not use prescription drugs illicitly or students who obtained prescription medication from *family* sources.

Conclusions—The findings of the present study offer strong evidence that undergraduate students obtain abusable prescription drugs from their peers. Greater prevention efforts are needed to reduce the illicit use and diversion of prescription medication.

Keywords

Drug abuse; Prescription drugs; Diversion; Illicit use; College students

1. Introduction

According to the 2001 National Household Survey on Drug Abuse (NHSDA) data, Americans 18 to 25 years of age reported the highest prevalence of illicit use of prescription drugs relative to other age groups (Office of Applied Studies, 2002). There is growing evidence that the illicit use of prescription drugs has been increasing in the past decade among U.S. undergraduate college students and is second only to marijuana as the most common form of illicit drug use (e.g., Johnston, O'Malley, & Bachman, 2003; Mohler-Kuo, Lee, & Wechsler, 2003).

Undergraduate college students are usually responsible for their own medication management and thus, prescription drugs may be readily diverted. In addition, a recent study suggests there is considerable availability among adolescents and young adults of abusable prescription drugs on the Internet (Califano, 2004). While the Internet can provide easier access to prescription medication for individuals who need them for legitimate medical purposes, there are few mechanisms in place to block individuals from purchasing drugs on the Internet without a prescription. To date, there is limited research regarding diversion of prescription drugs and this has contributed to an incomplete understanding of how young adults are obtaining these prescription drugs.

* Corresponding author. Tel.: +1 734 998 6500; fax: +1 734 998 6508. E-mail address: plus@umich.edu (S.E. McCabe).

This study focuses on the sources of illicit prescription drug use and considers four main classes of abusable prescription drugs: opioid analgesics, stimulants, anxiolytics/sedatives, and sleeping medications. These classes of prescription medications were chosen because they have relatively high rates of illicit use among college students (e.g., Johnston et al., 2003; Mohler-Kuo et al., 2003) and each class has a high degree of abuse potential (e.g., Griffiths & Weerts, 1997; Kollins, MacDonald, & Rush, 2001; Zacny et al., 2003). This study is based on survey data from a large Web-based study of 9161, randomly selected undergraduate college students and examines the following research questions: 1) What are the sources of prescription medication for illicit use among college students? 2) Are there gender or racial differences in the sources of prescription drugs for illicit use? 3) Are there differences in the rates of substance use based on source of prescription drugs for illicit use?

2. Methods

2.1. Design and sample

The study was conducted during a one-month period in March and April of 2003, drawing on a total undergraduate population of 21,294 full-time students (10,860 women and 10,434 men). A random sample of 19,378 full-time undergraduate students was drawn from the Registrar's Office. The entire sample was sent an e-mail describing the study and inviting them to self-administer a Web-based survey which was maintained on an Internet site running under a secure socket layer protocol to ensure privacy and security. Web-based study design and procedures are described in more detail elsewhere (McCabe, Boyd, Couper, Crawford, & d'Arcy, 2002).

The final sample consisted of 9161, undergraduate students and the demographic characteristics closely resembled the characteristics of the overall student population. However, the proportion of women was slightly higher in the sample than the overall student population (56% vs. 51%). The racial/ethnic and academic class year distributions between the sample and population closely resembled each other. The racial/ethnic distribution of the sample was 68% White, 13% Asian, 6% African-American, 4% Hispanic, and 9% other racial categories.

2.2. Instrument and measures

The Student Life Survey (SLS) includes items from several national studies of alcohol and other drug use (e.g., Johnston et al., 2003; Wechsler, Dowdall, Davenport, & Rimm, 1995). Demographic measures in the survey included items such as gender, race/ethnicity, class year, living arrangement, and fraternity and sorority membership.

Heavy episodic drinking was measured using the following single item question: "Over the past two weeks, how many occasions have you had five or more drinks in a row (four or more for women)?" The response scale ranged from (1) none to (6) 10 or more occasions (Wechsler et al., 1995). *Alcohol abuse* was assessed by the CAGE, which is a standard four-item brief alcoholism screening instrument (Mayfield, McLeod, & Hall, 1974).

Past year marijuana use was assessed using the following question: "On how many occasions have you used marijuana in the past 12 months?" The response scale ranged from (1) no occasions to (7) 40 or more occasions (Johnston et al., 2003). A *past year other illicit drug index* was developed by summing the total number of illicit drugs used in the past year (other than marijuana). The illicit drugs included in the index were cocaine, LSD, other psychedelics, inhalants, ecstasy, crystal methamphetamine, heroin, GHB, and Ketamine. The response scale for each drug was the same as past year marijuana use (Johnston et al., 2003).

Illicit use of prescription medication was assessed by asking the following question: "On how many occasions in the 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: (a) Sleeping medication (e.g., Ambien, Halcion, Restoril); (b) Sedative/anxiety medication (e.g., Ativan, Xanax, Valium, Klonopin); (c) Stimulant medication for ADHD (e.g., Ritalin, Dexedrine, Adderall, Concerta); (d) Pain medication (e.g., Vicodin, OxyContin, Tylenol 3 with Codeine). The response scale for each drug was the same as past year marijuana use. *Obtaining prescription medication* not prescribed to an individual was assessed by asking respondents who reported illicit use of each class of prescription medication to explain how they obtained prescription medications NOT prescribed to them by a doctor. Since little information is available in this area, an open-ended text box was provided to respondents.

2.3. Data analysis

A content analysis was performed on open-ended responses to the way students obtained prescription pain medication not prescribed to them by a doctor in the past year. After reading all of the open-ended textual responses provided by students, the first author constructed 18 distinct categories of sources based on the responses (see Table 1). The first author coded the students' responses within the previously determined categories. The textual responses were given to a second and third coder with instructions to independently code responses using the 18 categories. Inter-coder agreement was calculated after all three coders completed their coding of all textual data. Agreement between the raters was excellent, with Cohen's kappa values above 0.95 for each prescription drug category. Inter-coder agreement was defined as the number of responses agreed upon by the raters divided by the total number of responses assessed. After completing these analyses, we further reduced the data into three categories: *peers*, *family*, and *other*.

Multiple logistic regression analyses were used to examine the relationship between the sources of illicit prescription drugs with the likelihood of engaging in various substance use behaviors, adjusting for sex, race/ethnicity, class year, living arrangement, and fraternity/sorority membership and 95% confidence intervals (CI) were reported for the odds ratios. SPSS software 11.0 was used to conduct all analyses.

3. Results

3.1. Sources of prescription medication for illicit use

The prevalence of illicit use was highest for pain medication (9.3%) followed by stimulant medication (5.4%), sedative/anxiety medication (2.9%), and sleeping medication (2.0%). As illustrated in Table 1, the most common sources identified by illicit users for each class of prescription medication were *peer* sources.

The following responses from illicit users were illustrative of the *peer* category: “My friend told me that swallowing Vicodin before smoking altered the high, he'd found out by doing it. He offered me one and I accepted “ (male, White, freshman); “My friend had a prescription for Adderall and he gave me two to use during finals” (female, White, junior); “My friend had some left over from when he was prescribed to it so he gave me a tablet of Valium” (male, White, freshman); “Friend had some Ambien left over from vacation and gave them to me “ (female, White, senior).

The following responses from illicit users are illustrative of the *family* category: “Our family, or so it seems, is constantly in and out of surgery and these prescription pain medications are in ready stock” (female, White, sophomore); “A family member gave me a prescription pain killer for severe menstrual cramping “ (female, White, junior); “I was having a severe anxiety attack due to an unexpected death in the family, and my mother had some Xanax so she gave me half of a pill “ (female, White, sophomore).

3.2. Gender and racial differences in the sources of illicit medication

The sources for obtaining abusable prescription medication for illicit use differed significantly by gender (results not shown). For example, undergraduate women were more likely than men to obtain prescription medication from *family* sources for sedative/anxiolytic medications (14.6% vs. 4.8%, $\chi^2=6.97$, $df=1$, $p<0.01$), sleeping medications (24.2% vs. 7.5%, $\chi^2=7.80$, $df=1$, $p<0.01$) and pain medications (16.4% vs. 7.4%, $\chi^2=15.05$, $df=1$, $p<0.001$). There were racial differences in the sources for obtaining prescription pain medication. For example, 62.2% of White illicit users obtained prescription pain medication from *peer* sources as compared to only 35.3% of African-American illicit users ($\chi^2=20.44$, $df=4$, $p<0.001$). In addition, 33.3% of African-American illicit users obtained prescription pain medication from *family* sources as compared to 11.2% White, 7.7% Hispanic, and 7.2% Asian illicit users ($\chi^2=23.85$, $df=4$, $p<0.001$).

3.3. Substance use by sources of prescription medication for illicit use

As illustrated in Table 2, after adjusting for several sociodemographic characteristics, substance use differed significantly as a function of how undergraduate students obtained prescription medication for illicit use. Students who did not report illicit use of medication were used as the reference group. Illicit users who obtained their prescription medication from *peer* sources were over four times more likely to report heavy episodic drinking and over two times more likely to report two or more criteria for the CAGE. In contrast, the odds of heavy episodic drinking and CAGE scores for illicit users who obtained prescription medication from *family* sources did *not* differ significantly from those students who did not report illicit use of medication.

Illicit users who obtained their prescription medications from *peer* and *other* sources were also significantly more likely than non-illicit users to report concurrent use of alcohol and other drugs (AOD) in the past year (See Table 2). Furthermore, we examined the average number of days of concurrent AOD use in the past year based on source and compared these mean levels using one-way analyses of variance (ANOVA) and post hoc pairwise comparisons using Tukey's Honestly Significant Difference (HSD) test. The average number of days of concurrent AOD use was significantly higher among undergraduate students who obtained prescription pain medication from *peers* (28 days) and *others* (20 days) than those students who obtained either from *family* (2 days) sources or students who did not use (3 days) pain medication illicitly ($p<.001$). Finally, illicit users who obtained prescription medication from *peer* sources were also more likely to use marijuana and other illicit drugs.

4. Discussion

To our knowledge, this is the only large-scale investigation that examined the sources of prescription medication for illicit use among college students. Illicit users of prescription medication in the present study were most likely to obtain prescription medications from *peer* sources and such individuals were at particularly high risk for alcohol and other drug misuse. The results provide no evidence that undergraduate students were obtaining prescription medication via the Internet. In our sample, abusable prescription medications appeared to be readily available for illicit use and this could partially explain the apparent lack of purchase via the Internet. While there is evidence that prescription drugs are widely available via the Internet (Califano, 2004), there needs to be more research to determine the prevalence of purchasing these drugs online.

Illicit users who obtained prescription medication from *peer* or *other* (non-family) sources reported significantly higher rates of alcohol and other drug use than non-illicit users or students who obtained prescription medication from *family* members. In contrast, alcohol and other

drug use did not differ in most instances between illicit users who obtained prescription medication from *family* members and non-illicit users. Thus, illicit users who obtained prescription medication from *peer* or *other* (non-family) sources should be considered a high-risk population based on their substance use behaviors.

The findings of the present study have several important implications for future practice and research. Despite the increase in illicit use, prescription medications (e.g., stimulants, benzodiazepines and opioid analgesics) remain highly effective and safe for the majority of individuals who use these drugs as prescribed (Augustin, 2001; Greenhill et al., 2002; Savage, 2003; Zacny et al., 2003). However, clinicians prescribing abusable medications should exercise caution and not overprescribe these medications to college students. Clinicians can limit both the quantity (e.g., number of tablets or capsules) of medication prescribed as well as the number of refills, thereby limiting the supply. In this study, family members were common sources of opioid analgesic, sedative/anxiolytic, and sleeping medications. Indeed, parents made up the majority of family sources for supplying these medications, a finding that is consistent with Pedersen and Lavik's (1991) study in which the parents were a significant source of benzodiazepines. Although the present study provides evidence that students who obtained prescription medication from *family* members were not at the same increased risk for other drug use as students who obtained these drugs from *peer* or *other sources*, there are still risks associated with obtaining prescription medication from *family* members. Individuals who receive abusable prescription medication from *family* members are unlikely to receive the appropriate information about its actions and possible negative interactions with other substances. In addition, family members may not be aware of possible contraindications or adverse consequences. Taken together, these findings suggest there is a need to educate family members and parents about the potential dangers associated with providing abusable prescription medications to their children. The present study identified 18 possible sources of prescription drugs among undergraduate students and these sources can be used in future research. Based on the increasing rates of illicit prescription drug use among adolescents and young adults, it is imperative that future research carefully examine how these individuals are obtaining prescription medication for illicit use (Johnston et al., 2003; Mohler-Kuo et al., 2003).

The current study included some limitations that must be taken into account. First, the sample in the present study was from a single university so similar studies should be conducted on other college campuses. Second, we did not collect information regarding DSM-IV substance abuse or dependence criteria and future work should examine whether the sources for obtaining prescription drugs differ between those with and without DSM-IV substance abuse or dependence. Third, we found almost 3 out of 10 illicit users did not specify a source. Finally, non-response may have introduced potential bias in the present study.

Despite these limitations, the findings of the present study provide compelling evidence that peers represent the leading source of prescription medication among undergraduate students who report illicit use in the past year. Illicit users who obtained prescription medication from peer sources or other non-family sources also reported higher rates of alcohol and other drug use. Based on the findings of the present study, students who obtain prescription drugs from *peer* sources should be considered a high-risk population for polydrug use.

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Table 1
Sources of prescription drugs for past year illicit users

Source	Pain medication		Stimulant medication		Sedative medication		Sleeping medication	
	<i>n</i> =787	%	<i>n</i> =458	%	<i>n</i> =249	%	<i>n</i> =166	%
Peers	455	57.8	310	67.7	145	58.2	85	51.2
Friend	354		247		108		66	
Peers	63		51		29		11	
Roommate	28		8		4		7	
Boyfriend	5		2		3		—	
Girlfriend	5		—		1		1	
Family	96	12.2	14	3.1	24	9.6	29	17.5
Mother	33		1		11		9	
Family	23		6		7		6	
Parent	15		1		3		7	
Father	12		1		1		3	
Sibling	—		2		1		1	
Aunt	4		1		1		3	
Brother	3		2		—		—	
Husband	2		—		—		—	
Uncle	—		—		—		1	
Other	236	30.0	134	29.3	80	32.1	52	31.3
Unspecified	215		131		76		45	
OTC	9		—		—		5	
Self	9		1		1		1	
Drug dealer	2		1		2		1	
Abroad	1		1		1		—	

Table 2

Alcohol and other drug use by source of prescription drugs

Source (n) ^a	30-day cigarette smoking		2-week heavy episodic drinking		12-month CAGE ^{b,c} (2 or more items)		12-month concurrent AOD use ^{c,d}		12-month marijuana use		12-month other illicit drug index ^e		12-month prescription drug indices	
	%	OR ^g	%	OR ^g	%	OR ^g	%	OR ^g	%	OR ^g	%	OR ^g	%	OR ^g
<i>Pain medication</i>														
No illicit use	17.8	1.00	48.8	1.00	25.2	1.00	24.4	1.00	33.6	1.00	5.8	1.00	4.7	1.00
Peer (n=7651)	51.2	4.37***	81.5	4.17***	49.0	2.72***	74.8	8.56***	81.1	7.69***	46.6	13.08***	42.6	13.79***
Family (n=455)	22.9	1.42	50.0	1.18	28.0	1.26	31.8	1.56	45.8	1.79**	5.2	0.97	14.6	3.85***
Other (n=96)	46.0	3.70***	73.0	2.84***	35.9	1.57**	63.2	5.37***	67.5	4.04***	38.1	9.62***	41.1	14.01***
<i>Stimulant medication</i>														
No illicit use	17.8	1.00	49.1	1.00	25.8	1.00	25.3	1.00	34.1	1.00	6.0	1.00	8.6	1.00
Peer (n=7985)	66.6	7.68***	90.6	7.27***	49.4	2.43***	85.7	14.78***	94.2	24.61***	62.3	23.55***	56.8	12.49***
Family (n=308)	57.1	5.11**	71.4	1.85	28.6	1.03	50.0	2.52	71.4	3.76*	35.7	7.43**	42.9	6.49**
Other (n=14)	67.7	7.87***	84.7	3.79***	37.1	1.38	75.2	7.44***	90.7	15.36***	53.8	15.30***	57.1	13.24***
<i>Sedative medication</i>														
No illicit use	19.2	1.00	50.3	1.00	26.5	1.00	26.7	1.00	35.6	1.00	7.2	1.00	11.0	1.00
Peer (n=8192)	66.9	6.45***	86.2	4.14***	46.5	2.17***	89.2	18.37***	93.1	18.61***	69.7	23.46***	79.3	25.80***
Family (n=145)	33.3	1.92	66.7	1.57	29.2	1.08	58.3	3.80**	70.8	4.05**	16.7	2.64	45.8	6.03***
Other (n=24)	65.0	6.40***	78.5	2.54**	41.8	1.71*	89.2	19.91***	90.9	14.55***	69.6	25.56***	85.0	41.00***
<i>Sleeping medication</i>														
No illicit use	19.9	1.00	50.8	1.00	26.8	1.00	27.9	1.00	36.6	1.00	8.1	1.00	11.8	1.00
Peer (n=8275)	61.2	5.82***	82.4	4.07***	45.1	2.14**	72.5	6.52***	72.9	3.86***	60.0	16.44***	75.3	20.30***
Family (n=85)	34.5	1.98	57.1	1.01	29.6	1.07	40.7	1.74	51.7	1.60	13.8	1.88	41.4	4.87***
Other (n=29)	48.1	3.73***	65.4	1.62	31.3	1.22	52.3	2.86**	64.7	2.89**	36.5	6.47***	67.3	17.95***

^aSample sizes are based on 30-day smoking and vary due to missing responses to individual drug questions.

^bA standard form of scoring the CAGE within collegiate populations that counts two or more positive responses as "suspected" alcohol abuse was used (Heck, 1991).

^cThe 12-month CAGE, concurrent AOD use models included only those students who reported past 12 month alcohol use (sample sizes ranged from n=7193 to n=7432).

^d 12-month concurrent AOD use refers to students who used alcohol and other drugs at the same time at least once in the past 12 months.

^e A 12-month (other illicit drug) index consists of summing annual use of cocaine, LSD, other psychedelics, inhalants, ecstasy, crystal methamphetamine, heroin, GHB, and Ketamine.

^f For each prescription drug class, a 12-month 'prescription drug' index was created by summing annual use of the other three classes of prescription drugs (e.g., pain, stimulant, sedative and sleeping medications).

^g Odds ratios (OR) are adjusted for all other predictors in the model and the reference group for each model was students who did not report past year illicit use of prescription drugs. The odds ratios for these variables are not shown.

* $p < 0.05$.

** $p < 0.01$.

*** $p < 0.001$.