Published in final edited form as:

Subst Use Misuse. 2011 ; 46(1): 66–76. doi:10.3109/10826084.2011.521371.

Connecting to Young Adults: An Online Social Network Survey of Beliefs and Attitudes Associated With Prescription Opioid Misuse Among College Students

Sarah Lord^{1,2}, Julie Brevard³, and Simon Budman²

¹National Development and Research Institutes, New York, New York, USA

²National Development and Research, Cambridge, Massachusetts, USA

³Vericode, Holliston, Massachusetts, USA

Abstract

A survey of motives and attitudes associated with patterns of nonmedical prescription opioid medication use among college students was conducted on Facebook, a popular online social networking Web site. Response metrics for a 2-week random advertisement post, targeting students who had misused prescription medications, surpassed typical benchmarks for online marketing campaigns and yielded 527 valid surveys. Respondent characteristics, substance use patterns, and use motives were consistent with other surveys of prescription opioid use among college populations. Results support the potential of online social networks to serve as powerful vehicles to connect with college-aged populations about their drug use. Limitations of the study are noted.

Keywords

online social networks; college students; prescription drug misuse; beliefs and attitudes; perceived risks; survey methodology

INTRODUCTION

Nonmedical use of prescription medications by young adults aged 18–25 years is a growing public health problem in the United States (Johnston, O'Malley, Bachman, & Schulenberg, 2006; Substance Abuse and Mental Health Services Administration [SAMHSA], 2007).

Nonmedical use, or misuse, is typically defined as use without a prescription or for reasons

Copyright © 2011 Informa Healthcare USA, Inc.

Address correspondence to Sarah Lord, National Development and Research, One Broadway, 14th Floor, Cambridge, MA 02142; lord@ndri.org..

The first author was an employee of Inflexxion, Inc., at the time of this study.

Portions of this research were presented at the Society for Prevention Research 16th Annual Meeting, San Francisco, CA, May 2008; the annual conference of The College on Problems of Drug Dependence, Quebec City, Quebec, June, 2007; and the Addiction Health Services Research Conference, Little Rock, Arkansas, October, 2006.

Declaration of interest The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the article.

other than prescribed by a physician. Recent survey data indicated that prevalence of nonmedical use of *any* prescription medication in United States was highest among young adults aged 18–25 years, compared with all other age groups, and prescription opioid analgesics are among the most widely misused medications among this age group (SAMHSA, 2007). Twenty-six percent of those aged 18–25 years have misused prescription opioids analgesics in their lifetime, and 12% have misused in the past year (SAMHSA, 2007). The consequences of nonmedical prescription opioid misuse are substantial. Recently, over half of all drug-related suicide attempts reported to emergency departments involved prescription pain medications (SAMHSA, 2008). Misuse of prescription opioid medications is not isolated to the United States. A recent report by the UN International Narcotics Control Board (2009) indicated that misuse of prescription medications exceeds the use of illicit street narcotics worldwide.

College students are an important segment of the 18- to 25-year-old demographic. National survey studies conducted in the United States indicate an overall prevalence of about 12% for lifetime nonmedical use of prescription opioids among college students and about 7% for past-year misuse (McCabe, Teter, Boyd, Knight, & Wechsler, 2005). College students represent a heterogeneous population and there is considerable variation in rate of prescription analgesic misuse among student subgroups. Recent studies have focused on identifying individual characteristics and motivations associated with increased likelihood of prescription opioid misuse (McCabe, Teter, & Boyd, 2005; McCabe, Teter, Boyd, Knight et al., 2005). Factors that differentiate those who have misused prescription opioids from those who have not included being male, being white, living off campus, membership in a fraternity or sorority, and low academic achievement (McCabe, Teter, & Boyd, 2005; McCabe, Teter, Boyd, Knight et al., 2005). Reported motives for misuse include recreation (e.g., to get high) and self-treatment (e.g., to relax, to cope with chronic pain, to deal with depression; McCabe, Cranford, Boyd, & Teter, 2007). Nonmedical prescription opioid use has also consistently been shown to be associated with higher levels of alcohol and other illicit drug use among college-aged students (Lord et al., 2009; McCabe, Teter, Boyd, Knight et al., 2005).

Less research attention has focused on determining individual differences in typologies of prescription opioid misuse among college students who misuse prescription opioids to varying degrees, for example, those who have experimented with prescription drugs in their lifetime versus those who misuse these medications on a more regular basis (i.e., once a month or more). In addition, very little research has examined the diverse beliefs and attitudes that college students have about prescription drug misuse. In one of the only studies to examine perceived risk regarding prescription drug misuse, Arria, Caldeira, Vincent, Grady, and Wish (2008) found that college students who perceived a lower risk of harm from occasional use of prescription opioids were more likely to have misused opioid medications than those who perceived higher risk associated with misuse. A better understanding of the phenomenology underlying different levels of prescription drug misuse will arm health educators and practitioners with information to develop targeted intervention strategies for the range of prescription drug use involvement by students.

The goals of this study were to gain a better understanding of the beliefs and attitudes that college students have about prescription drug misuse and to begin to characterize the factors associated with different levels of prescription opioid misuse. These research questions required a large sample of students who endorsed nonmedical use of prescription opioid medications. Online social networking forums, such as Facebook and MySpace, offer rich vehicles for easy and cost-effective access to a broad range of college-aged young people. Facebook currently has 500 million users worldwide, over half of whom are daily users (Facebook Press Room, 2010). A recent Internet tracking analysis revealed that Facebook has surpassed Google as the most-visited Web site on the Internet (Hitwise Analytics, 2010). Facebook is the most popular site among college students (Anderson Analytics, 2009). Students use Facebook for a variety of purposes, including connection with acquaintances, friends, and family; sharing opinions and interests; gathering information; and receiving and providing support from others. Members can join virtual groups based on common interests. In a recent study, Ellison, Steinfield, and Lampe (2007) found a strong association between Facebook usage and students' social capital, further underscoring that online social networks are an important aspect of the social life of college-aged young people.

This article describes the methodology and results of a survey study conducted on Facebook in the fall of 2005 to tap into college students' motivations, beliefs, and attitudes associated with nonmedical prescription opioid analgesic and stimulant use. The study specifically targeted students who indicated misuse of either of these prescription medications in their lifetime. The results herein described focus on nonmedical prescription opioid analgesic use. The primary aims of the study were to (1) assess the feasibility of implementing a survey study about prescription medication misuse with college students on Facebook and (2) identify the characteristics, motivations, beliefs, and attitudes associated with experimental versus regular misuse of prescription opioid analgesic medications.

METHODS

This study was approved by the Institutional Review Board at Inflexxion, Inc. In the fall of 2005 an anonymous online survey was advertised for a 2-week period on the Facebook home pages of 24 of 4-year colleges and universities whose students had signed up for the social networking Web site. Prior to the onset of the study the project team established a working relationship with the sales and marketing division of Facebook. It is important to note that, at the time of the study, Facebook was a relatively new phenomenon with an audience of approximately 2.5 million student users. Membership was restricted to students with a host institution e-mail (i.e., with the “.edu” extension).

Recruitment

Schools were randomly selected from the universe of schools enrolled with Facebook to ensure geographic representation from all parts of the country. For the purposes of this study, only 4-year public and private colleges and universities were considered for inclusion. The research team worked with an Internet marketing expert to develop a text advertisement to target students who had used prescription drugs nonmedically. The advertisement was randomly posted (by way of advertising impressions), by Facebook staff, on the Facebook

home page of each selected school over the 2-week study period. The random impressions helped to assure that users had an equal chance of seeing the advertisement. Facebook users who saw and then clicked on the advertisement were presented with a screen that described the study and a two-screen consent process before they received the survey. Inclusion criteria were clearly described on the introduction screen. Participants had to be current students, aged 18–25 years, who admitted to use of prescription opioid or stimulant medications nonmedically in their lifetime. No incentive was offered for participation in the study.

Survey Development

A 95-item survey was developed for this study. The survey included close-ended questions that tapped gender, race, school year, housing location (on-campus/off-campus), current academic grades, and fraternity or sorority membership. The survey also included the following drug-related constructs: lifetime and past-year nonmedical use of prescription opioid analgesics, other substance use, reasons for nonmedical medication use, age at which prescription opioids were first misused, sources of medications, perceived risk and expectancy outcomes, and peer drug use. To the greatest extent possible, items for the survey were derived from empirically based surveys of college-aged populations (Johnston et al., 2006; Presley & Vineyard, 2004). An open-ended question was included at the end of the survey to tap students' beliefs about non-medical use of prescription medications compared with use of other illicit drugs. The survey was programmed using the software package Perseus Survey Solutions (Version 6) and was piloted for language, comprehension, and format usability with representative end users before the final refined version was posted on Facebook.

Prescription Medication Misuse—Nonmedical prescription opioid use was assessed by the following item: “Which of the following prescription pain medications have you ever used for nonmedical reasons? Nonmedical means use of a prescription drug without a prescription or for reasons other than those indicated by a prescription.” Respondents indicated all prescription opioids they had ever misused from a list of 13 categories, with brand examples and street names: oxycodone (Oxycontin), oxycodone (Percocet, Percodan, Roxicet), hydrocodone (Vicodin, Lortab), propoxyphene (Darvocet, Darvon), acetaminophen with codeine (Tylenol with Codeine), Meriperidine (Demerol), hydromorphone (Dilaudid), norphindin, methadone, morphine (MS-Contin, Kadian, Avinza), fentanyl (Duragesic), fentanyl lollipop (Actiq), and tramadol (Ultram). A fake medication name, Norphindin, was included as a validity check.

The medication list also included an open-ended “other” category where respondents could enter any other specific opioid analgesic medication they had misused. Skip algorithms were built into the survey to ensure that respondents who indicated lifetime misuse of any of the medications were asked relevant follow-up items, including the age first misused, frequency of past-year misuse (1 = never to 8 = every day), reasons for misuse, and beliefs about prescription drugs.

Peer Drug Use—Two items were included in the survey to assess the degree to which respondents' peer groups were involved in drug use: “How many of your close friends use drugs other than alcohol?” (1 none to 5 all of them) and “In the past year, how often have you been around people who used prescription medications for non-medical reasons?” (1 = never to 5 = most of the time).

Motives—Motives for nonmedical use were assessed by a single item: “Please provide reasons why you have used prescription pain medications nonmedically.” Respondents were asked to check all that apply from a list of 13 motives: relax, have fun, experiment, manage chronic pain, cope with depression or anxiety, counteract other drugs, get high, improve concentration, increase alertness, perform better at school, manage weight, increase energy, and stay up all night. An open-ended “other” option was also included to allow respondents to add other motivations for misuse.

Beliefs—Twelve items were developed by the research team to tap students' beliefs about nonmedical prescription drug use in terms of accessibility, relative effects compared with other substances, and potential consequences. Items were measured on a 5-point Likert scale (1 = strongly agree to 5 = strongly disagree). Representative items included the following: “Prescription medications give me a better buzz/high than alcohol or other drugs”; “I like the effects of prescription medications better than alcohol or other drugs”; “Prescription medications are less expensive than alcohol or other drugs”; and “Compared to alcohol or other drugs you're less likely to get in trouble using prescription medications.”

Perceived Risks—Three items assessed students' perceptions of risk associated with misuse of prescription opioids to varying degrees (once or twice, occasionally, regularly). Items were measured on a 4-point scale ranging from “no risk” to “great risk.”

Alcohol and Other Drug Use—Past-year frequency of alcohol and other illicit drug use was assessed by a single query: “In the past year, about how often did you use each of the following?” The follow-up list included tobacco, alcohol, marijuana, methamphetamine, cocaine, tranquilizers/sedatives, hallucinogens, steroids, heroin, inhalants, and ecstasy. Street names of the drugs were included to promote ready identification. Respondents indicated frequency on an 8-point anchored scale (1 = never to 8 = every day). Respondents were also asked to indicate the number of standard alcoholic beverages consumed each day in the last 7 days.

Validity Checks—Online survey methodology has some inherent challenges in terms of assurance of reaching the target audience and the validity of data, particularly when implemented in an open manner on a social networking Web site. We took a number of steps to ensure the validity of the data collected in the study. First, participants were not paid or compensated in any way for responding to the survey, and they were informed of this in the consent form. We feared that an incentive, no matter how small, would increase the chances that some people would answer the survey repeatedly to receive multiple payments. Second, at the time of the study, Facebook could only be accessed by those with a valid institution e-mail address (with the extension “.edu”). The decision to implement the survey on this particular social network also reduced the chances of noncollege students responding

to the survey. Two types of data checks were also incorporated into the survey to identify respondent dishonesty. Respondents were asked their date of birth at the beginning of the survey and their age at the end of the survey. Data from respondents whose date of birth and age did not match were not used. In addition, as noted earlier, a fake medication was included in the prescription opioid list, and data from those who indicated use of this medication were excluded from the analyses.

Data Analysis

All analyses were conducted using SPSS 11.0. Bivariate analyses were conducted to examine differences between infrequent (less than once a month) and regular (once a month or more) misuse of prescription opioids in the past year as a function of student demographics (gender, race, age, year in school, academic performance, housing location, and fraternity/sorority membership), peer drug use, and motivational and attitudinal factors (reasons for use, beliefs about prescription drug misuse, and perceived risks). Multivariate logistic regressions were performed to examine the influence of demographics, peer context, motivations, beliefs, and perceived risks on the probability of regular prescription opioid misuse, adjusting for significant bivariate associations. Adjusted odds ratios (AORs) and 95% confidence intervals (CIs) are reported. Two-tailed significance was established at $p < .05$.

RESULTS

Response Characteristics

The response metrics to the text advertisement for the survey study indicate that the recruitment strategy was successful in reaching the college student audience. The average click-through rate (CTR, defined as the number of times that the ad was clicked per 100 ad impressions) ranged from 0.02% to 0.04%, which is consistent for a passive advertisement like the one used in this study (Haugtvedt, Machleit, & Yalch, 2005). Of the 2,583 students who clicked on the advertisement, 689 (27%) consented and completed the survey. The time it took to complete the survey exceeded the typical time that Internet users spend on an advertisement survey. Seventy-six percent (527) of the completed surveys were valid and met the inclusion criteria. Data from 37 respondents (5%) were deleted because of mismatch of date of birth and age; data from 12 respondents (1.8%) were deleted because of selection of the nonexistent prescription medication; and 120 respondents did not report any misuse of prescription opioids or stimulants in their lifetime in the survey. Item-level missing data was minimal (2% or less).

Subject Characteristics

Final respondent characteristics are depicted in Table 1. The sample was 41% female, 83% White (non-Hispanic), 7% Hispanic, 2.5% Asian (East Asian, Middle Eastern, Asian Indian), and 1% Black with 3% from other racial/ethnic group. These demographics are consistent with other studies that indicate that prescription opioid misuse is more prevalent among students who are White and male relative to their non-White and female counterparts (McCabe, Teter, Boyd, Knight et al., 2005). The mean age of respondents was 20 years ($SD = 2.5$). The sample was largely evenly distributed across 5 school years, with a quarter of

respondents in their 3rd year of college. Forty percent of respondents lived off campus, and approximately 20% were involved in fraternity or sorority life on campus.

Prescription Medication Misuse

Sixty-one percent of the sample reported having misused both prescription opioids and prescription stimulants at some point in their lives, and 18% of the sample had only misused prescription opioids. A majority of respondents who reported any nonmedical use of prescription opioids had misused in the past year (91%), and half indicated having done so “a few times.” Thirty percent of respondents (126) indicated that they had misused opioids regularly in the past year (defined as a frequency of once a month or more). Most respondents indicated that they had first misused prescription opioids in high school (56%) or junior high (8%).

The most frequently misused prescription opioids were oxycodone (Percocet, Percodon, Roxicet, Oxycontin: 70%), hydrocodone (Vicodin, Lortab: 67%), and acetaminophen with codeine (Tylenol with Codeine: 42%). The average number of different opioids misused by respondents was 2.4 ($SD = 2.2$). The most frequently cited source of medications was friends (85%). “Other” sources were also frequently reported (48%). Parents (18%) and other family members (12%) were also sources of medications. Online was the least reported source (5%).

Bivariate analyses revealed just one significant demographic difference between those respondents who had used opioids regularly and those who had not; respondents who reported low academic performance (56%) were more likely than high achievers (44%) to report regular misuse [$\chi^2 (1, 411) = 8.72, p < .01$].

Other Substance Use

Approximately 84% of respondents had used tobacco in the past year, and 63% had used at a frequency of once a month or more. The majority (97%) had used alcohol in the past year; over half (59%) drank a few times a week or more. Eighty-six percent of respondents had used marijuana in the past year, and 39% used a few times a week or every day. Forty-three percent of respondents reported past-year cocaine use, and 13% indicated using once a month or more. Nearly half (47%) of respondents had used tranquilizers in the past year, with 16% using once a month or more. Forty-three percent had used hallucinogens in the past year; 7% used at least once a month. One quarter of respondents reported past-year use of ecstasy, and 5% used at least once a month. Past-year rate of methamphetamine use was 6%; that of steroid use was 4%; that of heroin use was 3%; and that of inhalant use was 8%.

Respondents who indicated regular misuse of prescription opioid medications in the past year were significantly more likely than others to have used cocaine (51% vs. 39%, $\chi^2 (1, 411) = 4.84, p < .05$), methamphetamine (14% vs. 6%, $\chi^2 (1, 411) = 6.58, p < .01$), ecstasy (31% vs. 20%, $\chi^2 (1, 411) = 5.54, p < .05$), heroin (6% vs. 1%, $\chi^2 = 9.46, p < .01$), and prescription tranquilizers (67% vs. 39%, $\chi^2 (1, 411) = 27.2, p < .001$) at least once in the past year.

Peer Drug Use

Respondents indicated, on average, that about half of their close friends used drugs other than alcohol. There was no difference between regular and infrequent misuse of prescription opioids in terms of drug use of close friends. Those who misused regularly did, however, report being around other people who misused prescription medications more often than those whose misuse was infrequent [$F(1, 411) = 9.91, p < .01$].

Motives

As shown in Table 1, the most common reported reasons for nonmedical use of opioids were to relax, to get high, to have fun, and to experiment. Opioids were misused to cope with depression or anxiety for over a quarter of respondents and to help with chronic pain for nearly one out of five. Although less frequently reported, respondents also cited improved concentration, energy, alertness, and school and work performance as motives for misuse, as well as counteraction of other drug effects and weight management. Thirty-seven (9%) selected “other” from the option list. Additional write-in motives included recreation, improved sleep, enhanced sexual performance, addiction, and response to peer norms.

Bivariate analyses revealed several demographic subgroup differences in motives for opioid misuse. Males were more likely than females to use opioids to get high (63% vs. 37%, $p < .05$) and to have fun (63% vs. 37%, $p < .05$), while females were more likely than males to misuse opioids to cope with depression (53% vs. 47% $p < .001$), to help with chronic pain (57% vs. 43%, $p < .001$), and to manage weight (81% vs. 19%, $p < .001$). Respondents who had first misused prescription opioids prior to college were more likely than college initiators to report “to get high” (72% vs. 28%, $p < .001$) and “to have fun” (69% vs. 31%) as motives for misuse.

As depicted in Table 1, regular prescription opioid misuse was associated with a number of motives. Compared with those who had not used in the past year or had used less frequently, those who misused regularly were more likely to endorse “to relax,” “to get high,” and “to have fun” as motives. Regular misuse was also associated with greater likelihood of misuse to help manage chronic pain and to cope with depression or anxiety. Those who regularly misused were also more likely than infrequent users to endorse improved concentration, energy, and school performance as motives for misuse. Regular misuse was also associated with a higher likelihood of using opioid medications to counteract the effects of other drugs.

Beliefs and Perceived Risks

Beliefs—Results for beliefs about prescription medication misuse are depicted in Table 2. Items are organized by level of agreement with the statements so that statements with the highest levels of agreement are at the top and those with highest levels of disagreement at the bottom. Overall, respondents indicated some degree of agreement that prescription medications are easy to hide, do not produce a hangover, facilitate getting drunk, produce longer-lasting effects than alcohol or other drugs, and lead to less trouble in the event of being caught. Overall, respondents were neutral about whether prescription medications produced a better buzz than other substances and whether they liked the effects of prescription medications better than those of other substances. In general, respondents

tended to disagree that it is easier to get high with prescription medications compared with other substances and that prescription medications are less expensive and more accessible than alcohol or other drugs. Respondents also generally disagreed that prescription medications are safe to use by virtue of being prescribed by a doctor.

Table 2 highlights a number of significant differences between the beliefs of those respondents who reported regular misuse of opioids relative to those who did not misuse during this time or who did so infrequently. Compared with others, respondents who regularly misused were more likely to agree that prescription medications do not produce hangovers and that the effects of medications last longer than those of other substances. Regular misusers were also more likely to agree that prescription medications gave them a better buzz than alcohol or other drugs, that they liked the effects of prescription medications better than those of other substances, and that it is easier to get high using medications compared with other substances. Further, those who regularly misused indicated less disagreement with the statement that prescription medications are safe to use, relative to their infrequently misusing peers.

Perceived Risk—The results of the analyses for perceived risk of nonmedical use of prescription opioid medications are depicted in Table 3. On average, the respondents perceived only a slight risk of harm associated with nonmedical use of prescription opioids once or twice or occasionally. A moderate risk was perceived for more regular misuse of opioids. Only two out of five respondents indicated great risk associated with regular use. Bivariate analyses revealed students who regularly used opioids perceived lower levels of risk associated with regular use compared with those who endorsed infrequent misuse.

Portrait of Regular Prescription Opioid Misuse

Results from the logistic regression analysis are shown in Table 4. Predictors were added to the model in blocks to examine the differential association of social characteristics, motivations, beliefs, and perceived harm risk on the likelihood of regular misuse. Adjusting for other predictors, respondents who had lower academic grades were nearly twice as likely to have used opioids regularly and over two times more likely to have frequently been around people who used prescription medications. The odds of regular prescription opioid use were three times more likely for those who misused to get high and/or to manage chronic pain and nearly two and a half times more likely for those who endorsed coping with depression as a motive. The more a respondent agreed with the statement “I like the effects of prescription medications better than other substances,” the higher the odds of their being a regular user, and lower levels of perceived risk associated with regular use were associated with greater odds of regular misuse.

Qualitative Data: Student Voices About Prescription Drug Misuse

Four hundred thirty-five of the valid surveys contained responses to an open-ended question intended to elicit respondents' beliefs about the nonmedical use of prescription drugs: “What is your opinion about using prescription drugs that aren't prescribe to you?” In many cases, the respondents wrote in elaborate detail their thoughts and opinions, some even

volunteering to assist in the development of the drug abuse prevention program that the study was designed to inform.

Coding Scheme

Following the content-coding guidelines of Neuendorf (2002), the research team developed a coding scheme for these qualitative data, based on conceptual themes. Sample coding sessions were conducted to train the research staff coders and refine the coding system. Formal inter-rater reliability testing was then conducted with 30 random posts, and discrepancies were reconciled. Reliability of the coders was reassessed halfway through the process to ensure consistency. Inter-rater reliability was established at .80 or better.

As illustrated in Table 5, six conceptual domains emerged from the coding process to describe respondent beliefs and opinions about prescription drug misuse relative to other substance use: social acceptability, legal consequences, harm, addiction, accessibility, and personal acceptability. It became apparent during the development of the coding scheme that respondents often differentiated alcohol and tobacco from marijuana and other illicit drugs. As such, when noted, each distinct response was considered comparatively for these substance categories (tobacco, alcohol, marijuana, other drugs) for all of the conceptual domains, with the exception of personal overall acceptability. For the five comparative domains, posts were coded in one of three categories, namely, greater than, less than, and equal to, with prescription drugs as the reference point. Overall personal acceptability of prescription drug use was coded as “acceptable,” “not acceptable,” and “sometimes acceptable.” Descriptive results are summarized below.

Nearly half of respondents (44%) indicated that misuse of prescription drugs was wrong or not acceptable; 16% felt that prescription drug misuse was acceptable; and 40% indicated that misuse was sometimes acceptable when used safely under certain conditions. All respondents reported that they felt that prescription drug misuse was less socially acceptable than that of tobacco or alcohol, and a majority of posts (89%) indicated that prescription misuse was less socially accepted than marijuana use. However, 77% of respondents believed that prescription drug misuse was more socially acceptable than other illicit drug use; only 9% believed that prescription misuse was less socially accepted than other illicit drug use.

Respondents uniformly felt that prescription drugs were less accessible than tobacco, alcohol, and marijuana but were divided in their perceptions of accessibility of prescription drugs relative to other illicit drugs, such as cocaine or heroin. Forty-one percent of posts supported the belief that prescription drugs were more accessible than illicit drugs; 36% indicated that prescription drugs were less accessible than other drugs; and 23% felt that prescription medications and illicit drugs were equally accessible. Over half (54%) of respondent posts supported the belief that the legal consequences for misuse of prescription drugs were less harsh than for marijuana or other illicit drugs, while 38% indicated that legal consequences would be the same for the prescription drug misuse and other drug use. Respondents by and large (75%) indicated that prescription drugs were more harmful than marijuana, but over half (52%) indicated that prescription drugs were less harmful than other illicit drugs. Respondent posts were divided in the perception of the addictive potential of

prescription drugs; 64% indicated that prescription drugs were more (43%) or equally (21%) addictive as other illicit drugs, while over a third endorsed the belief that prescription drugs were less addictive than other illicit drugs.

DISCUSSION

The response metrics to the text advertisement for this survey study indicate that the recruitment strategy was successful in reaching the target audience. A conversion rate of 27% is excellent when considered in the context of online marketing campaigns, where a very successful conversion is approximately 8%. That the advertisement was designed to target only a portion of the universe of college student Facebook users (12% as a conservative estimate) further supports the success of the advertisement recruitment strategy for reaching the target audience. It is encouraging that a respectable conversion rate was achieved even in the absence of an incentive for survey completion. The relatively low percentage of invalid surveys indicates that those who committed to the survey were largely honest in their responses.

The validity of the data is further supported by the consistency of a number of results with other studies of prescription opioid medication misuse across diverse college student populations. The demographic constellation of the study sample mirrored that of other studies in that there were more male respondents, and overall rates of other illicit substance use were comparable to those of college students who had misused prescription medications in other studies (McCabe, Teter, Boyd, Knight et al., 2005). Types of medications misused (primarily oxycodone and hydrocodone derivatives) and sources of medication (primarily friends, but also parents and family members) are also consistent with a number of other studies of adolescent and college student populations (Lord, Lorin, & Butler, 2007; McCabe, Boyd, & Teter, 2005; McCabe, Teter, Boyd, Knight, et al., 2005). Additionally, the patterns of specific medications misused by respondents in this study mirror the prescription rates and overall availability of these medications to the general public (Kuehn, 2007).

Accounting for other factors, three motives were related to a higher likelihood of regular misuse: to get high, to manage chronic pain, and to cope with depression or anxiety. Those who misuse prescription medications to get high may represent a typology of student more entrenched in drug use in general. Consistent with other studies, there also appears to be a typology of individuals who misuse prescription medications to self-medicate potentially untreated physical or mental health conditions. While beyond the scope of this article, more research is needed to identify contributors to undertreatment of pain-related physical conditions and depression among college students. Potential contributors include lack of problem awareness, prior negative treatment experiences or perceived stigma about treatment, and limited access to care. More research is also needed to examine the mechanisms by which motives influence nonmedical prescription use and the association of different person-centered typologies of motives and characteristics with nonmedical use.

To the best of our knowledge, this is the first study to quantitatively examine the association of beliefs about prescription medication misuse with the degree of misuse. Not surprisingly, individual differences in beliefs were associated with regular prescription misuse, and these

differential belief patterns were primarily associated with the preference for the physical effects of medications compared with alcohol and other drugs (do not get hangover, effects last longer, like the effects better, better buzz, easier to get high). Consistent with the results of Arria and colleagues (2008), respondents who perceived less risk associated with regular misuse of opioid medications were more likely to use regularly. Additionally, there was a good deal of variability in perceptions of potential harm associated regular misuse; fewer than half of the respondents who did not regularly use perceived great risk with this level of use, while 12% indicated no risk or only slight risk associated with such use. Given the cross-sectional nature of the data, it cannot be determined whether more positive beliefs and risk perceptions precede the onset of regular misuse or are a by-product of, or rationalization for, a more intransigent level of misuse. Prospective longitudinal studies are needed to help elucidate the direction of effects and how beliefs influence different prescription drug use trajectories within the diverse college student population.

The abundance of qualitative data gathered in this study yielded a rich source of information about attitudes toward prescription medications, which corroborated individual differences revealed in the quantitative work and added to the portrait of how individuals who have misused medications think about such use. It is encouraging that four out of five respondents took the time to offer qualitative data after having completed the quantitative aspects of the survey and without any incentive to do so. Respondents were highly engaged in the survey process and the topic area. This enthusiasm was also evident in the depth of some of the qualitative responses (paragraphs in many cases), the comments by respondents about the importance of the project, and a number of offers by respondents (all anonymous) to help with the project.

Highlighted in the qualitative results is the diversity of perceptions of this sample population, which further supports the importance of examining individual differences in profiles of prescription misuse within the student population as a whole. It is noteworthy that a majority of respondents felt that prescription misuse was more socially acceptable than use of illicit drugs such as cocaine or heroin. It is also of concern that over half of respondent posts supported the belief that prescription drug misuse was less physically harmful than use of illicit drugs such as cocaine or heroin, and a third endorsed the belief that prescription medications are less addictive than these illicit drugs. Not surprisingly, over half of the responses supported the belief that the legal consequences of prescription medication misuse are not as harsh as for marijuana or other illicit drugs. This perception may reflect an overall lack of awareness about the illegality of non-medical prescription drug use, as well as a general feeling that such misuse is not a big deal, since enforcement of prescription drug misuse on college campuses is typically not a focus of attention, particularly compared with alcohol.

Taken together, the survey results indicate the need for prevention programming for college students that builds awareness about the risks of prescription drug use, challenges positive beliefs and outcome expectancies related to misuse, and fosters motivation and skills to avoid nonmedical use of prescription drugs. Programming for health practitioners that builds awareness about the risk potential of prescription drug misuse and promotes development of policy initiatives that direct attention to prescription drug misuse on campuses can help to

quell the growing misuse of these medications among student populations. An online social network such as Facebook, with its diverse audience appeal and broad reach, could serve as an ideal platform for delivery of program initiatives to both young adults and health professionals.

Indeed, it is reasonable to postulate that prevention programming disseminated via popular online social networks such as Facebook can reach individuals with substance use issues who might not otherwise seek treatment resources. A recent SAMHSA (2009) report indicated that only about 10% of young adults in need of treatment for substance use actually receive help. Of those who demonstrated a need for treatment but had not received it, 96% did not perceive the need for treatment. Moreover, less than one third of young people who thought they needed treatment actually made an attempt to get it (SAMHSA, 2009). Programming that can be accessed easily and confidentially from an online platform may reduce the potential perceived stigma for getting help while also promoting recognition of substance use problems and fostering motivation and skills to access further care.

The emergence of mobile technologies in the United States and the rest of the world has further broadened the accessibility of Internet-based social media platforms for young people in need. Mobile phones are ubiquitous among young people. In addition, a recent Pew Report indicated that the “digital divide” for Internet accessibility in the United States is rapidly closing with the ability of mobile phones to access the Web—African Americans and Latin Americans are the most active users of the Internet via mobile devices (Horriggan, 2009). By offering interventions on easily accessible platforms that are familiar and popular among target audiences, there is great potential to reach individuals who might not be reached in traditional models of care. Future research will focus on delivery of evidence-based drug use prevention interventions targeted to young adults with Facebook as a dissemination platform.

Limitations

As with any survey study, there is the possibility of sample selection bias in this study. The study targeted a fairly narrow demographic, namely, college students from 4-year institutions who used Facebook and admitted to nonmedical use of prescription medications in their lifetime. It is possible that this narrow focus may have limited the generalizability of results to the college population as a whole. It is encouraging that the sample characteristics of respondents in this study largely mirror those obtained in numerous other survey studies of prescription drug misuse in college student populations. This parallel suggests that we were able to reach a similar audience with our outreach strategy on Facebook.

At the time of this study the Facebook user population was limited to those individuals with a specified institution e-mail address (with the extension “.edu”). While validity indicators were included in the survey to limit the participant pool to students aged 18–25 years, it is possible that other university personnel outside of students accessed the survey. Since Facebook is now open-access with regard to users (i.e., there is no e-mail extension restriction), the inclusion of validity indicators is all the more important when using it as a platform for research activities to ensure that the intended target audience is reached.

Summary

The 2-week targeted survey campaign on Facebook yielded a rich pool of both quantitative and qualitative data about the perceptions and beliefs of college students who endorse nonmedical prescription opioid medication use. The results of the study are a first step toward describing portraits of regular prescription opioid medication misuse in college-aged young people and serve as a guide for future research and interventions directions using social media platforms. With over 500 million active users worldwide (Facebook Press Room, 2010), Facebook holds tremendous promise as a platform for reaching diverse populations of young people with evidence-based prevention and health promotion programming.

Acknowledgments

This research was supported by a Small Business Innovation Research (SBIR) grant to Inflexxion from the National Institute on Drug Abuse (no. R43DA018552-02).

Biographies

Sarah Lord, Ph.D., is a Principal Investigator with the Center for Technology and Health. A clinical–developmental psychologist, Dr. Lord received her Ph.D. from the University of Colorado, Boulder, and completed an internship and a postdoctoral fellowship at the University of Wisconsin, Madison. Dr. Lord's research activities focus on the development, evaluation, and dissemination of technology-based prevention and assessment tools for adolescent, young-adult, and parent populations, primarily in the areas of substance abuse and HIV prevention. Her current projects include use of online social networks to deliver evidence-based risk prevention and health promotion programs, use of mobile technologies to promote HIV health service utilization and preventive behaviors among high-risk adolescents and young adults, and computer-delivered training programs for parents to promote parent–youth communication about drug use prevention. Dr. Lord has served as Principal Investigator on numerous projects funded by the National Institutes of Health in the areas of adolescent HIV/sexually transmitted infection, tobacco use, alcohol use, and other drug use prevention. She has also worked extensively with community leaders, health educators, and marketing professionals to develop strategies for sustainable dissemination and implementation of technology-based prevention initiatives.

Julie Brevard, M.P.H., is a statistician currently working at Veristat in the field of clinical trials research. She has participated in the analysis of over 25 clinical trials in the fields of oncology and vaccine research, developing research protocols and analysis plans, performing data analysis, writing statistical reports, and serving as a member of several Data Safety Monitoring Boards. She has participated in data analysis of academic research in the areas of addiction and drug abuse since 1997. She received her M.P.H. from Boston University in 2004.

Simon Budman, Ph.D., is president and chief executive officer of Inflexxion, a health care technology company in Newton, Massachusetts. His areas of research interest are the use of technology in substance abuse screening and treatment and risk management of prescription opioids and stimulants. Prior to founding Inflexxion he was at the Harvard Medical School and the Harvard School of Public Health.

GLOSSARY

<i>Click-through rate (CTR)</i>	Number of times an online advertisement is clicked on per 100 advertisement impressions.
<i>Conversion</i>	Percentage of users who clicked on a text advertisement impression and reached the desired outcome (e.g., completed study survey).
<i>Facebook</i>	Popular social networking Web site started in 2004 that has over 500 million users worldwide.
<i>Nonmedical prescription medication use</i>	Use of a prescription medication without a valid prescription or only for the experience or feeling it causes.
<i>Online social network</i>	Web-based community of people who share interests or activities.

<i>Prescription opioid analgesic</i>	Pain reliever that acts on the central nervous system requires a valid prescription from a physician to be obtained legally.
<i>Text advertisement impression</i>	View of a text advertisement on a Web page.

REFERENCES

- Anderson Analytics. College students say that Facebook is the only social networking site that really matters. Dec. 2009 Retrieved September 29, 2010, from <http://www.andersonanalytics.com/index.php?mact=News,cntnt01,detail,0&cntnt01articleid=72&cntnt01origid=16&cntnt01detailtemplate=newsdetail.tpl&cntnt01dateformat=%m.%d.%Y&cntnt01returnid=46>
- Arria AM, Caldeira KM, Vincent KB, O'Grady KE, Wish ED. Perceived harmfulness predicts nonmedical use of prescription drugs among college students: Interactions with sensation seeking. *Prevention Science*. 2008; 9(3):191–201. [PubMed: 18633709]
- Ellison NB, Steinfield C, Lampe C. The benefits of Facebook “Friends”: Social capital and students' use of online social network sites. *Journal of Computer-Mediated Communication*. 2007; 12(4):1–27.
- Facebook Press Room. 2010. Retrieved September 29, 2010, from <http://www.facebook.com/#!/press/info.php?statistics>
- Haugtvedt, CP.; Machleit, KA.; Yalch, R. Online consumer psychology: Understanding and influencing consumer behavior in the virtual world. Routledge; New York: 2005.
- Hitwise Analytics. Facebook reaches top ranking in US. Mar 15. 2010 Retrieved September 29, 2010, from http://weblogs.hitwise.com/heather-dougherty/2010/03/facebook_reaches_top_ranking_i.html
- Horrigan, J. Wireless Internet use. Jul 22. 2009 Pew Internet & American Life Project. Retrieved April 1, 2010, from <http://pewinternet.org/Reports/2009/12-Wireless-Internet-Use.aspx>
- International Narcotics Control Board. Report of the International Narcotics Control Board for 2008. United Nations; New York: 2009.
- Johnston, LD.; O'Malley, PM.; Bachman, JG.; Schulenberg, JE. Monitoring the future national survey results on drug use, 1975–2005: Volume II, college students and adults ages 19–45. National Institute on Drug Abuse; Bethesda, MD: 2006. NIH Publication No. 06-5884
- Kuehn BM. Opioid prescriptions soar: Increase in legitimate use as well as abuse. *Journal of the American Medical Association*. 2007; 297:249–251. [PubMed: 17227967]
- Lord SE, Downs G, Furtaw P, Chaudhuri A, Silverstein A, Budman S. Nonmedical use of prescription opioid and stimulant medications among student pharmacists. *Journal of the American Pharmacists Association*. 2009; 49(4):519–528. [PubMed: 19589764]
- Lord, SE.; Lorin, LA.; Butler, SF. Prescription drug misuse among adolescents in treatment. Annual conference of College on Problems with Drug Dependence; Quebec City, QC, Canada. 2007, June 16–21;
- McCabe SE, Cranford JA, Boyd CA, Teter CJ. Motives, diversion, and routes of administration associated with nonmedical use of prescription opioids. *Addictive Behaviors*. 2007; 53:562–575. [PubMed: 16843611]
- McCabe SE, Teter CJ, Boyd CA. Illicit use of prescription pain medication among college students. *Drug and Alcohol Dependence*. 2005; 77:37–47. [PubMed: 15607840]
- McCabe SE, Teter CJ, Boyd CA, Knight J, Wechsler H. Nonmedical use of prescription opioids among US college students: prevalence and correlates from a national survey. *Addictive Behaviors*. 2005; 30:789–805. [PubMed: 15833582]
- Neuendorf, KA. The content analysis guidebook. Sage; Thousand Oaks: CA: 2002.
- Presley, CA.; Vineyard, GM. Users manual. 7th ed.. Southern Illinois University; Carbondale, IL: 2004.

- Substance Abuse and Mental Health Services Administration. Results from the 2006 national survey on drug use and health: National findings. Office of Applied Studies; Rockville, MD: 2007. NSDUH Series H-32, DHHS Publication No. SMA 07-4293
- Substance Abuse and Mental Health Services Administration. Drug Abuse Warning Network, 2006: National Estimates of Drug-Related Emergency Department Visits. Office of Applied Studies; Rockville, MD: 2008. DAWN Series D-30, DHHS Publication No. SMA 08-4339
- Substance Abuse and Mental Health Services Administration. The NSDUH report; Young adults need for and receipt of alcohol and illicit drug use treatment in 2007. Office of Applied Studies; Rockville, MD: 2009.

Frequency of motivations for nonmedical use of prescription opioid medications as a function of level of misuse

TABLE 1

Motive	Total (%)	Past-year misuse		χ^2 (df)	p-value
		Infrequent, ^a N = 286	Regular, ^b N = 126		
Relax	72	68	80	6.54 (1)	<.01
Get high	68	63	79	10.18 (1)	<.001
Have fun	65	62	74	5.81 (1)	<.05
Experiment	48	50	42	2.21 (1)	ns
Cope with depression	27	18	44	9.58 (1)	<.001
Manage chronic pain	19	15	28	8.67 (1)	<.01
Improve concentration	14	10	22	11.51 (1)	<.001
Improve energy	11	10	14	12.32 (1)	<.001
Perform better at school	11	7	18	9.58 (1)	<.01
Stay up all night	11	10	14	1.78 (1)	ns
Counteract other drugs	9	7	14	5.56 (1)	<.05
Increase alertness	8	7	12	2.72 (1)	ns
Perform better at work	6	2	15	28.33 (1)	<.001

^a Less than once a month.

^b Once a month or more.

TABLE 2

Beliefs about nonmedical prescription opioid use

Beliefs about prescription opioids ^a	Past-year misuse			F	p-value
	Total M(SD)	Infrequent, N = 286 M(SD)	Regular, N = 126 M(SD)		
Easy to hide	1.81 (0.95)	1.78 (0.92)	1.83 (0.96)	0.26	ns
Do not get a hangover	2.26 (1.25)	2.35 (1.28)	2.03 (1.17)	5.70	<.05
Easier to get drunk	2.28 (1.23)	2.28 (1.19)	2.28 (1.19)	0.00	ns
Effects last longer ^b	2.86 (1.17)	2.93 (1.14)	2.69 (1.23)	3.74	<.05
Less likely to get into trouble ^b	2.91 (1.33)	2.92 (1.29)	2.88 (1.42)	0.09	ns
Give me a better buzz ^b	3.03 (1.29)	3.27 (1.21)	2.47 (1.30)	35.60	<.001
Like the effects better ^b	3.19 (1.41)	3.50 (1.31)	2.47 (1.39)	51.40	<.001
Easier to get high ^b	3.34 (1.32)	3.50 (1.26)	2.98 (1.39)	13.70	<.001
Less expensive ^b	3.41 (1.31)	3.39 (1.32)	3.45 (1.29)	0.16	ns
Easy to get online	3.42 (1.13)	3.38 (1.10)	3.52 (1.19)	1.26	ns
Safe because prescribed	4.07 (1.05)	4.18 (.97)	3.81 (1.18)	10.70	<.001
Easier to get ^b	4.17 (1.10)	4.23 (1.02)	4.03 (1.25)	2.72	ns

^a 1 = strongly agree, 2 = agree, 3 = neutral, 4 = disagree, 5 = strongly disagree.

^b Compared with alcohol and other drugs.

TABLE 3

Perceived risks regarding nonmedical prescription medication use

How much risk do you think people take if they ^a	Past-year misuse			F	p-value
	Total M(SD)	Infrequent, N = 286 M(SD)	Regular, N = 126 M(SD)		
Try prescription pain medications once or twice ^b	2.04 (0.92)	2.01 (0.91)	2.10 (0.96)	0.75	ns
Use prescription medications occasionally ^b	2.25 (0.78)	2.29 (0.77)	2.18 (0.82)	1.58	ns
Use prescription medications regularly ^b	3.25 (0.76)	3.33 (0.72)	3.07 (0.84)	10.0	<.01

^a 1 = no risk, 2 = slight risk, 3 = moderate risk, 4 = great risk.

^b For nonmedical reasons.

TABLE 4

Hierarchical logistic regression analyses predicting regular prescription opioid misuse in the past year

Step and predictor	Step 1 AOR[CI]	Step 2 AOR[CI]	Step 3 AOR[CI]	Step 4 AOR[CI]
Low academic grades	1.75[1.22, 2.77]**	1.85[0.33, 0.88]**	1.85[0.31, 0.91]*	1.85[0.34, 0.93]*
Peer misuse	2.26[1.44, 3.54]***	2.12[1.30, 3.46]**	2.23[1.32, 3.77]**	2.21[1.30, 3.74]**
Relax		1.51[0.81, 2.83]	1.15[0.58, 2.29]	1.14[0.57, 2.29]
Get high		2.19[1.19, 4.01]**	2.70[1.37, 5.30]**	2.93[1.48, 5.82]**
Have fun		0.82[0.44, 1.53]	0.68[0.34, 1.33]	0.62[0.31, 1.24]
Cope with depression		2.68[1.57, 4.56]***	2.55[1.41, 4.60]**	2.44[1.34, 4.43]**
Manage chronic pain		2.15[1.20, 3.84]**	2.78[1.45, 5.30]**	2.82[1.46, 5.43]**
Improve concentration		1.15[0.44, 3.01]	1.06[0.37, 3.01]	1.09[0.34, 3.17]
Improve energy		1.53[0.65, 3.61]	1.35[0.54, 3.33]	1.30[0.52, 3.25]
Perform better at school		1.17[0.43, 3.17]	1.68[0.56, 4.99]	1.59[0.53, 4.76]
Counteract other drugs		1.26[0.57, 2.79]	1.56[0.67, 3.66]	1.67[0.71, 3.94]
Give me better buzz			0.88[0.65, 1.18]	0.85[0.63, 1.15]
Easier to get high			1.17[0.90, 1.51]	1.17[0.90, 1.52]
Like the effects better			1.69[1.30, 2.22]***	1.69[1.30, 2.22]***
Don't get a hangover			1.06[0.84, 1.35]	1.07[0.85, 1.36]
Effects last longer			1.02[0.80, 1.30]	1.02[0.80, 1.31]
Safe to use			0.77[0.60, 0.99]*	0.83[0.64, 1.07]
Perceived risk of regular use				1.45[1.03, 2.08]*
Nagelkerke R^2	.07	.22	.34	.36

*
 $p < .05$.**
 $p < .01$.***
 $p < .001$.

TABLE 5

Student voices about nonmedical prescription use: conceptual domains

“What you think about using prescription drugs that aren’t prescribed to you?”
<i>Personal acceptability</i>
More: “Using stimulants for school is acceptable to me since if I really wanted to I could get them prescribed by a doctor.”
Not acceptable: “Bottom line, taking any prescription drug that isn’t prescribed to you is wrong.”
<i>Social acceptability</i>
More: “Its [sic] quite obviously more acceptable ... [L]ook at the character Karen on Will and Grace. She takes painkillers (with alcohol) at least once an episode. How many times have you seen characters of an award winning show walking around smoking a joint?”
Less: “I think it’s less socially acceptable because it is less of a social activity and more a sign of serious drug problems.”
Equal to: “As far as being socially acceptable, drugs are drugs, whether manufactured by rogue chemists or drug companies. Snorting Adderall is the same as snorting cocaine from a social standpoint ... [Y]ou are doing both to get high.”
<i>Legal consequences</i>
More: “It seems that the legal consequences are stricter for them because someone had to abuse a legitimate prescription to get them ...”
Less: “It’s less likely you’ll get in trouble for using a prescription drug. It’s easy to play it off as an accident.”
Equal to: “Legal consequences are harsh in either category.”
<i>Harm/danger potential</i>
More: “Prescriptions can be more dangerous than street drugs if the user does not take the necessary precautions or is just pushing the limits because they want to see how high they can get.”
Less: “Dangerous, of course, but under proper dosing, risks are not as great as most street drugs.”
Equal to: “Prescription drugs are just as dangerous as street drugs. Just because the FDA approved it doesn’t mean it’s safe.”
<i>Addictive potential</i>
More: “Prescription drugs are more insidious (i.e. seem less potent but thus susceptible to heavier use).”
Less: “If people who actually have prescriptions can take them regularly then clearly they’ve been tested by the FDA and don’t have as bad side effects or dependency issues as street drugs.”
Equal to: “They are just as bad as street drugs because they alter your state of mind, cause addiction, and have harmful side effects if used in high dosages or frequency.”
<i>Accessibility</i>
More: “I came from a very poor area and we couldn’t afford the street drugs [sic]. Prescription drugs are cheap, so they were really really common. Medicare covers them if you can get a prescription, and if you have extra, you can sell them.”
Less: “They are more expensive.”
Equal to: “Prescription and street drugs are as easy to get as a pack of gum.”