



Trends in medical use, diversion, and nonmedical use of prescription medications among college students from 2003 to 2013: Connecting the dots



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HIGHLIGHTS

- We examined trends in medical use, diversion and nonmedical use of prescription medications.
- Medical use, diversion and nonmedical use of prescription opioids decreased over time.
- Medical use, diversion and nonmedical use of prescription stimulants increased over time.
- Medical use trends parallel changes in diversion and nonmedical use of the same prescription medication classes.

ARTICLE INFO

Available online 12 March 2014

Keywords:

Trend
Prescription medication
College students
Nonmedical use
Substance abuse
Diversion

ABSTRACT

Objectives: To examine trends in the lifetime and past-year prevalence of medical use, diversion, and nonmedical use of four prescription medication classes (i.e., sedative/anxiety, opioid, sleeping, and stimulant) among college students between 2003 and 2013; and to identify demographic and background characteristics associated with trends in past-year nonmedical use of prescription medications.

Methods: A self-administered, cross-sectional Web survey was conducted in 2003, 2005, 2007, 2009, 2011, and 2013 at a large public four-year university in the Midwest United States.

Results: Approximately one in every five individuals reported nonmedical use of at least one prescription medication class in their lifetime. The past-year prevalence of medical use, diversion and nonmedical use of prescription stimulants increased significantly between 2003 and 2013 while the past-year prevalence of medical use, diversion and nonmedical use of prescription opioids decreased significantly over this same time period. The odds of past-year nonmedical use of each prescription medication class were generally greater among males, Whites, members of social fraternities and sororities, and those with a lifetime history of medical use of prescription medications or a past-year history of being approached to divert their prescription medications.

Conclusions: The present study represents the first investigation to demonstrate that trends in medical use of controlled medications parallel changes in diversion and nonmedical use of the same medication class among college students. The findings reinforce the importance of continued monitoring of prescription medication use at colleges to help guide prevention and intervention efforts.

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1. Introduction

Although several studies have reported recent increases in the prescribing of controlled medications (e.g., sedative/anxiety, opioid, sleeping, stimulant) among children, adolescents and young adults in

the United States (Fortuna, Robbins, Caiola, Joynt, & Halterman, 2010; Thomas, Conrad, Casler, & Goodman, 2006; Zuvekas & Vitiello, 2012), there is a lacuna of knowledge regarding recent trends in medical use of controlled medications among college students in the United States, and related behaviors such as diversion and nonmedical use. And once medical users divert (e.g., sell, trade, or give away) their own medications to peers, these medical users create nonmedical users (e.g. a person who uses controlled medications without their own prescription).

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In this way, medical use, diversion and nonmedical use of prescription medications are inter-related behaviors, especially among adolescents and young adults who rely primarily on their peers as sources of diversion for nonmedical use (Arria et al., 2008; Arria & DuPont, 2010; Johnston, O'Malley, Bachman, & Schulenberg, 2013; McCabe et al., 2007a, 2011).

Analyzing data from the Monitoring the Future (MTF) study, Johnston, O'Malley, Bachman and Schulenberg (2013) examined the trends in nonmedical use of prescription medications among college students and found evidence of significant changes over the past decade. However, the MTF study does not report trends in diversion and medical use among college students, and study measures for nonmedical use changed over time, combining "street" drugs in some prescription categories. For example, the MTF study introduced new medications (e.g. Adderall® in 2007) and included "street" drugs (e.g. crystal methamphetamine) in the same question with prescription amphetamines (e.g. Ritalin®). As a result, trends in nonmedical use of prescription medications among college students over the past decade that are estimated using the MTF data are difficult to interpret. The National Epidemiologic Survey on Alcohol and Related Conditions and the National Survey on Drug Use and Health both suffer from similar measurement limitations (Boyd & McCabe, 2008; Hubbard, Pantula, & Lessler, 1992).

The past-year prevalence of nonmedical use of prescription medications increased significantly between 1993 and 2001 among U.S. college students and varied considerably between individual U.S. colleges (McCabe et al., 2005a, 2007b, 2011). For example, College Alcohol Survey (CAS) data collected from 10,904 college students who were randomly selected from a nationally representative sample of 119 U.S. colleges in 2001 revealed that the past-year prevalence rates of non-medical use of prescription medications (i.e., sedative/anxiety, opioid, sleeping, and stimulant) ranged from zero percent at the lowest use schools to 31% at the highest use school (McCabe et al., 2011). Unfortunately, the CAS did not contain measures of diversion and medical use of prescription medications and has not collected data recently.

Although previous college-based cross-sectional regional and national studies indicate that the nonmedical use of prescription medications is generally more prevalent among males, Whites, members of social fraternities and sororities, and those with a lifetime history of medical use of prescription medications (Johnston et al., 2013; McCabe, 2008a, 2008b; McCabe et al., 2005a, 2005b, 2007a), it remains unknown whether these characteristics remain significantly associated with nonmedical use of prescription medications over time. The main objectives of the present study were to 1) examine the trends in lifetime and past-year prevalence of medical use, diversion, and nonmedical use of prescription medications between 2003 and 2013 among college students; and 2) identify demographic and background characteristics associated with trends in nonmedical use of prescription medications between 2003 and 2013.

2. Materials and methods

2.1. Data collection

After receiving Institutional Review Board approval [H03-00002776-R2], the College Student Life Survey (CSLS) was conducted during a one-month period, drawing on the total undergraduate population of full-time students attending a large public research university located in the Midwest United States in the winter semesters of the 2003 (N = 21,294), 2005 (N = 20,138), 2007 (N = 25,555), 2009 (24,574), 2011 (N = 25,874) and 2013 (N = 26,156) school years. A simple random sample of full-time students was drawn from the total undergraduate population for each of the six studies. The University's Registrar Office provided the study team with the total student population during each Winter term and a computer program was used to randomly draw a sample from the total population.

The entire sample was sent a pre-notification letter describing the study and inviting students to self-administer a Web survey by using a URL address and unique password. Informed consent was obtained online from each participant. Non-respondents were sent up to three reminder e-mails. The CSLS instrument was maintained on an Internet site running under the secure socket layer protocol to ensure privacy and security. By participating in the survey, students became eligible for a sweepstakes that included cash and other prizes. The average response rate for the six study years was 50% based on guideline #2 (RR2) of the American Association for Public Opinion Research (The American Association for Public Opinion Research, 2011) which is similar to other studies of college students such as the CORE study (Presley & Pimentel, 2006), the CAS (Wechsler et al., 2002), and the National College Health Assessment (Zullig & Divin, 2012). The potential for non-response bias was assessed by administering a short form of the questionnaire via a brief telephone survey to a randomly selected sample of 159 students who did not respond to the original web survey and analyses of these data produced minimal evidence for nonresponse bias. In particular, there were no significant differences in prevalence rates of past-year alcohol use, binge drinking, 30-day cigarette smoking and other problem health behaviors between respondents who completed the original web survey and respondents to the follow-up phone survey (McCabe, 2008a; McCabe & Teter, 2007).

2.2. Sample

As illustrated in Table 1, the overall respondent sample across all six study years consisted of 21,771 undergraduate college students (56% female and 44% male). The mean age of respondents in the overall sample was 20 years of age (age range = 17 to 56). The racial/ethnic distribution for the overall sample was 68% White, 13% Asian, 6% African-American, 4% Hispanic, and 10% from other racial/ethnic categories. The demographic characteristics of the overall respondent sample closely resembled the characteristics of the undergraduate student population. For example, the mean age of the population was 20 years of age, and the population was 50% female, 65% White, 13% Asian, 7% African-American, 5% Hispanic and 10% from other racial/ethnic categories. Comparisons across study years indicated no statistically significant differences in terms of age, gender or fraternity/sorority membership distributions. However, study year was associated with race/ethnicity ($p < 0.001$), with African-Americans and individuals reporting other ethnicity having slightly higher than expected representation (7.9% and 13.5%) in 2009, and Asians having higher than expected representation in 2011 (15.1%).

2.3. Measures

For all six study years between 2003 and 2013, the web-based CSLS assessed demographic characteristics (e.g., age, gender, race/ethnicity) and included items adapted from several national studies of alcohol and other drug use (Johnston et al., 2013; Substance Abuse Mental Health Services Administration, 2009). Many of these substance use items are known to be valid and reliable for population-based research using multiple modes of data collection, including pencil-and-paper, mail, and web-based surveys (Johnston & O'Malley, 1985; McCabe, 2004; O'Malley, Bachman, & Johnston, 1983). Standard measures of substance use were included, such as nonmedical use of prescription medications, medical use of prescription medications, being approached to divert prescription medications, marijuana use, other drug use, and problems related to drug use in the past year.

Nonmedical use of prescription medications was assessed with the following items: "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 the past 12 months) have you used the following types of drugs not prescribed to you?" A separate question was asked for each of the following four

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