HHS Public Access

Author manuscript

Addict Behav. Author manuscript; available in PMC 2018 May 01.

Published in final edited form as:

Addict Behav. 2017 May ; 68: 59–65. doi:10.1016/j.addbeh.2017.01.016.

Health-Compromising Practices of Undergraduate College Students: Examining Racial/Ethnic and Gender Differences in Characteristics of Prescription Stimulant Misuse

Sheena Cruz, B.S., M.P.H.c,
Health Science Department, California State University, Long Beach, 1250 Bellflower Blvd, Long Beach, CA 90840, Phone: (562) 985-7792, Fax: (562) 985-2384

Stephanie Sumstine, C.H.E.S., M.P.H.c,
Health Science Department, California State University, Long Beach, 1250 Bellflower Blvd., Long Beach, CA 90840, Phone: (562) 985-7792

Jocelyne Mendez, and
California State University, Long Beach, 1250 Bellflower Blvd., Long Beach, CA 90840, Phone: (562) 985-7792

Niloofar Bavarian, Ph.D., M.P.H.
Assistant Professor, Health Science Department, California State University, Long Beach, 1250 Bellflower Blvd, Long Beach, CA 90840, Phone: (562) 985-7792, Fax: (562) 985-2384

1. Introduction

Prescription stimulants such as amphetamines (e.g., Adderall), dextroamphetamines (e.g., Dexedrine), and methylphenidates (e.g., Ritalin and Concerta) are commonly prescribed medications for the treatment of attention-deficit hyperactivity disorder (ADHD). As the number of students diagnosed with ADHD attending college increases (Benson et al., 2015), the availability of prescription stimulants on campus has increased (McCabe et al., 2006). The increased availability of prescription stimulants has paralleled the rise in the illicit use of prescription stimulants [IUPS] on college campuses; this is cause for concern because misuse of prescription stimulants is associated with a host of adverse psychological and physiological effects including abuse, addiction, dependence, psychosis, seizures, cardiovascular events, cardiac arrest, and death (Lakhan & Kirchgessner, 2012).

We characterize IUPS as use of any class of prescription stimulants in excess of what is prescribed by a physician, use without a prescription, and/or use for non-medical reasons (Bavarian et al., 2015). Results from a 2015 national study involving 2,450 students showed

Statement of Disclosure: A. This manuscript is not submitted, in press, or published elsewhere. In addition, we have no conflicts of interest to declare.

Preliminary findings were presented at the 15th Annual UCLA Research and Evidence-Based Practice Conference. Los Angeles, CA.

that 10.7% of college students used Adderall for non-medical reasons in the past year (Miech et al., 2016). Single campus studies have also demonstrated a relatively high prevalence. A recent investigation indicated that 13.9% of a sample of 682 college students reported engaging in non-medical use (i.e., use for academic performance) of prescription stimulants (Gallucci & Martin, 2015), while another single campus study estimated that 38% of a cohort of 984 college students reported non-medical use (Arria et al., 2013); these sets of data may underestimate the true prevalence of illicit use, as many studies focused on use for academic enhancement, which is just one form of illicit use.

1.1 Characteristics of IUPS in the College Population

Understanding students' preferred routes of administration, sources of drugs, monetary costs, and IUPS motives should have prevention and intervention implications. For this study, routes of administration are classified into the following categories: oral ingestion, nasal ingestion, intravenous injection, smoking, or other. Past studies have shown that oral administration is the preferred route; for instance, it accounted for 90% of non-medical users over a four year period (Garnier-Dykstra et al., 2012). However, in the same study, 17% of college students also reported smoking prescription stimulants as their preferred route. The type of route of administration can significantly increase health and drug dependency risks, and thus, this behavior should be carefully monitored among misusers.

Next, we investigate monetary costs and sources; specifically, we are interested in how much money students spent per pill when they engaged in IUPS, and from whom they obtain these drugs. Although most students report paying little to no charge (Dupont et al., 2008), students have also reported paying $1-$5 per pill, paying $6-$10 per pill, and paying more than $10 per pill (Bavarian et al., 2014). A student's willingness to pay more per pill may suggest a dependency issue, and is therefore, a necessary characteristic to examine. Additionally, determining the source(s) of the drug (e.g., self, friend, family) is an important step that will allow researchers to determine the extent of diversion. Studies of college students indicate that most users obtained stimulant medication from a peer or friend (Garnier-Dykstra et al., 2012). It is essential to investigate both the costs and sources of stimulant medication to understand the social and environmental context in which IUPS occurs and whether accessibility and access to prescription stimulants affects misuse.

Furthermore, investigating motivations for engaging in IUPS is crucial to understanding health behaviors and intentions. There is a widespread belief that stimulant drugs enhance cognitive skills; specifically, popular media perpetuates these cognitive-enhancing properties by calling them “smart pills” (Partridge et al., 2011). As a result, past literature have indicated that the most salient motivation to engage in IUPS is academic in nature (e.g., to help with studying, to increase focus time; Dupont et al., 2008; Garnier-Dykstra et al., 2012; Teter et al., 2006). However, other studies have shown recreational motives (e.g., to get high) have been reported by 25-30% of non-medical users (Teter et al., 2005), which indicates that stimulant drugs may be used concurrently with other forms of substances (e.g., alcohol); the high-risk nature of this behavior is why understanding motives is particularly warranted.

Finally, there is limited research on how often IUPS produced student's desired outcomes (e.g., improved academic performance). One study has reported that 90% of students who

used ADHD drugs non-medically believed it was helpful and that 70% reported an overall positive experience with IUPS (Rabiner et al., 2009). Despite reports of positive experiences, engaging in IUPS often also produced adverse events including poor sleep, headaches, stomachaches, and sadness (Rabiner et al., 2009). As experiences during trial behavior may predict subsequent behavior (e.g. Flay & Petraitis, 1994; Flay et al., 2009), more information is needed to investigate the actual experience (positive or negative) students have with IUPS.

1.2. Research Gaps

To date, there has been a paucity of literature examining sub-group (e.g., racial/ethnic and gender) differences in characteristics of the IUPS behavior (e.g., administration routes, monetary costs, motivations). Although, the motives to engage in IUPS (e.g., academic and non-academic) can apply to college students of all racial/ethnic backgrounds, research has focused predominately on whether overall use (e.g., Pastor et al., 2005), not characteristics of use, differ by race/ethnicity The growing population of young minority groups, along with the increased availability of prescription stimulants in the college environment, warrant research to characterize IUPS patterns by race/ethnicity. Doing so will allow researchers to determine if specific racial/ethnic groups have use characteristics that warrant greater unique prevention messages.

With respect to gender-specific differences, past research indicates that males are more likely to misuse prescription stimulants than females (Teter et al., 2005; Poulin, 2007); however, one study found that female stimulant misusers were significantly more likely than male misusers to meet the criteria for stimulant dependence (Rabiner et al., 2009). Moreover, one study found that increased stimulant misuse was present within a specific group of college-age women at risk for or with a clinical or subclinical eating disorder (Gibbs et al., 2016). These findings highlight possible gender differences in patterns of stimulant misuse that require further investigation (Wu & Schlenger, 2003); to date, however, these possible differences in use characteristics have not been examined.

Exploration of IUPS-specific characteristics by race/ethnicity and gender is merited. The purpose of our study, therefore, was to examine racial/ethnic and gender differences in characteristics of prescription stimulant misuse (i.e., routes of administration, prescription stimulant sources, monetary costs, IUPS motives, and experiences with illicit use) in a sample of college students from two geographically and ethnically diverse universities in California who report engaging in IUPS.

2. Methods

2.1. Study Design

The data are from two ethnically diverse California universities. Campus 1 data were collected from a northern California university during Spring Semester 2013. Campus 2 data were collected from a southern California university during Spring Semester 2016. At both campuses, one-stage cluster sampling was used to obtain the study sample. A random sample of instructors who taught eligible undergraduate classes (i.e., lecture-based academic courses) were asked, via e-mail, to have their students participate in a paper-based survey

during the last 20 minutes of class time. Students who were eligible to participate (e.g., students who were 18 years or older and classified as undergraduate standing) were asked to complete a paper-based version of the updated Behavior, Expectancies, Attitudes, and College Health Questionnaire (BEACH-Q; Bavarian et al., 2013), a survey instrument created using the Theory of Triadic Influence (Flay & Petraitis, 1994; Flay et al., 2009). The BEACH-Q survey was anonymous and confidential. Participants received a small monetary gift card upon completion of the survey. Trained research staff (i.e., the principal investigator and student research assistants) conducted all data collections. This study was approved by the Institutional Review Boards (IRB) at both participating campuses.

2.2. Participants

A total of 1,053 undergraduate students (n=554 from Campus 1 and n=499 from Campus 2) participated in this study. The average age for Campus 1 was 22.84 years and included: 57.56% Female, 21.44% White, 25.98% Asian, 35.26% Latino, and 9.07% All Other. The average age for Campus 2 was 21.6 years and included: 58.00% Female, 34.00% White, 36.00% Asian, 18.00% Latino, and 20.03% All Other. The combined response rate for both universities was 92.6% (Campus 1 was 90.5% and Campus 2 was 94.7%). The total sample included: 58.69% Female, 28.13% White, 31.05% Asian, 26.27% Latino, and 14.55% All Other. Age ranged from 18-67 years old, and the average age of the combined sample was 22.8 years old. Both Campus 1 and Campus 2 had survey samples that were representative of the corresponding campus.

Participants were instructed to self-report on five items that would indicate their engagement in IUPS in their lifetime: (1) if they had ever [during college] used prescription stimulants without a prescription from a healthcare provider; (2) for nonmedical purposes (i.e., to stay awake, to study for finals, to party longer); or (3) in excess in what was prescribed if they had a prescription; and their (4) frequency of IUPS (e.g., never to 40 or more occasions) per academic term; and (5) first time they initiated IUPS. If students answered in a way that reflected lifetime IUPS (i.e., yes to any of the first three questions, at least 1-2 times for the frequency question, and at least “elementary school” to the initiation item), they were categorized as having engaged in IUPS in their lifetime. The analytic sample (n=257 students with lifetime IUPS) included: 54.13% Female, 38.71% White, 25.00% Asian, 22.58% Latino, and 13.71% All Other. The average age of the analytic sample was 22.88 years, and ranged from 18-61 years.

2.3. Measures

In addition to the items used to categorize lifetime use, students were asked sociodemographic items and items about their IUPS. Sociodemographic characteristics included items such as gender and race/ethnicity. Due to small sample sizes for some racial/ethnic groups, we created a racial/ethnic variable with the following categories: White, Asian, Latino, or All Other. Individuals who were classified as All Other were those who marked African-American, Native American/Alaskan Native, or Biracial/Multiracial. Students were asked their gender identity, and the gender variable was created as a binary outcome (male or female).

For students who reported lifetime IUPS, additional items inquired about routes of administration, sources of prescription stimulants, motives for engaging in the behavior, monetary costs per pill, and whether they experienced outcomes they desired. Routes of administration included oral ingestion, nasal ingestion, intravenous injection, smoking, and other. Cost per pill ranged from no charge, $1-$5, $6-$10, and more than $10. Sources included having a personal prescription (self) or receiving medication from friends, family members, acquaintances, the internet, or other. Motives for IUPS included improving focus, making studying more enjoyable, staying awake, improving concentration, losing weight, partying longer, experimenting, and other. For each of the above categories and sub-categories, participants were asked to mark “yes” or “no” for all that were true or not true for them, respectively. Finally, desired outcomes were measured by asking students to rate how often their IUPS resulted in achieving the outcomes they desired; response options ranged from “none of the time” to “all of the time.”

2.4. Data Analysis

A series of chi-square tests were conducted to examine differences in characteristics of IUPS first, by racial/ethnic category, then, by gender. For significant ($p<0.05$ and $p<0.01$) and marginal associations (p-value between 0.051 and 0.10), logistic regressions were used to determine the direction and magnitude of relationships, via odds ratios. Additionally, for results that showed a significant association between race/ethnicity or gender and IUPS characteristic, we conducted adjusted multivariate logistic regression models in order to test if these relationships were still significant after controlling for known covariates. These multivariate regressions controlled for being male (Rabiner et al., 2009), race/ethnicity (Rabiner et al., 2009), year in school (DeSantis et al., 2008), sensation seeking (a known correlate of IUPS at the individual level;e.g., Bavarian et al., 2013), Greek life participation (a known correlate of IUPS at the relationship level; e.g., Weyandt et al., 2009), and perceived drug culture on campus (a known correlate of IUPS at the environmental level; Bavarian et al., 2013). All analyses were conducted using Stata 14.1 statistical software; percentages and odds ratios are reported to two decimal places.

3. Results

Table 1 presents sample characteristics and comparisons by racial/ethnic group for routes of administration, monetary costs, sources, motives, and desired outcomes. Table 2 shows the results of the logistic regression for those categories that had significant and marginal associations by racial/ethnic category in the chi-square analyses. Table 3 presents sample characteristics and comparisons by gender groups for routes of administration, monetary costs, sources, motives, and desired outcomes. Table 4 shows the results of the logistic regression models for the one characteristic that had a significant association with gender in the chi-square analyses. Table 5 shows the results of the adjusted multivariate logistic regression models.

3.1 Routes of Administration

Significant associations were found between race/ethnicity and the following routes: nasal ingestion ($p<0.05$) and smoking prescription stimulants ($p<0.01$). Compared to Whites,

Asians were less likely to engage in nasal ingestion (OR=0.35, 95% CI 0.14-0.86, $p<0.05$). Asians were more likely to smoke prescription stimulants than Whites (OR=3.76, 95% CI 1.67-8.44, $p<0.01$). Being Latino (OR=2.82, 95% CI 1.22-6.53, $p<0.05$) versus being White, also increased the odds of smoking prescription stimulants.

A marginal association (p-value between 0.051 and 0.1) was found between race/ethnicity and oral ingestion. Compared to being White, being Asian (OR= 0.26, 95% CI 0.08-0.82, $p<0.05$) or Latino (OR=0.298, 95% CI 0.09-0.97, $p<0.05$) decreased the odds of oral ingestion.

3.2 Monetary Costs

Significant associations were found between race/ethnicity and cost per pill. Compared to Whites, Asians were less likely to pay $1-$5 per pill (OR=0.35, 95% CI 0.16-0.75, $p<0.01$). Being Asian, versus being White, increased the odds of paying more than $10 per pill (OR=3.24, 95% CI 1.09-9.64, $p<0.05$). Compared to Whites, Latinos were also more likely to pay more than $10 per pill (OR=3.84, 95% CI 1.25-11.82, $p<0.05$).

3.3 Sources

Significant associations were found between race/ethnicity and specific drug sources. Compared to Whites, Asians were less likely to have a personal prescription for stimulant medication (OR=0.16, 95% CI 0.03-0.74, $p<0.05$). Identifying as All Other, versus being White, decreased the odds of having a friend as source (OR=0.12, 95% CI 0.03-0.42, $p<0.05$).

3.4. Motives

Significant associations were found between race/ethnicity and the following motives: to improve focus ($p<0.05$) and to stay awake ($p<0.01$). Being Asian, versus being White, decreased the odds of having the motive to improve focus (OR=0.30, 95% CI 0.14-0.67, $p<0.05$). Asians were less likely to have the motive to stay awake than Whites (OR=0.33, 95% CI 0.15-0.70, $p<0.01$).

Marginal associations were found between race/ethnicity and the following motives: to improve concentration and to party longer. Being Asian, versus being White, decreased the odds of having the motive to improve concentration (OR=0.36, 95% CI 0.17-0.78, $p<0.05$). Asians were less likely to have the motive to party longer than Whites (OR=0.37, 95% CI 0.16-0.88, $p<0.05$).

A significant association ($p<0.05$) was found between gender and the motive to lose weight. Being male, versus being female, decreased the odds of having the motive to lose weight (OR=0.21, 95% CI 0.06-0.76, $p<0.05$).

3.5. Desired Outcomes

No associations were found between race/ethnicity and how often IUPS produced desired outcomes.

3.6. Adjusted Logistic Regression Models

After the inclusion of known covariates in the adjusted regression models, ten of the twelve associations between race/ethnicity and gender and IUPS characteristics (i.e., oral ingestion, smoking, cost of $1-$5 per pill, cost of more than $10 per pill, having a personal prescription as a source, having a friend as a source, motive to improve focus, motive to stay awake, motive to improve concentration, and motive to lose weight) remained significant.

4. Discussion

To our knowledge, our study is one of the first investigations to examine racial/ethnic and gender differences in characteristics of prescription stimulant misuse. Prior research indicates White adolescents are more likely to be diagnosed with ADHD (Zuvekas & Vitiello, 2012) and to be prescribed stimulants as treatment (McCabe et al., 2006), which provides insight into results from our investigation that indicate Whites were more likely to report personal prescriptions as their source as compared to other racial/ethnic groups. Interestingly, Asians and Latinos were more likely to engage in smoking prescription stimulants. This finding is consistent with a methamphetamine study in a Chinese population where 90.0% of methamphetamine abusers reported smoking the drug (He et al., 2013), which is markedly higher than what is seen in Western populations (Brecht et al., 2004). These deviations from suggested routes of administration may significantly alter the rate of release, absorption, bioavailability, and reinforcing effects of the active stimulant drug (Jain & Stark, 2016), which may potentially increase a student's vulnerability for dependence on these drugs (Teter et al., 2006). Thus, further investigation into cultural factors are needed to provide valuable information to healthcare providers and prevention scientists in regards to commonly preferred drug practices and methods among marginalized populations.

In terms of monetary costs, Asians and Latinos were more likely to pay more than $10 per pill compared to Whites, and Asians were less likely to pay $1-$5 per pill than Whites. More research is needed to understand the reasons why a subset of Asians and Latinos are more willing to pay a higher cost for stimulants, and whether this increase in costs is due to a higher demand, higher disposable income, or higher susceptibility to dependence among these racial/ethnic groups (which may be a result of their greater likelihood for higher risk ingestion). In regards to sources where stimulants are obtained, our study found that the All Other races category was less likely to obtain drugs through friends than Whites. However, the difficulty in interpreting these results due to the diversity of the All Other category support the need to oversample African Americans, Native Americans, and multiracial individuals in future studies, as aggregate estimates may mask health disparities among these groups.

With respect to motives, individuals who identified as Asian were less likely to have the motive to improve focus or to stay awake than Whites. Additionally, Whites were more likely to engage in IUPS to party longer or to improve concentration than Asians. These findings illustrate the heterogeneous nature of motivations for IUPS. The lower prevalence of these motives in racial/ethnic minorities compared to Whites may be related to the lower prevalence of IUPS in general among Asian, Latino, or All Other student populations. Unique cultural and familial factors may also play a part in shaping these racial/ethnic

differences in motives. However, it is evident that racial/ethnic differences do exist in motivations for stimulant use (Bussing et al., 2003), and thus, further studies are needed to validate these findings before firm conclusions can be made.

Finally, the only significant difference among gender subgroups within this study was the motivation to lose weight: females were more likely to engage in IUPS with the motive to lose weight than males. These results are consistent with previous literature that indicate that females may be more likely than males to misuse ADHD medication with the purpose of losing weight (Teter et al., 2006).

4.1. Limitations and Strengths

Limitations of this present study should be considered when interpreting results. First, the survey data relied on self-report measures and thus, are subject to non-response and recall bias. Although survey results were anonymous and there was no way to link data to an individual student, the sensitive nature of illicit drug use may have introduced social desirability biases in the report of some behaviors. The sample may also have limited geographic generalizability as the data were from two college in California. Furthermore, the inclusion of an All Other racial/ethnic group limits our ability to make solid conclusions about the participants in this category since aggregate estimates may mask differences within the category.

This study has noteworthy strengths, including being one of the first studies to document characteristics of prescription stimulant misuse by race/ethnicity and gender. Survey data were collected from large, ethnically-diverse samples of California universities where the study samples were representative of their respective undergraduate student populations. The study design included probability sampling and a high student response rate was attained. Furthermore, this study includes a broad definition of IUPS, which allowed for us to obtain more accurate estimates of IUPS, and therefore, more accurate understanding of differences in characteristics of IUPS by race/ethnicity and gender.

4.2 Prevention and Research Implications

Our clinicians, college administrators, and prevention scientists should all be cognizant of the underlying racial/ethnic and gender differences in IUPS characteristics we have reported. For example, physicians should exercise caution when prescribing medication to high-risk groups, and implement more intensive drug monitoring to prevent misuse and diversion on college campuses. Future research should aim to determine reasons for observed racial/ethnic differences in characteristics of misuse, and use them as guides for culturally appropriate interventions.

Acknowledgments

B. This research was supported by the BUILD Research Stimulus Grant for Pilot Projects, NIH/NIGMS 8UL1GM118979-02 and a grant from the Prevention Research Center Development Fund.

References

Arria AM, Wilcox HC, Cladeira KM, Vincent KB, Garnier-Dykstra LM, O'Grady KE. Dispelling the myth of “smart drugs”: Cannabis and alcohol use problems predict nonmedical use of prescription stimulants for studying. Addictive Behaviors. 2013; 38:1643–1650. [PubMed: 23254212]

Bavarian N, Flay B, Smit E. Development and psychometric properties of a theory-guided prescription stimulant misuse questionnaire for college students. Substance Use and Misuse. 2013; 48(6):457–469. [PubMed: 23528146]

Bavarian N, Flay BR, Ketcham PL, Smit E. Illicit use of prescription stimulants in a college student sample: A theory-guided analysis. Drug and Alcohol Dependence. 2013; 132(3):665–673. [PubMed: 23683794]

Bavarian N, Flay BR, Ketcham PL, Smit E, Kodama C, Martin M, Saltz RF. Using structural equation modeling to understand prescription stimulant misuse: A test of the theory of triadic influence. Drug and Alcohol Dependence. 2014; 138:193–201. [PubMed: 24647369]

Bavarian N, Flay BR, Ketcham PL, Smit E. The illicit use of prescription stimulants on college campuses: A theory-guided systematic review. Health Education & Behavior. 2015; 42(6):719–729. [PubMed: 26032000]

Benson K, Flory K, Humphreys K, Lee S. Misuse of stimulant medication among college students: A comprehensive review and meta-analysis. Clinical Child & Family Psychology Review. 2015; 18(1): 50–76. [PubMed: 25575768]

Brecht ML, O'Brien A, von Mayrhauser C, Anglin MD. Methamphetamine use behaviors and gender differences. Addictive Behaviors. 2004; 29(1):89–106. [PubMed: 14667423]

Bussing R, Gary FA, Mills TL, Garvan CW. Parental explanatory models of ADHD: Gender and cultural variations. Social Psychiatry and Psychiatric Epidemiology. 2003; 38(10):563–575. [PubMed: 14564385]

DeSantis AD, Webb EM, Noar SM. Illicit use of prescription ADHD medications on a college campus: a multimethodological approach. Journal of American College Health. 2008; 57:315–326. [PubMed: 18980888]

Dupont RL, Coleman JJ, Bucher RH, Wilford BB. Characteristics and motives of college students who engage in nonmedical use of methylphenidate. American Journal of Addiction. 2008; 17(3):167–171.

Flay, BR., Petraitis, J. The theory of triadic influence: a new theory of health behavior with implications for preventive interventions. In: Albrecht, GS., editor. Advances in Medical Sociology, Vol IV: A Reconsideration of Models of Health Behavior Change, Jai Pr. Greenwich, CT: 1994. p. 19-44.1994

Flay, BR., Synder, F., Petraitis, J. The theory of triadic influence. In: DiClemente, RJ.Kegler, MC., Crosby, RA., editors. Emerging Theories in Health Promotion Practice and Research (Second edition). Wiley and Sons; New York, NY: 2009. p. 451-510.2009

Gallucci AR, Martin RJ. Misuse of prescription stimulant medication in a sample of college students: Examining differences between varsity athletes and non-athletes. Addictive Behaviors. 2015; 51:44–50. [PubMed: 26217928]

Garnier-Dykstra LM, Caldeira KM, Arria AM. Nonmedical use of prescription stimulants during college: Four-year trends in exposure opportunity, use, motives, and sources. Journal of American College Health. 2012; 60(3):226–234. [PubMed: 22420700]

Gibbs EL, Kass AE, Eichen DM, Fitzsimmons-Traft EE, Trockel M, Wilfley DE. Attention-deficit/hyperactivity disorder-specific stimulant misuse, mood, anxiety, and stress in college-age women at high risk for or with eating disorders. Journal of American College Health. 2016; 64(4):300–308. [PubMed: 26822019]

He J, Xie Y, Tao J, Su H, Wu W, Zou S, et al. Gender differences in socio-demographic and clinical characteristics of methamphetamine inpatients in a Chinese population. Drug and Alcohol Dependence. 2013; 130(1-3):94–100. [PubMed: 23149112]

Jain R, Stark JG. Safety and efficacy considerations due to misuse of extended-release formulations of stimulant medications. Postgraduate Medicine. 2016; 128(7):672–681. [PubMed: 27467139]

Lakhan SE, Kirchgessner A. Prescription stimulants in individuals with and without attention deficit hyperactivity disorder: Misuse, cognitive impact, and adverse effects. Brain and Behavior. 2012; 2(5):661–677. [PubMed: 23139911]

McCabe SE, Knight JR, Teter CJ, Wechsler H. Non-medical use of prescription stimulants among US college students: Prevalence and correlates from a national survey. Addiction. 2005; 100(1):96–106. [PubMed: 15598197]

McCabe SE, Teter CJ, Boyd CJ. Medical use, illicit use and diversion of prescription stimulant medication. Journal of Psychoactive Drugs. 2006; 38(1):43–56. [PubMed: 16681175]

Miech, RA., Johnston, LD., O'Malley, PM., Bachman, JG., Schulenberg, JE. Monitoring the Future national survey results on drug use, 1975-2015: Volume I, Secondary school students. Ann Arbor: Institute for Social Research, The University of Michigan; 2016. p. 636

Partridge BJ, Bell SK, Lucke JC, Yeates S, Hall WD. Smart drugs “as common as coffee”: Media hype about neuroenhancement. Public Library of Science. 2011; 6(11)

Pastor PN, Reuben CA. Racial and ethnic differences in ADHD and LD in young school-age children: Parental reports in the national health interview survey. Public Health Reports (1974-). 2005; 120(4):383–392.

Poulin C. From attention-deficit/hyperactivity disorder to medical stimulant use to the diversion of prescribed stimulants to non-medical stimulant use: Connecting the dots. Addiction. 2007; 102(5): 740–751. [PubMed: 17506151]

Rabiner DL, Anastopoulos AD, Costello EJ, Hoyle RH, McCabe SE, Swartzwelder HS. Motives and perceived consequences of nonmedical ADHD medication use by college students: Are students treating themselves for attention problems? Journal of Attention Disorders. 2009; 13(3):259–270. [PubMed: 18664714]

Teter CJ, McCabe SE, Cranford JA, Boyd CJ, Guthrie SK. Prevalence and motives for illicit use of prescription stimulants in an undergraduate student sample. Journal of American College Health. 2005; 53(6):253–262. [PubMed: 15900989]

Teter CJ, McCabe SE, LaGrange K, Cranford JA, Boyd CJ. Illicit use of specific prescription stimulants among college students: Prevalence, motives, and routes of administration. Pharmacotherapy. 2006; 26(10):1501–1510. [PubMed: 16999660]

Wu L, Schlenger WE. Psychostimulant dependence in a community sample. Substance Use & Misuse. 2003; 38(2):221. [PubMed: 12625429]

Zuvekas SH, Vitiello B. Stimulant medication use in children: A 12-year perspective. American Journal of Psychiatry. 2012; 169(2):160–166. [PubMed: 22420039]

Highlights

- Illicit use of prescription stimulants (IUPS) is prevalent among college students.
- Associations were found between race, gender, and IUPS characteristics.
- Being Asian or Latino increased the odds of smoking stimulants.
- Being Female increased the odds of using stimulants to lose weight.
- Many of the associations remained after controlling for known correlates of IUPS.

Addict Behav. Author manuscript; available in PMC 2018 May 01.

Table 1

Routes, Cost, Sources, Motives, and Experience with IUPS by Racial/Ethnic Group (N = 257 students)

	Race				χ^2 *p*-value
Route – Student indicated "Yes" to the following routes:	**White**	**Asian**	**Latino**	**All Other**	
Mouth	N=86 (94.51%)	N=40 (81.63%)	N=41 (83.67%)	N=26 (83.87%)	0.080
Nose	N=30 (39.47%)	N=8 (18.60%)	N=11 (27.50%)	N=4 (16.00%)	0.038 *
Veins	N=4 (5.80%)	N=1 (2.33%)	N=0 (0.00%)	N=0 (0.00%)	0.246
Smoke-	N=15 (21.74%)	N=24 (51.06%)	N=18 (43.90%)	N=13 (46.43%)	0.006 **
Other	N=1 (1.89%)	N=2 (6.90%)	N=1 (4.76%)	N=0 (0.00%)	0.531
Cost-Student indicated "Yes" to the following costs:					
No Charge	N=60 (76.92%)	N=31 (68.89%)	N=32 (84.21%)	N=21 (75.00%)	0.438
$1-$5	N=48 (63.16%)	N=16 (37.21%)	N=17 (45.95%)	N=10 (41.67%)	0.030 *
$6-$10	N=25 (36.76%)	N=16 (39.02%)	N=18 (50.00%)	N=8 (33.33%)	0.521
More than $10	N=6 (10.17%)	N=11 (26.83%)	N=10 (30.30%)	N=3 (13.04%)	0.050 *
Source-Student indicated "Yes" to the following sources:					
Myself	N=14 (21.88%)	N=2 (4.26%)	N=3 (7.89%)	N=9 (33.33%)	0.002 **
Friend	N=80 (95.24%)	N=44 (91.67%)	N=44 (88.00%)	N=21 (70.00%)	0.002 **
Family	N=14 (22.22%)	N=4 (9.09%)	N=6 (15.38%)	N=7 (28.00%)	0.174
Acquaintance	N=37 (52.11%)	N=25 (54.35%)	N=25 (59.52%)	N=12 (46.15%)	0.742
Internet	N=4 (6.35%)	N=1 (2.33%)	N=1 (2.56%)	N=0 (0.00%)	0.444
Other	N=2 (3.57%)	N=1 (2.78%)	N=0 (0.00%)	N=0 (0.00%)	0.698
Motives-Student indicated "Yes" to the following motives:					
To Improve Focus	N=68 (80.95%)	N=27 (56.25%)	N=35 (71.43%)	N=16 (57.14%)	0.010 **
To Make Studying More Enjoyable	N=42 (53.16%)	N=17 (38.64%)	N=21 (47.73%)	N=7 (31.82%)	0.219
To Stay Awake	N=59 (73.75%)	N=21 (47.73%)	N=29 (63.04%)	N=9 (36.00%)	0.002 **
To Improve Concentration	N=62 (77.50%)	N=26 (55.32%)	N=34 (73.91%)	N=17 (68.00%)	0.061
To Lose Weight	N=11 (15.28%)	N=3 (6.82%)	N=2 (4.88%)	N=1 (4.76%)	0.194
To Party Longer	N=32 (41.56%)	N=9 (20.93%)	N=11 (25.00%)	N=8 (36.36%)	0.078

	Race				χ^2 *p*-value
Route – Student indicated "Yes" to the following routes:	**White**	**Asian**	**Latino**	**All Other**	
To Experiment	N=42 (53.85%)	N=30 (66.67%)	N=29 (63.04%)	N=13 (59.09%)	0.525
Other-	N=4 (8.00%)	N=5 (17.86%)	N=2 (11.11%)	N=2 (12.50%)	0.633
Experience: Frequency of IUPS Desired Outcomes					
Not Applicable***	N=6 (26.09%)	N=7 (30.43%)	N=5 (21.74%)	N=5 (21.74%)	0.497
None of the time	N=4 (18.18%)	N=8 (36.36%)	N=8 (36.36%)	N=2 (9.09%)	
A little of the time	N=13 (33.33%)	N=10 (25.64%)	N=9 (23.08%)	N=7 (17.95%)	
Some of the time	N=12 (34.29%)	N=9 (25.71%)	N=8 (22.86%)	N=6 (17.14%)	
Most of the time	N=33 (42.86%)	N=17 (22.08%)	N=18 (23.38%)	N=9 (11.69%)	
All of the time	N=19 (55.88%)	N=6 (17.65%)	N=6 (17.65%)	N=3 (8.82%)	

* Refers to *p*-values significant at $p<0.05$

** Refers to *p*-values significant at $p<0.01$

*** Represents students who are lifetime misusers, but marked Not Applicable to this item

Table 2

Summary of Logistic Regression Analysis for Race and IUPS Characteristics with Significant Chi-Square Associations (N = 257 students)

	Odds Ratio (SE)	95% CI	p-value
Route – Oral			
Whites	1.00 (ref)	--	--
Asians	.26(.15)	.081,.82	0.022 *
Latinos	.30 (.18)	.092, .97	0.044 *
All Other	.30(.20)	.08, 1.13	0.075
Route - Intranasal			
Whites	1.00 (ref)	--	--
Asians	.35 (.16)	.14, .86	0.022 *
Latinos	.58(.25)	.25, 1.34	0.202
All Other	.29(.17)	.09, .94	0.038 *
Route – Smoking			
Whites	1.00 (ref)	--	--
Asians	3.76(1.55)	1.67,8.44	0.001 **
Latinos	2.82(1.21)	1.21,6.53	0.016 *
All Other	3.12(1.49)	1.22,7.97	0.017 *
Cost - $1-$5 per pill			
Whites	1.00 (ref)	--	--
Asians	.35(.14)	.16,.75	0.007 **
Latinos	.50(.20)	.22,1.10	0.085
All Other	.42(.20)	.16,1.06	0.067
Cost - >$10 per pill			
Whites	1.00 (ref)	--	--
Asians	3.24(1.80)	1.09,9.64	0.035 *
Latinos	3.84(2.20)	1.25,11.82	0.019 *
All Other	1.33(.10)	.30,5.81	0.709
Source – Myself ***			
Whites	1.00 (ref)	--	--
Asians	.16(.12)	.03,.74	0.019 *
Latinos	.30(.21)	.08, 1.15	0.079
All Other	1.79(.91)	.66, 4.83	0.254
Source – Friend			
Whites	1.00 (ref)	--	--
Asians	.55(.40)	.13, 2.31	0.414
Latinos	.37(.25)	.10, 1.37	0.136

	Odds Ratio (SE)	95% CI	p-value
All Other	.12(.08)	.03,.42	0.001**
Motive – To Improve Focus			
Whites	1.00 (ref)	--	--
Asians	.30(.12)	.14, .67	0.003**
Latinos	.59(.25)	.26, 1.34	0.207
All Other	.31(.15)	.12,.79	0.014*
Motive – To Stay Awake			
Whites	1.00 (ref)	--	--
Asians	.32(.13)	.15, .70	0.004**
Latinos	.61(.24)	.28, 1.32	0.209
All Other	.20(.10)	.08, .52	0.001**
Motive – To Improve Concentration			
Whites	1.00 (ref)	--	--
Asians	.36(.14)	.17,.78	0.010*
Latinos	.82(.35)	.35, 1.91	0.649
All Other	.62(.31)	.23, 1.66	0.339
Motive – To Party Longer			
Whites	1.00 (ref)	--	--
Asians	.37(.16)	.16, .88	0.025*
Latinos	.47(.20)	.21, 1.06	0.070
All Other	.80(.40)	.30, 2.14	0.662

* Refers to *p*-values significant at $p<0.05$

** Refers to *p*-values significant at $p<0.01$

*** Myself refers to having a personal prescription for stimulant medication from a provider.

Table 3
Routes, Cost, Sources, Motives and Experience with IUPS by Gender (N = 257 students)

	Gender		χ^2 *p*-value
Route - Student indicated "Yes" to the following routes:	**Males**	**Females**	
Mouth	N=90 (88.24%)	N=100 (86.96%)	0.776
Nose	N=25 (30.12%)	N=27 (27.00%)	0.641
Veins	N=1 (1.27%)	N=4 (4.12%)	0.256
Smoke-	N=27 (33.33%)	N=40 (29.60%)	0.383
Other	N=1 (1.72%)	N=3 (4.92%)	0.334
Cost-Student indicated "Yes" to the following costs:			
No Charge	N=60 (70.59%)	N=83 (80.58%)	0.110
$1-$5	N=44 (52.38%)	N=45 (48.39%)	0.596
$6-$10	N=35 (43.75%)	N=31 (35.63%)	0.284
More than $10	N=13 (18.06%)	N=16 (19.51%)	0.818
Source-Student indicated "Yes" to the following sources:			
Myself	N=13 (15.66%)	N=14 (15.73%)	0.990
Friend	N=88 (90.72%)	N=98 (89.09%)	0.698
Family	N=14 (17.50%)	N=16 (18.18%)	0.908
Acquaintance	N=47 (54.65%)	N=50 (52.63%)	0.786
Internet	N=3 (3.80%)	N=3 (3.41%)	0.893
Other	N=0 (0.00%)	N=2 (3.23%)	0.138
Motives-Student indicated "Yes" to the following motives:			
To Improve Focus	N=69 (71.88%)	N=77 (70.64%)	0.846
To Make Studying More Enjoyable	N=46 (52.87%)	N=41 (41.00%)	0.104
To Stay Awake	N=54 (59.34%)	N=65 (63.73%)	0.532
To Improve Concentration	N=67 (72.83%)	N=74 (71.15%)	0.795
To Lose Weight	N=3 (3.57%)	N=14 (15.05%)	0.010 *
To Party Longer	N=29 (33.72%)	N=31 (31.63%)	0.763
To Experiment	N=51 (57.95%)	N=61 (60.40%)	0.733
Other	N=4 (6.78%)	N=8 (15.69%)	0.135
Experience: Frequency of IUPS Desired Outcomes			
Not Applicable ***	N=7 (33.33%)	N=14 (66.67%)	0.192
None of the time	N=6 (31.58%)	N=13 (68.42%)	
A little of the time	N=19 (48.72%)	N=20 (51.28%)	
Some of the time	N=11 (32.35%)	N=23 (67.65%)	
Most of the time	N=41 (53.95%)	N=35 (46.05%)	
All of the time	N=20 (55.56%)	N=16 (44.44%)	

* Refers to *p*-values significant at $p<0.05$

** Represents students who are lifetime misusers, but marked Not Applicable to this item

Table 4

Summary of Logistic Regression Analysis for Gender and IUPS Motives (N = 257 students)

	Odds Ratio (SE)	95% CI	p-value
Motive – To Lose Weight			
Females	1.00 (ref)	--	--
Males	.21 (.14)	.06, .76	0.017*

*Refers to *p*-values significant at $p<0.05$

Table 5

Summary of Adjusted[+] Logistic Regression Analysis for Items Having Significant Associations between Race/Ethnicity or Gender and IUPS Characteristics (N=257 students)

	Odds Ratio (SE)	95% CI	p-value
Route – Oral			
Whites	1.00 (ref)	--	--
Asians	.19 (.13)	.05, .71	0.014 *
Latinos	.23 (.15)	.05, .85	0.027 *
All Other	.23 (.18)	.05, 1.08	0.063
Route - Intranasal			
Whites	1.00 (ref)	--	--
Asians	.40 (.20)	.15, 1.09	0.072
Latinos	.77 (.36)	.31, 1.91	0.571
All Other	.29 (.21)	.07, 1.20	0.088
Route – Smoking			
Whites	1.00 (ref)	--	--
Asians	5.06 (2.44)	1.97, 13.02	0.001 **
Latinos	4.02 (1.92)	1.57, 10.24	0.004 **
All Other	3.29 (1.83)	1.10, 9.78	0.033 *
Cost - $1-$5 per pill			
Whites	1.00 (ref)	--	--
Asians	0.31 (.14)	.13, .77	0.011 *
Latinos	.51 (.22)	.21, 1.21	0.126
All Other	.50 (.27)	.18, 1.43	0.198
Cost - >$10 per pill			
Whites	1.00 (ref)	--	--
Asians	3.03 (1.80)	.95, 9.70	0.061
Latinos	3.57 (2.11)	1.12, 11.40	0.032 *
All Other	.41 (.47)	.04, 3.86	0.437
Source – Myself ***			
Whites	1.00 (ref)	--	--
Asians	.15 (.12)	.03, .76	0.022 *
Latinos	.30 (.21)	.08, 1.15	0.080
All Other	.98 (.61)	.29, 3.31	0.969
Source – Friend			
Whites	1.00 (ref)	--	--
Asians	.44 (.34)	.10, 1.98	0.287

	Odds Ratio (SE)	95% CI	p-value
Latinos	.44 (.32)	.11, 1.79	0.252
All Other	.13 (.09)	.03, .54	0.005**
Motive – To Improve Focus			
Whites	1.00 (ref)	--	--
Asians	.23 (.11)	.09, .57	0.002**
Latinos	.52 (.24)	.21, 1.29	0.157
All Other	.30 (.16)	.10, .88	0.028*
Motive – To Stay Awake			
Whites	1.00 (ref)	--	--
Asians	.29 (.13)	.12, .70	0.006**
Latinos	.62 (.27)	.27, 1.44	0.267
All Other	.13 (.08)	.04, .42	0.001**
Motive – To Improve Concentration			
Whites	1.00 (ref)	--	--
Asians	.31 (.14)	.13, .76	0.010*
Latinos	.79 (.37)	.32, 1.99	0.623
All Other	.72 (.41)	.23, 2.22	0.567
Motive – To Party Longer			
Whites	1.00 (ref)	--	--
Asians	.44 (.22)	.16, 1.17	0.099
Latinos	.54 (.24)	.22, 1.31	0.173
All Other	.97 (.58)	.30, 3.10	0.955
Motive – To Lose Weight			
Females	1.00 (ref)	--	--
Males	.24 (.16)	.06, .92	0.037*

+ Adjusted for gender, race/ethnicity, year in school, sensation-seeking, Greek Life participations, and perceptions of campus drug culture.

* Refers to *p*-values significant at $p<0.05$

** Refers to *p*-values significant at $p<0.01$

*** Myself refers to having a personal prescription for stimulant medication from a provider