



Prescription drugs purchased through the internet: Who are the end users?

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ARTICLE INFO

Article history:

Received 12 October 2009

Received in revised form 22 January 2010

Accepted 25 January 2010

Keywords:

Prescription drug abuse

Non-medical use of prescription medications

Internet

Online Drug sales

Diversion

ABSTRACT

Although prescription drugs are readily available on the Internet, little is known about the prevalence of Internet use for the purchase of medications without a legitimate prescription, and the characteristics of those that obtain non-prescribed drugs through online sources. The scientific literature on this topic is limited to anecdotal reports or studies plagued by small sample sizes. Within this context, the focus of this paper is an examination of five national data sets from the U.S. with the purpose of estimating: (1) how common obtaining prescription medications from the Internet actually is, (2) who are the typical populations of “end users” of these non-prescribed medications, and (3) which drugs are being purchased without a prescription. Three of the data sets are drawn from the RADARS[®] (Researched Abuse Diversion and Addiction-Related Surveillance) System, a comprehensive series of studies designed to collect timely and geographically specific data on the abuse and diversion of a number of prescription stimulants and opioid analgesics. The remaining data sets include the National Survey on Drug Use and Health (NSDUH) and the Monitoring the Future (MTF) survey. Our analysis yielded uniformly low rates of prescription drug acquisition from online sources across all five data systems we examined. The consistency of this finding across very diverse populations suggests that the Internet is a relatively minor source for illicit purchases of prescription medications by the individual end-users of these drugs.

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1. Introduction

The earliest report in the medical literature describing the sale of illicit drugs through the Internet was in 2001 (Lieberman, 2001), and since that time a number of provocative phrases have been heard chronicling the ready availability of prescription drugs online. In 2002, for example, Dr. Paul M. Wax of Good Samaritan Regional Medical Center in Phoenix noted that drugs were “just a click away” on the Internet (Wax, 2002); shortly thereafter a *Washington Post* article on drug trafficking pointed out that “the Internet has become a pipeline for narcotics and other deadly drugs” (Gaul and Flaherty, 2003); in 2005, Drug Enforcement Administration (DEA) official Karen P. Tandy asserted that “the Internet has become an open medicine cabinet, a help-yourself pill bazaar to make you feel good” (Kaufman, 2005); and perhaps most dramatically, in 2007, Joseph A. Califano, Jr., president of Columbia University’s Cen-

ter on Addiction and Substance Abuse (CASA) and former Secretary of Health, Education and Welfare, stated before the Senate Judiciary Committee that “the Internet has become a pharmaceutical candy store stocked with addictive drugs, available at the click of a mouse to any kid with a credit card number” (Califano, 2007).

Without question prescription drugs are available on the Internet, and it would appear that the problem has been escalating significantly since the early to mid-1990s (Adams, 2000). In this regard, a systematic Internet-based monitoring study conducted by Forman et al. (2006) clearly documented an abundance of web sites offering to sell opioid medications without a prescription. Although actual drug purchases were beyond the scope of this study, efforts by other investigators have demonstrated that Internet-based pharmacy sites do deliver opioid medications to consumers without a prescription (United States General Accounting Office, 2004). Moreover, recent media reports of seizures and interceptions of prescription drugs by the DEA, U.S. Customs, and local police agencies and drug task forces suggest that the number of domestic and foreign web sites offering both unscheduled and scheduled drugs remains significant (Appleby, 2003; Mosier, 2003; Kaufman, 2005; Shiffman, 2006; Hirschler, 2008; Dummermuth, 2009). Interestingly, however, although it is clear in both police and media

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accounts that there are many wholesale customers who are purchasing large quantities of prescription drugs from Internet web sites, there is little or no information in these reports regarding the end users of these drugs. It seems, furthermore, that this issue is addressed only minimally in the research literature. Moreover, what appears in the literature is either anecdotal, or is limited in scope by small sample sizes. In a study by Gordon et al. (2006), for example, the investigators drew a convenience sample of 100 drug-dependent patients residing in a private drug treatment program. Only 11 had ever accessed the Internet to obtain drugs or drug information, and only 6 had actually purchased drugs via the Internet. Similarly, in a more recent study of 515 prescription drug abusers recruited from the Miami club scene, only 1% had ever utilized the Internet to purchase medications without a prescription (Inciardi et al., 2008). The primary reasons for not using the Internet expressed by the sample members included: price considerations – “prescription drugs are cheaper on the street;” and, fear of scams or detection by the authorities – “there are too many ‘rip offs’,” and “big brother is watching.”

Within the context of these remarks, the focus of this paper is the examination of five national data sets for the purpose of estimating: (1) how common obtaining prescription drugs from the Internet actually is, (2) who are the typical populations of “end users” of these non-prescribed medications, and (3) which prescription medications are most typically being obtained. Three of the data sets are drawn from the RADARS[®] (Researched Abuse Diversion and Addiction-Related Surveillance) System, a comprehensive series of studies designed to collect timely and geographically specific data on the abuse and diversion of a number of prescription stimulants and opioid analgesics (Cicero et al., 2007; RADARS System, 2009). The remaining data sets include the National Survey on Drug Use and Health (NSDUH) and the Monitoring the Future (MTF) survey.

2. Method

2.1. RADARS System data

The RADARS System is composed of seven programs that target diverse populations across the United States, including: (1) a *Drug Diversion Program* that surveys more than 300 police and regulatory agencies from jurisdictions in all 50 states, the District of Columbia, and Puerto Rico; (2) a *Key Informant Program* that surveys “key informants” (physicians and program directors) in substance abuse treatment facilities in rural, urban, and suburban areas across the U.S.; (3) a *Poison Center Program* that collects data on acute and chronic exposures to prescription drugs for all ages from 48 of the 60 poison centers in the United States; (4) a *Survey of Key Informants’ Patients Program* that surveys patients recruited by key informants from their respective treatment populations; (5) an *Opioid Treatment Program* that surveys patients about their drug use at enrollment in methadone maintenance treatment programs; (6) an *Impaired Health Care Worker Program* that is a subset of the Drug Diversion, Key Informant, Poison Center, Survey of Key Informants’ Patients and Opioid Treatment Programs; and, (7) a *College Survey Program* that collects prescription drug abuse data from a sample of college and university students across the United States. Only the Key Informant’s Patients, Opioid Treatment, and College Survey programs are used for the analyses in this paper since the others do not collect data on mechanisms of prescription drug acquisition.

2.1.1. Survey of Key Informants’ Patients Program (SKIP). As part of the RADARS System Key Informant Program, data are collected on a quarterly basis from 101 key informants located in 42 states, selected primarily from regions where prescription

opioid abuse is believed to be prevalent. These key informants approach new admissions to their programs who reported abusing opioids in the past 30 days and who endorsed a prescription opioid as their primary drug. Potential respondents are given an information sheet explaining the rationale and procedures of the survey, and that the study is voluntary and anonymous. Consenting patients are asked to complete a brief survey instrument, which is returned directly to Washington University and is not seen by treatment staff. The study protocol was approved by the Institutional Review Board (IRB) at the Washington University School of Medicine.

During the survey period, January 2005 through December 2008, data were collected from 4008 respondents. The questionnaire included numerous items on demographics, opioid use, and source of primary drug. A checklist of opioid drugs captured those used in the past 30 days, followed by an item asking respondents to indicate their primary drug. This list included buprenorphine, fentanyl, hydromorphone, methadone, morphine, oxycodone (with controlled release and immediate release listed as separate items), hydrocodone, and tramadol. Sources for the primary drug were also obtained with a check list. Respondents were asked to indicate as many items that applied to the question, “In the past month were did you get your primary drug?” Sources included: dealer, theft, forged prescription, prescription by a doctor, friend or relative, emergency room, Internet, and “any other way.”

Analyses were conducted to determine the prevalence of the Internet as a source for acquiring opioid medications without a prescription, whether there was a change in Internet use over time, whether any specific opioid was more or less likely to be acquired through the Internet compared to other opioids, and whether the Internet as a source was associated with any particular socio-demographic variables. Chi-square was used to examine associations when both variables were dichotomous and *t*-tests were used to examine associations when one of the variables (e.g., age) was continuous. Mantel–Haenszel chi-square was used to determine whether there was a linear relationship between year the survey was taken and the Internet as a source.

2.1.2. Opioid Treatment Program (OTP). Details on the setting, procedure, and study instrument are briefly described below, with further details available in an earlier paper (Rosenblum et al., 2007). Data were collected on a quarterly basis from January 2005 through December 2008 in 81 methadone maintenance treatment programs (MMTPs) located in 34 states. As in the SKIP system, the MMTPs participating in this study were selected from regions in the U.S. where prescription opioid abuse was believed to be prevalent, particularly major metropolitan areas as well as non-urban areas in the southeast. Respondents were treatment-seeking persons who reported abusing opioids in the past 30 days and who endorsed a prescription opioid as their primary drug. During the first week after enrolling into a MMTP, respondents were given an information sheet explaining the rationale and procedures of the study and that the study was voluntary and anonymous. Consenting patients were asked to complete a one-page survey instrument. This study protocol was approved by the IRB of the National Development and Research Institutes, Inc.

During the survey period, data were collected from 9008 respondents.

Questionnaire items were comparable to those in the SKIP System, including demographics, opioid use, and source of primary drug. As in the SKIP System, checklists focused on drugs used in the past 30 days, primary drug (although tramadol was not added to the survey until the fourth quarter of 2006), and sources of the primary drug. Analyses were conducted to determine the prevalence of the Internet as a source for acquiring opioid medications without

a prescription, whether there was a change in Internet as a source over time, whether any specific opioid was more or less likely to be acquired through the Internet compared to other opioids, and whether the Internet as a source was associated with any socio-demographic variables. The analysis techniques were identical to those conducted for the SKIP data.

2.1.3. College Survey Program. The College Survey is a multi-round online questionnaire collecting data from self-identified students who are enrolled in 2- and 4-year colleges, universities, online courses, or technical schools at least part-time during a specified sampling period. The sample is obtained through the use of a survey panel company in which respondents voluntarily register. The sample is equally distributed across the four geographic regions of the United States (W, NW, S, NE). Each launch of the questionnaire collects responses from approximately 2000 college students. Data are collected at the completion of the fall semester, at the completion of the spring semester, and at the completion of the summer sessions.

The questionnaire is designed to be self-administered online, and consists of basic demographics, the 3-digit ZIP code of where the respondent reports living during the specified sampling period, illicit drug use, prescription drug use (including opioids, stimulants, and carisoprodol), source from which the drugs were obtained, and route of administration. Background variables include age, gender, race/ethnicity, and grade point average. Drug use variables consist of dichotomous items querying the use of alcohol, tobacco, marijuana, and other illicit drugs during the semester in question. In addition, a series of dichotomous items query the use of a number of prescription medications, including stimulants and opioids “for reasons other than what was indicated by a prescribing doctor” in the same time period. Mechanisms of access to prescription medications were queried by a checklist. For the semester in question, participants were asked to “select all methods by which you obtained . . .” Items included: prescription by a doctor; given by friend, family member, relative, or someone else; purchased from friend, family member, dealer, or someone else; purchased through the Internet; stolen from a friend, family member, or someone else; and, “other.”

Participants identified by the survey panel company are sent an email invitation to take the online questionnaire. Inclusion criteria are: age 18 years or older; and, enrollment in college during the current semester for the fall and spring survey, or enrollment during the previous semester and the following semester for the summer survey. Exclusion criteria are answering a specified screening question incorrectly; indicating the use of any of the “fake” or decoy drugs included in the questionnaire; not currently attending school; indicating the use of every prescription stimulant and opioid drug; and, indicating the use of every possible recreational drug for more than 10 days per month.

For the December 2008 launch, 1,866 participants returned valid questionnaires, and of these 27.5% ($N = 514$) reported misusing prescription drugs. The data presented in this paper, however, are limited to 214 participants who were in the age range (18–24 years) most typical of college students, and who endorsed the misuse of prescription opioids and/or stimulants. Because the College Survey was launched in the fall of 2008, longitudinal data are not available for the examination of trends over time. Cross-sectional descriptive analyses were conducted to examine: the prevalence of the Internet as a source for both non-prescribed stimulants and opioids; the likelihood that particular opioids were acquired through the Internet; and, the potential associations of demographic factors with Internet medication purchases. Chi-square tests were used to examine associations when both variables were dichotomous and t -tests were used to examine associations when one of the variables of interest was continuous.

2.2. National Survey of Drug Use and Health (NSDUH)

The National Survey of Drug Use and Health is a federally sponsored annual cross-sectional household survey that gathers data on substance use and abuse among the non-institutionalized household population of the United States, ages 12 and above. Data are collected by RTI International for the Substance Abuse and Mental Health Services Administration (SAMHSA). In 2007, some 141,487 households were screened and 67,870 interviews were conducted across all 50 states and the District of Columbia. Details of the survey methodology and data analyses can be found in SAMHSA (2008).

The data presented in this paper were drawn from the 2007 survey. In the 2007 NSDUH survey, respondents were asked to report the non-medical use of “psychotherapeutics,” defined as pain relievers, tranquilizers, stimulants, and sedatives (SAMHSA, 2008). Specific items queried the respondents about recency of use: “How long has it been since you last used any prescription [pain reliever, sedative, stimulant, or tranquilizer] that was not prescribed for you or that you took only for the feeling or experience it caused?”

For estimates of the sources of prescription drugs, NSDUH uses composite figures which include (a) past month users who reported a single source of obtaining drugs during the past 30 days; (b) past month users who identified their last source of obtaining drugs after reporting multiple sources of obtaining drugs in the past 30 days; and, (c) all other *past year* users who reported their last source of obtaining drugs. For prescription medications reportedly obtained from individuals such as friends and relatives, NSDUH also reports data on the original source of these medications. These are also composite estimates derived from: (a) past year users who reported obtaining drugs for their most recent non-medical use from a friend or relative for free and then reported a valid source for where their friend or relative obtained the drugs; and, (b) past month users who reported only obtaining drugs for their past month non-medical use from a friend or relative for free and then reported a single valid source for where their friend or relative obtained drugs.

2.3. Monitoring the Future (MTF)

Monitoring the Future is an ongoing study of the behaviors, attitudes, and values of American secondary school students, college students, and young adults. Each year, a total of approximately 50,000 8th, 10th and 12th grade students are surveyed (12th graders since 1975, and 8th and 10th graders since 1991). Details of the survey methodology and data analyses can be found in Johnston et al. (2009). In 2007, the MTF survey encompassed over 46,000 8th-, 10th-, and 12th-grade students in almost 400 secondary schools nationwide. The data presented in this paper, however, are limited to 12th-graders – drawn from a multistage random sample that included 15,132 students from 132 schools.

In the 2007 MTF survey, 12th grade respondents were asked to report past year use of prescription medications “without a doctor’s order.” Respondents were queried regarding several drug classes: “narcotics other than heroin” (including methadone, codeine, OxyContin, Percodan, opium, Demerol, Percocet, Ultram, morphine, and Vicodin); prescription stimulants (including Benzedrine, Dexedrine, Methedrine, Ritalin, Adderall, Concerta, and methamphetamine); and prescription tranquilizers (including Librium, Valium, Xanax, Soma, Meprobamate, Ativan, and Klonopin). For each of the prescription drugs endorsed in the past year, respondents were then queried regarding the source of the medication by asking: “where did you get the . . . you used without a doctor’s order in the past year?”

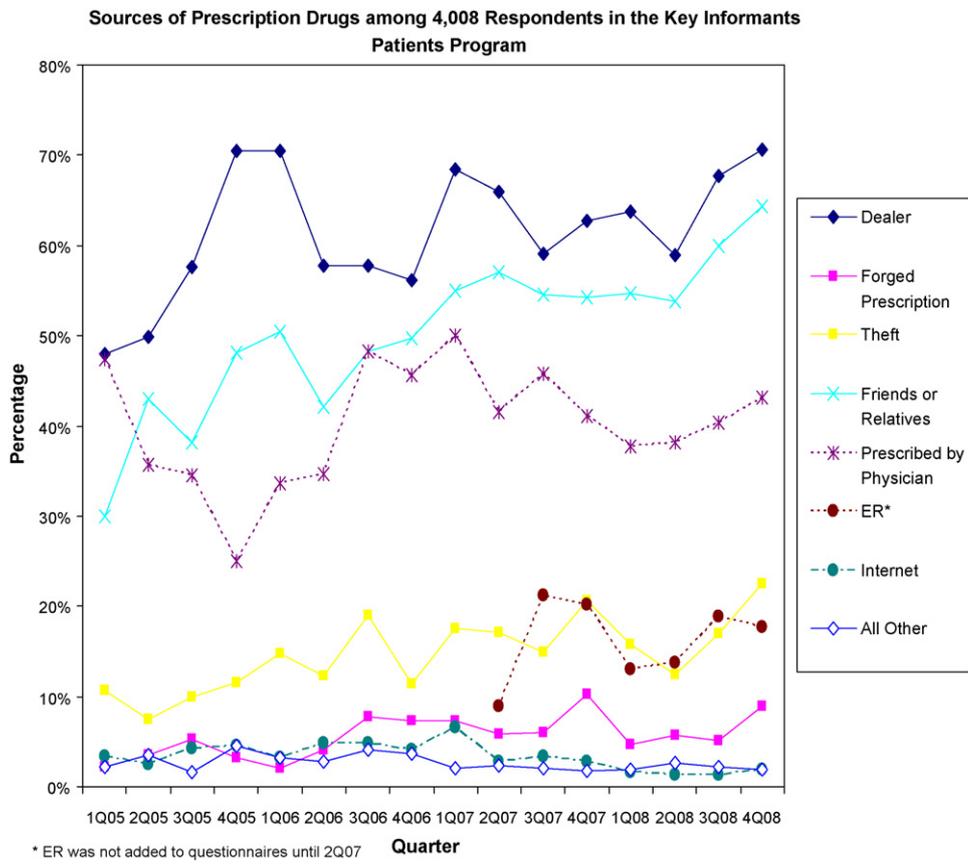


Fig. 1. Sources of prescription drugs among 4008 Respondents in the Key Informants Patients Program.

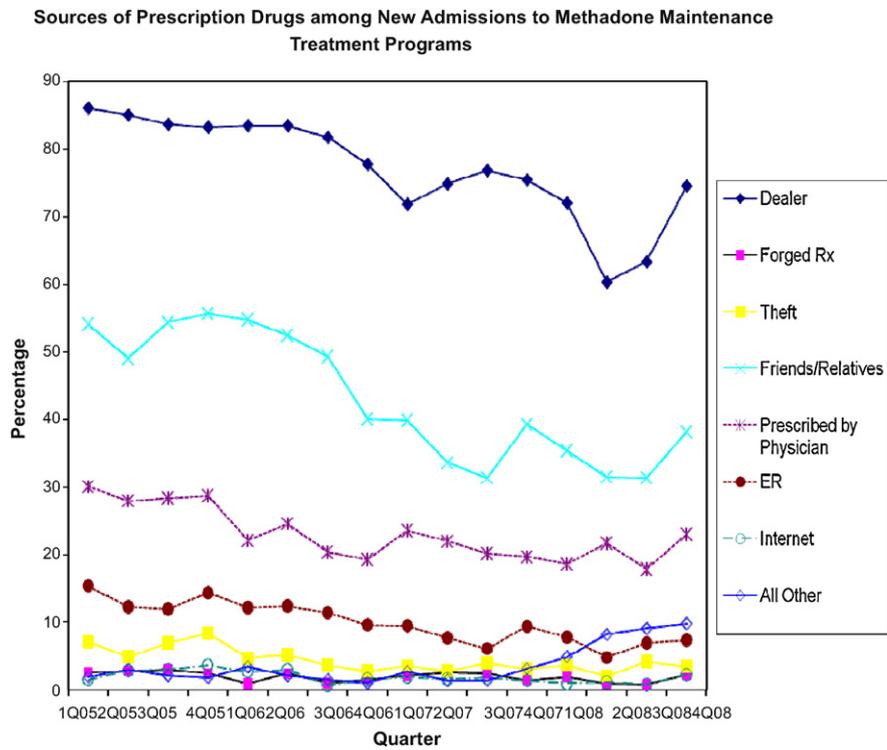


Fig. 2. Sources of prescription drugs among new admissions to methadone maintenance treatment programs.

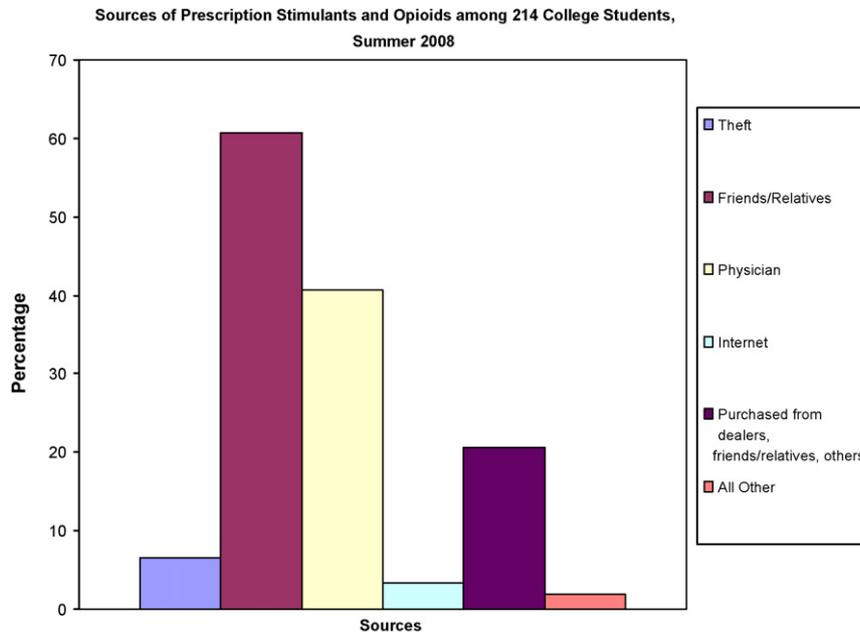


Fig. 3. Sources of prescription stimulants and opioids among 214 college students, summer 2008.

3. Results

3.1. Survey of Key Informants' Patients (SKIP)

Among the 4008 respondents in SKIP, the mean age was 35.3; 45% were women; 78% were white, 8.4% black/African American, 6% Hispanic, and 7.4% endorsed some other race/ethnicity; 57% reported employment as their major source of income; and the mean number of different types of opioids used in the past month was 1.8. The prescription opioids most frequently endorsed as primary drugs were controlled-release oxycodone

(24.7%), hydrocodone (23.5%), methadone (9%), immediate release oxycodone (4.7%), and morphine (4%). The remaining opioids were each endorsed as a primary drug by fewer than 2% of the respondents (fentanyl, 1.5%; buprenorphine, 1.3%; and tramadol, 0.3%).

Overall, for the 4-year survey period, the three most frequently accessed sources for acquiring a primary drug were dealers (62%), friends or relatives (52%), and a doctor's prescription (41%). The remaining sources were theft (15%), emergency rooms (9%), forged prescriptions (6%), and the Internet (3%). All other sources totaled some 3% (see Fig. 1).

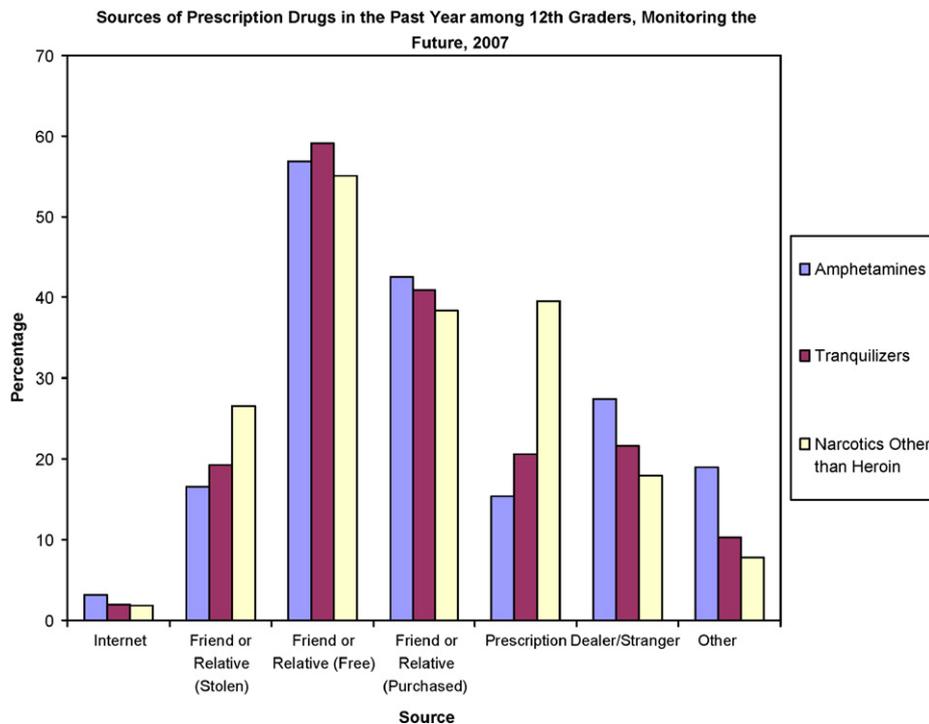


Fig. 4. Sources of prescription drugs in the past year among 12th graders, Monitoring the Future, 2007.

Table 1
Sources of prescription drugs for most recent non-medical use among past year users.

	Pain relievers ^a	Tranquilizers ^b	Prescription stimulants ^c	Sedatives ^d
One doctor	18.1	9.5	9.7	e
More than one doctor	2.6	1	0.6	1.1
Forged prescription	0.2	0.2	0.3	e
Stolen from doctor's office, clinic, hospital, or pharmacy	0.3	0.3	1.3	1.2
Friend or relative for free	56.5	60.9	53.9	65.4
Bought from friend or relative	8.9	12.3	16.2	4.4
Stolen from friend or relative	5.2	6.6	4.9	2.5
Drug dealer or other stranger	4.1	4.9	6.8	4.5
Internet	0.5	1	4.1	0.7
Other	3.7	3.4	2.3	3.6

NSDUH (2007).

Note: Estimates include (a) past month users who reported a single source of obtaining drugs during the past 30 days, (b) past month users who identified their last source of obtaining drugs after reporting multiple sources of obtaining drugs in the past 30 days and (c) all other past year users who reported their last source of obtaining drugs.

^a Pain relievers include hydrocodone, oxycodone, hydromorphone, methadone and morphine.

^b Tranquilizers include benzodiazepines, azaspirodecanediones, and muscle relaxants.

^c Prescription stimulants include methamphetamines, amphetamines, and methylphenidate.

^d Sedatives include barbiturates and some benzodiazepines (temazepam, flurazepam, triazolam) not included under tranquilizers.

^e Low precision, no estimate reported.

Compared to other drugs, hydrocodone was more frequently acquired via the Internet (2.2% vs. 2.7%, Chi-square = 14, $p < 0.00001$). Of the nine respondents who reported tramadol as their primary drug, three claimed to have obtained it via the Internet, which is considerably higher than all of the other drugs (33% vs. 4.7% Chi-square = 16, $p < 0.001$). None of the patients who indicated immediate release oxycodone and buprenorphine as primary drugs reported obtaining them through the Internet ($p < 0.01$). Compared to other drugs, methadone was less frequently acquired from the Internet (5.2% vs. 2.9%, Chi-square = 1.7, $p = 0.19$) and controlled-release oxycodone was also less frequently acquired (5.6% vs. 3.7%, Chi-square = 2.9, $p = 0.09$) in this manner. Yearly breakdowns for the proportions endorsing the Internet as a source were: 3.4% in 2005, 4.3% in 2006, 3.8% in 2007, and 1.5% for 2008 (see Fig. 1). No socio-demographic variables were significantly associated with accessing the Internet as a source for opioids.

3.2. Opioid Treatment Program (OTP)

Among the 9008 respondents in the OTP system, the mean age was 31.9; 41% were women; 94.5% were white, 1.9% Hispanic, 1.6% black/African American, and 2.0% endorsed some other race/ethnicity. Two-thirds (67%) reported that this was their first episode of methadone maintenance treatment and 57% reported employment as their major source of income. The mean number of different types of opioids used in the past month was 3.22. The prescription opioids most frequently endorsed as primary drugs were controlled-release oxycodone (45%), hydrocodone (20%), and methadone (12%). The remaining opioids were each endorsed as a primary drug by fewer than 10% of the respondents, and in particular, buprenorphine and tramadol were endorsed as a primary drug by fewer than 1% of the respondents. The three most frequent sources for acquiring a primary drug were dealers (78%), friends or relatives (44%), and a doctor's prescription (23%). The remaining sources were emergency rooms (10%), theft (5%), the Internet (2%), forged prescriptions (2%), and other ways (3%) (see Fig. 2).

Compared to other drugs, hydrocodone was more frequently acquired via the Internet (1.3% vs. 5.1%, Chi-square = 99.4, $p < 0.00001$), and methadone was less frequently acquired from the Internet (2.3% vs. 0.8%, Chi-square = 9.96, $p = .0016$). Similarly, controlled-release oxycodone was less frequently acquired (2.8% vs. 1.1%, Chi-square = 32.5, $p < 0.00001$) via the Internet. As illustrated in Fig. 2, the yearly breakdowns for the proportions reporting the Internet as a source for prescription drugs were 3% in 2005,

2.0% in 2006, 1.7% in 2007, and 1.3% in 2008 (Chi-square = 17.1, $p = 0.00004$). None of the socio-demographic variables were significantly associated with the Internet as source for opioids.

3.3. College Survey

Among the 214 respondents in the December 2008 launch of the College Survey, 69.6% were women; 72.9% were white, 15.9% Hispanic, 5.1% Asian, 3.3% African American, and the remaining 2.8% reported some other race/ethnicity. Nearly three-quarters of the respondents (71.5%) were enrolled in 4-year colleges, and most (66.8%) reported residing in off-campus housing. The most frequently endorsed prescription drugs were stimulants, with 61.2% reporting methylphenidate use in the current semester and 60.7% reporting amphetamine use. Among prescription opioids, the most frequently endorsed were hydrocodone (30.8%), immediate release oxycodone (15.9%), extended release oxycodone (12.2%), and morphine (7.0%). Regardless of the drug type, and as illustrated in Fig. 3, the three most frequently accessed sources for acquiring prescription drugs were friends and/or relatives for free (60.7%), physicians (40.7%), and purchases from dealers, friends/relatives, or others (20.6%). Only 7 (3.3%) respondents reported using the Internet as a source for obtaining prescription drugs. Five individuals reported obtaining a prescription stimulant from the Internet, one reported obtaining both a prescription stimulant and fentanyl, and one reported obtaining fentanyl and hydromorphone.

Compared to users of opioids only, stimulant users were more likely to acquire prescription medications via the Internet (0% vs. 5.0%, Chi-square = 3.825, $p = 0.05$). Male college students were more likely than their female counterparts to report the Internet as a source of prescription drugs (7.7% vs. 1.3%, Chi-square = 5.77, $p = 0.016$). With the exception of gender, none of the other socio-demographic variables we examined was associated with Internet acquisition of prescription drugs.

3.4. Monitoring the Future (MTF)

In the 2007 MTF survey, 9.2% of 12th grade students reported past year misuse of "narcotics other than heroin"; 7.5% reported misusing prescription stimulants; and 6.2% reported misusing prescription tranquilizers. As illustrated in Fig. 4, the major source for obtaining prescription drugs was friends/relatives (whether they were for free, purchased or stolen), followed by physicians and dealers/strangers. The Internet played a small role, 1.8% for opioids, 3.1% for amphetamines, and 1.9% for tranquilizers.

Table 2
Sources of prescription drugs obtained by friends and/or relatives and provided to past month users.

	Pain relievers ^a	Tranquilizers ^b	Prescription stimulants ^c	Sedatives ^d
One doctor	81	75.1	72	91.7
More than one doctor	2.9	2.3	3.4	2.7
Forged prescription	0.1	0.1	0	^e
Stolen from doctor's office, clinic, hospital, or pharmacy	0.8	0.4	0.2	^e
Friend or relative for free	6.6	10.5	12.7	3.7
Bought from friend or relative	4.8	5.1	7.1	1.4
Stolen from friend or relative	1.1	1.3	0.7	0.3
Drug dealer or other stranger	1.8	3.3	1.3	^e
Internet	0.1	0.2	1.3	0.1
Other	0.8	1.9	1.2	0.2

NSDUH (2007).

Note: Estimates include (a) past month users who reported a single source of obtaining drugs during the past 30 days, (b) past month users who identified their last source of obtaining drugs after reporting multiple sources of obtaining drugs in the past 30 days and (c) all other past year users who reported their last source of obtaining drugs.

^a Pain relievers include hydrocodone, oxycodone, hydromorphone, methadone and morphine.

^b Tranquilizers include benzodiazepines, azaspirodecanediones, and muscle relaxants.

^c Prescription stimulants include methamphetamines, amphetamines, and methylphenidate.

^d Sedatives include barbiturates and some benzodiazepines (temazepam, flurazepam, triazolam) not included under tranquilizers.

^e Low precision, no estimate reported.

3.5. National Survey of Drug Use and Health (NSDUH)

In the 2007 NSDUH survey, 6.6% of the general population ages 12 and above reported misusing “psychotherapeutics” (prescription pain relievers, tranquilizers, stimulants, or sedatives) *in the past year*. For pain relievers (oxycodone, hydrocodone, and morphine), 5% reported misuse (including OxyContin 0.3%); 2.1% reported misusing tranquilizers, 1.2% stimulants, and 0.3% sedatives.

As illustrated in Table 1, NSDUH respondents reported obtaining their prescription drugs from a variety of sources, but most commonly from friends and/or relatives for free (56.5% for pain relievers, 60.9% for tranquilizers, 53.9% for stimulants, and 65.4% for sedatives), followed by a physician (18.1% for pain relievers, 9.5% for tranquilizers, 9.7% for stimulants, and less than 0.1% for sedatives). As for the Internet, the proportions were quite small – 0.5% for pain relievers, 1.0% for tranquilizers, 4.1% for stimulants, and 0.7% for sedatives. At 4.1%, stimulants were the prescription drugs most commonly obtained via the Internet.

With friends and/or relatives emerging as one of the primary sources for prescription drugs in these various datasets, the NSDUH survey offers some insights into where friends are obtaining these drugs. For example, as illustrated in Table 2, a physician was the most common source (81.0% for pain relievers, 75.1% for tranquilizers, 72.0% for stimulants, and 91.7% for sedatives) for friends/relatives to obtain medication, whereas the Internet was among the least common sources (0.1% for pain relievers, 0.2% for tranquilizers, 1.3% for stimulants, and 0.1% for sedatives).

Table 3 summarizes the data on sources of drug acquisition reported across the five surveillance systems we examined. For

the sake of comparability across datasets, this table was limited to information on prescription opioid acquisition. While there is some variation in the collection and reporting of diversion mechanisms across these systems, this summary table indicates considerable uniformity across systems in the prevalence of physicians, friends/relatives, and the Internet as sources of diversion.

4. Discussion

According to the Pew Internet and American Life Project, the overwhelming majority of Americans use the Internet – 93% of youths ages 12–17, and 74% of adults ages 18 and above (Pew, 2009). Although the 12–17 year age cohort contains the highest proportion of users, young adults ages 18–29 are not far behind. E-mail is the major online activity for all age groups, however, market research and industry analyses indicate that online sales for all types of products and merchandise are increasing in all age groups (Plunkett, 2009). With regard to Internet sales of prescription drugs, in a recent analysis of 365 web sites offering controlled substances for sale online, 42% explicitly stated that no prescription was needed, 45% offered an “online consultation,” and 13% made no mention of a prescription (CASA, 2008). Given the documented escalation of prescription drug abuse reported in both national and regional data sources, and the apparent proliferation of “no-prescription” Internet pharmacy sites as a source for prescription medications, this paper examined five national data sets for the purpose of indicating how common obtaining prescription drugs from the Internet actually is, which medications are being purchased without a prescription, and who might be the possible populations of “end users” of these drugs. The data sets included in these analyses are three programs in the RADARS System (2005–2008), the 2007 National Survey on Drug Use and Health, and the 2007 Monitoring the Future survey.

Among the 4008 respondents in the RADARS SKIP System, the three most frequently accessed sources for acquiring a primary prescription drug were dealers (62%), friends and/or relatives (52%), and a doctor's prescription (41%), with the Internet accounting for only 3%. Compared to other drugs, hydrocodone was more frequently acquired via the Internet, whereas controlled-release oxycodone was less frequently acquired. Moreover, there seemed to be a declining use of the Internet as a source, ranging from a high of 4.3% in 2006 to 1.5% in 2008.

Among the 9008 respondents in the RADARS OTP System, the three most frequently accessed sources for acquiring a primary drug were dealers (78%), friends or relatives (44%), and a doctor's prescription (23%), with the Internet accounting for only 2.1%.

Table 3
Sources of prescription opioid acquisition by surveillance system.

	SKIP	OTP	College ^a	NSDUH	MTF
Dealer	62	78	19.8 ^b	4.1	17.9
Friends/relatives	52	44	52.6	65.4	93.5
Doctor	41	23	38.8	20.7	39.5
Emergency rooms	9	10	NR	NR	NR
Theft	15	5	6	5.5 ^c	26.6 ^c
Forged prescription	6	2	NR	0.2	NR
Internet	3	2	1.7 ^d	0.5	1.8
Other	3	3	0	3.7	7.7

NR = not reported.

^a Includes only opioid users, $n = 116$.

^b Includes purchases from friends, relatives, and dealers.

^c Includes theft from friends/relatives.

^d Based on two responses.

The use of the Internet peaked at 3.7% during the 4th quarter of 2005, declining to 2.2% in the last quarter of 2008. Consistent with SKIP results, compared to other drugs, hydrocodone was more frequently acquired via the Internet, whereas controlled-release (CR) oxycodone was less frequently acquired. Methadone (like CR-oxycodone, a Schedule II medication) was also less frequently acquired via the Internet.

The findings from these two large, longitudinal samples of drug abusers in treatment suggest that dealers were the major source for obtaining prescription drugs among opioid abusers. Moreover, the findings add to the emerging data-based literature documenting that the Internet represents a negligible and declining source for accessing scheduled opioid medications (Cicero et al., 2008; Boyer and Wines, 2008; Inciardi et al., 2009a; Surratt et al., 2006). The positive association between the Internet as a source for hydrocodone (a Schedule III medication) and the negative association between the Internet as a source for two Schedule II medications (methadone and controlled-release oxycodone) may reflect the comparatively greater difficulty in acquiring Schedule II medications from online sources. Tramadol, an unscheduled opioid-like medication, has been previously reported to be easily available from the Internet (Cicero et al., 2008). But since only 9 respondents in SKIP and 10 respondents in OTP reported tramadol as their primary drug, sample size limited our ability to conduct analyses to adequately determine whether the Internet was a significant source for this medication among prescription opioid abusers.

Among the 214 respondents in the RADARS System College Survey, the three most frequently accessed sources for acquiring prescription drugs were friends and/or relatives for free (60.7%), physicians (40.7%), and purchases from dealers, friends/relatives, or others (20.6%). Only 7 (3.3%) respondents reported using the Internet a source for obtaining prescription drugs.

If not treatment clients or college students, then who are the end users of drugs purchased via the Internet without a prescription? The NSDUH data may provide some preliminary insights. In the NSDUH survey, for example, 6.6% of persons ages 12 and above reported the misuse of prescription drugs during 2007. On a national basis, this prevalence estimate would correspond to some 16 million persons. And among these users, 0.5% or 80,000 individuals reported obtaining pain relievers via the Internet, 1.0% or 160,000 persons for tranquilizers, 4.1% or 656,000 persons for stimulants, and 0.7% or 112,000 persons for sedatives. Here again we see that the online purchase of prescription medications is proportionately low. Nevertheless, considered from a slightly different perspective, the NSDUH survey would appear to indicate that there are significant numbers of individuals in the general population obtaining prescription drugs via the Internet, and that stimulants are the drugs most often purchased through this mechanism. Although data on the specific stimulants purchased from the Internet are not available from this national survey, recent research indicates that Schedule III stimulants are more widely available for online purchase than Schedule II stimulant medications (Schepis et al., 2008).

The three RADARS programs we examined, along with NSDUH and MTF, indicate that the use of the Internet as a source for prescription drugs is generally rare. The use of these multiple data sources, each with a national focus, is an important strength of our approach to this analysis. We believe that the concordance of data drawn from these widely disparate sources constitutes a significant piece of evidence that prescription drug acquisition on the Internet is limited in scope, particularly among the individual end-users of these drugs. The broad inclusion of diverse populations in our analysis, including Internet-savvy high school and college students, chronic drug users, and members of the general population, clearly lends broad support to this overall finding.

Despite these consistent findings, there are several limitations to the data in this report. First, despite the fact that all three RADARS programs are national in scope, they cannot be considered nationally representative samples. The individuals surveyed as part of SKIP, for example, included 4008 patients in 101 programs in 42 states. Although the geographical coverage is quite broad, they represent only a small proportion of the more than 700,000 annual substance abuse treatment admissions for “opioids” in the U.S. – defined in the Treatment Episode Data Set to include codeine, hydrocodone, hydromorphone, meperidine, morphine, opium, oxycodone, pentazocine, propoxyphene, tramadol, and any other drug with morphine-like effects, except methadone (SAMHSA, 2006). A similar situation is present in the OTP system. Data were collected in 81 methadone maintenance treatment programs located in 34 states, nevertheless, the sample contains few of the 1200 methadone programs and almost 266,000 methadone patients in the United States (SAMHSA, 2009). In addition, because both SKIP and OTP concentrated their data collection in high prevalence areas for prescription opioid abuse, the sampled users may have reported more extensive opioid involvement than would be found in nationally representative samples of treatment and methadone clients. Nevertheless, even among these heavily opioid-experienced groups, the use of the Internet to obtain such medications is quite low and comparable to the reports from the other data sources reviewed in this paper.

The RADARS System College Survey data set possesses similar limitations to those described for SKIP and OTP. Although the survey distribution is broad with attention to geographic diversity, the sample we utilized in this report is quite small and is likely not representative of the U.S. college population. The survey was originally sent to a sample of 60,010 students, of which only 18.6% ($N = 11,174$) actually filled it out. Of these 11,174 students, only 16.7% ($N = 1866$) met the eligibility criteria and completed the questionnaire correctly. However, it should also be noted here that this low figure is also due to the fact that the survey closes after 2000 valid responses are received, usually within only a few days after launch. Nevertheless, because of the substantial level of non-response, sample bias is a potential issue in the College Survey. Unfortunately, we are unable to examine this potential due to the lack of available data on non-responders in this system. Prior research with college student samples has generally found either no significant differences on substance use measures between responders and non-responders to web-based surveys (McCabe, 2008), or higher levels of substance use among responders (Cranford et al., 2008). If we assume that responders in the present College Survey follow the previously reported patterns of equal or higher drug-involvement than non-responders, the reported low prevalence of Internet use to obtain prescription medications would appear to be compelling.

An additional caveat to the SKIP and OTP data sets is that source data were collected only for the respondents' primary drug, although many respondents endorsed the use of other opioids as well. Also, these two data sets were limited in scope to opioid medications.

A final limitation to the study involves all of the data sets we analyzed, including the MTF and NSDUH studies. It is not known, for example: (1) how often the Internet was used to purchase prescription drugs; (2) how many drugs were involved in each purchase; (3) whether the drugs received were those that were ordered; and, (4) if any prescription drugs were actually received.

A finding of particular interest is the high proportion of respondents who indicate accessing prescription opioids from dealers: 62% of the patients in the RADARS SKIP System and 78% of the clients in the RADARS OTP System. Despite these and other reports indicating dealers as a primary source for diverted medications, additional data on this phenomenon are generally unavailable – primarily because dealers are a difficult population to access. Both the Drug

Enforcement Administration (DEA) and the National Drug Intelligence Center (NDIC) have reported that large quantities of Schedule III and IV medications are being acquired through the Internet, yet both agencies are vague as to whether it is drug dealers or individual users who are making the purchases (NDIC, 2009). NDIC has indicated that street gangs and outlaw motorcycle gangs are becoming increasingly involved in the retail distribution of drugs obtained via the Internet, but no supporting documentation has generally been provided (NDIC, 2009).

One of the few recently published papers addressing the sources of “dealers” and “pill brokers” was a small rapid assessment study conducted in Wilmington, Delaware, during December 2006 (Inciardi et al., 2009b). Three dealers and two pill brokers were interviewed at length. Prescription drug “dealers” in this study were typically drug abusers who hustled prescription medications and other drugs whenever and however they could to help support their own drug habits. None of these dealers reported accessing the Internet, and all three generally had only small supplies for sale. By contrast, the two “pill brokers” interviewed tended to be more organized than dealers, and were not abusers. Most specialized in any type of prescription medication, regularly worked with a consistent crew of people—purchasing drugs from a given set of “doctor shoppers,” pain patients, pharmacists, or even physicians. Neither of these brokers had used the Internet to obtain drugs.

Our analysis offers some useful insight on the Internet as a source for purchasing prescription medications. Importantly, we documented uniformly low rates of prescription drug acquisition from online sources across all five data systems we examined. The consistency of this finding across very diverse populations suggests that the Internet is a relatively minor outlet for illicit purchases of prescription medications by the individual end-users of these drugs. Nevertheless, Internet acquisition of prescription medications by dealers and distributors would appear to be quite visible to law enforcement agencies, and may comprise the bulk of online prescription drug purchasing activities in the U.S. at this time.

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