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Perceived academic benefit is associated with nonmedical prescription stimulant use among college students

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Abstract

Introduction—College students are at higher than average risk for nonmedical use of prescription stimulants (NPS). A commonly identified motive among students who engage in NPS is to improve grades. Several research studies have observed that NPS most likely does not confer an academic advantage, and is associated with excessive drinking and other drug use. This study documents the proportion of the general college student population who believe that NPS will lead to improvements in academic performance.

Methods—This study gathered online survey data from a large, demographically diverse sample of college students to document the prevalence of perceived academic benefit of NPS for improving grades and to examine the association between such belief and NPS.

Results—Overall, 28.6% agreed or strongly agreed that NPS could help students earn higher grades, and an additional 38.0% were unsure. Students with a higher level of perceived academic benefit of NPS and more frequent patterns of drinking and marijuana use were more likely to engage in NPS, even after adjustment for a wide range of covariates.

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Conclusions—The results underscore the need for interventions that simultaneously correct misperceptions related to academic benefit and target alcohol and marijuana use to reduce NPS.

Keywords

Academic achievement; motives for nonmedical use of prescription stimulants; alcohol use; marijuana use; undergraduates

1. Introduction

Nonmedical use of prescription stimulants (NPS) is defined as the use of a medication usually prescribed to treat Attention-Deficit/Hyperactivity Disorder (ADHD) without a prescription or in a way that is inconsistent with a doctor's orders (Colliver, Kroutil, Dai, & Gfroerer, 2006; DeSantis, Webb, & Noar, 2008; McCabe, West, & Wechsler, 2007; Substance Abuse and Mental Health Services Administration, 2006). In the US, 3.7% of full-time college students are estimated to have engaged in NPS during the past month (Substance Abuse and Mental Health Services Administration, 2016). Lifetime prevalence estimates of NPS vary, but studies among college students have found the range to be between 5.3% and 35% (DeSantis et al., 2008; DuPont, Coleman, Bucher, & Wilford, 2008; Weyandt et al., 2013). The Monitoring the Future study reported that college students are more likely than their non-college attending peers to use Adderall® nonmedically [10.7% vs. 7.1%, respectively; (Johnston, O'Malley, Bachman, Schulenberg, & Miech, 2016)]. NPS is more prevalent among college students who are white, male, members of a Greek organization, and whose parents have at least a four-year college degree (Johnston et al., 2016; McCabe, Knight, Teter, & Wechsler, 2005). Attending a college located in the Northeast or with highly competitive admission standards is also significantly associated with NPS (McCabe et al., 2005).

While prescription stimulants such as Adderall® and Ritalin® are beneficial for the treatment of ADHD (Chan, Fogler, & Hammerness, 2016; Wilens et al., 2006) using these drugs nonmedically is associated with risk for dependence and other substance use. McCabe et al. (2007) found that 12.6% of individuals who began engaging in NPS at age 19 became stimulant dependent, with lifetime stimulant dependence increasing with earlier initiation. Several cross-sectional studies have observed that nonmedical users of prescription stimulants also drink alcohol excessively and use illicit drugs, particularly cannabis (Arria et al., 2008a; DeSantis, Noar, & Webb, 2009; McCabe et al., 2005; Teter, McCabe, Boyd, & Guthrie, 2003). McCabe et al. (2005) found that students who engaged in NPS were more than ten times more likely to use cannabis during the past year than non-users.

The cognitive benefit of NPS has been called into question. Experimental studies have demonstrated that among individuals without an ADHD diagnosis, taking prescription stimulants does not result in marked cognitive improvement compared with controls (Advokat, 2010; Chamberlain et al., 2011; Ilieva, Boland, & Farah, 2013; Volkow et al., 2008). For example, Ilieva and colleagues (2013) conducted a double-blind placebo-controlled trial and found that Adderall® was not associated with enhancement of any of the thirteen cognitive measures assessed. One experimental study using a balanced placebo

design reported a deterioration in performance associated with methylphenidate administration among individuals without ADHD (Volkow et al., 2008). The authors concluded that NPS might slow metabolic activation in an already optimally focused brain when performing cognitive tasks, thereby actually weakening cognitive performance.

One naturalistic longitudinal study of college students linked NPS with a pattern of increasing marijuana and alcohol use accompanied by increases in skipping class and decreases in grade point average [GPA; (Arria et al., 2013)]. Other cross-sectional research has also shown that college students who engage in NPS have lower GPAs and skip more classes (Clegg-Kraynok, McBean, & Montgomery-Downs, 2011; McCabe et al., 2005; McCabe, Teter, & Boyd, 2006; Rabiner et al., 2009). Nonmedical users of prescription stimulants also spend less time studying and more time socializing with their counterparts, patterns of behavior that would appear to impede academic performance (Arria, O'Grady, Caldeira, Vincent, & Wish, 2008b). A more recent study observed that students who initiate NPS show no statistically significant improvement in their GPA and gain no detectable advantages over their peers academically (Arria et al., 2017).

Although research studies have cast substantial doubt regarding the academic benefit of NPS, the belief that these drugs, when taken nonmedically, can improve academic performance appears to be widespread among college students who engage in NPS. Teter and colleagues (2006) examined student's motivations for NPS and found students believe that the drugs will enhance their concentration (65%), help with studying (60%), and increase alertness (48%). Consistently, academic motives are commonly reported among students who engage in NPS (Clegg-Kraynok et al., 2011; DeSantis et al., 2009; DeSantis et al., 2008; DuPont et al., 2008; Garnier-Dykstra, Caldeira, Vincent, O'Grady, & Arria, 2012; Low & Gendaszek, 2002; McCabe et al., 2005; Rabiner et al., 2009; Teter, McCabe, Cranford, Boyd, & Guthrie, 2005; Teter et al., 2006; White, Becker-Blease, & Grace-Bishop, 2006). However, the literature does not provide information about the range of beliefs that exist among the general college student population regarding the putative academic benefit of NPS. Studies examining motives for NPS can only be conducted among individuals who engage in use. Therefore, there is limited information about the perceived academic benefit of NPS among college students in general. The present study makes an important distinction by measuring how widespread the perceived academic benefit of NPS really is among a large college student sample.

Perceived benefits of using a substance influence the desire to initiate and maintain use of that substance (Cox & Klinger, 1988; Goldman, Brown, & Christiansen, 1987; Leigh, 1989). Positive or negative expectancies can mediate behavior and might have reinforcing effects on behavior over time (Jones, Corbin, & Fromme, 2001). Researchers have found the expected positive and negative consequences of NPS can be measured and classified (Labbe & Maisto, 2010; Looby & Earleywine, 2010), similar to other substances. Nonusers, recreational users, and medical users can be discriminated on the basis of expectancies (Looby & Earleywine, 2010). An exploratory factor analysis performed on the Prescription Stimulant Expectancy Questionnaire II revealed that nonusers of prescription stimulants held significantly weaker expectancies for cognitive enhancement and stronger expectancies for guilt and dependence compared with user groups. Combining positive items together and

negative items together to create composite scales confirmed that nonusers of prescription stimulants held the strongest negative expectancies and recreational/medical users held the strongest positive expectancies. If predictive of use, the expectancy that NPS will confer academic advantages might be a valuable prevention target, both to avert initiation and to discourage continued use after initiation.

This study of a large, demographically diverse sample of college students sought to: a) describe the prevalence of perceived academic benefit of NPS as a viable means of improving grades, and b) examine the explanatory power of such belief for predicting NPS. We hypothesized that three constructs would be associated with NPS—namely, higher levels of perceived academic benefit, alcohol use, and marijuana use patterns after holding constant demographic variables.

2. Methods

2.1. Multi-site design

This multi-site study uses data collected from 8,039 full-time undergraduate students at nine colleges and universities in the US during the 2015-2016 academic year (see Table 1). The sites were selected based on variability by size, type, and geographic location. Students were randomly selected at every site, and eligibility was restricted to individuals between the ages of 18 and 25. A categorical variable for school was used to account for regional differences in prevalence of NPS.

2.2. Participant recruitment

Lists of randomly selected enrolled students were obtained from Registrar's Offices at each site. Students were invited via e-mail to participate in a 10- or 20-minute (varied by site) confidential online survey. Up to eight email reminders were sent to those who had not responded. At one site, items for the present study were administered as part of a larger survey measuring campus climate, and therefore recruitment emails originated from the university's Title IX office; at the other eight sites, recruitment emails originated from the principal investigators. The overall response rate was modest (27.3%, see Table 1). Students were paid $5 or $10 (depending on the length of the survey) for completing the assessment; at one site, $10 payments were offered to the first 3,000 participants. All procedures were approved by the Institutional Review Boards at each University, and participants received further protection under a federal Certificate of Confidentiality.

2.3. Participants

For the present study, the sample was restricted to the 7,287 individuals who indicated that they had never been diagnosed with ADHD. The decision to exclude students with an ADHD diagnosis was based on the notion that their perceptions about NPS might differ in meaningful ways from those of other students, as a result of their personal experiences with taking ADHD medications for their diagnosed condition. The final analytic sample was further restricted to the 6,962 individuals who had valid responses on all variables of interest for the present study (see Table 2). Missing data were minimal (≤2%). Self-reported gender was dichotomized as male (40.9%) and female (59.1%); transgendered and other responses

were treated as missing due to small cell sizes (<1% of sample). Participants had a mean age of 19.94 (*SD*=1.46) years of age. Multiple response options were permitted for race, and later collapsed into four categories (62.1% White, 19.5% Asian, 9.9% Black or African-American, and 8.5% other or multiple). Ethnicity was assessed separately as Hispanic (9.3%) and not Hispanic.

2.4. Measures

2.4.1. Nonmedical use of prescription stimulants (NPS)—Participants were asked the number of days they had used prescription stimulants nonmedically during the past six months. NPS was defined as using a prescription stimulant that was not prescribed to you or that you took only for the experience or feeling it caused, as well as overusing a stimulant that you had been prescribed (Colliver et al., 2006; McCabe, 2008; Substance Abuse and Mental Health Services Administration, 2014). Along with this standard definition, the names of five different stimulant medications students might have used were provided as examples (e.g., "*Ritalin®, Dexedrine®, Adderall®, Concerta®, methylphenidate")*. Responses were later dichotomized as using at least once versus no use.

2.4.2. Perceived academic benefit of NPS—Students were asked to rate the degree to which they agree or disagree with the statement that "prescription stimulants will help people without a prescription get better grades." Likert-type response options were scored one through five (i.e., strongly disagree, disagree, unsure, agree, strongly agree). This item was created for this study.

2.4.3. Alcohol use—Alcohol use was operationalized as the total number of drinks consumed in a typical week during the past six months, which was computed from responses to the Daily Drinking Questionnaire (Collins, Parks, & Marlatt, 1985). To minimize the excessive influence of extremely large values, 40 was selected as the maximum valid value, based on examination of the sample variance (i.e., approximately three standard deviations above the mean) combined with clinical experience validating the plausibility of 40 drinks per week. Values exceeding 40 were automatically recoded to 40 (n=61). Nondrinkers were coded as having zero drinks per week (30.9% of sample).

2.4.4. Marijuana use frequency—Students were asked the number of days they had used marijuana during the past six months. Valid values ranged from zero to 183.

2.5. Statistical analysis

First, descriptive statistics were computed for the overall sample and within the subsets of students who did and did not engage in NPS during the past six months. Second, a multivariate logistic regression model was developed with NPS as the binary dependent variable, and including three hypothesized explanatory variables (perceived academic benefit, alcohol use, marijuana use) and four demographic control variables (gender, race, ethnicity, school). Perceived academic benefit of NPS was operationalized as a continuous variable and as an ordinal variable in two alternative versions of the logistic regression, respectively.

3. Results

3.1. Prevalence of NPS

11.2% of the overall sample engaged in NPS during the past six months.

3.2. Prevalence of perceived academic benefit of NPS

Among the overall sample, 28.6% endorsed the belief that NPS could help students earn higher grades (23.3% agree + 5.3% strongly agree), and an additional 38.0% were unsure (see Table 2). Not surprisingly, compared with non-users, the proportion endorsing academic benefit was considerably higher (64.9%) among the subset who had engaged in NPS during the past six months (45.0% agree + 19.9% strongly agree), whereas the proportion who were unsure was somewhat lower (25.8%). It is noteworthy that, even among students who refrained from NPS, perceived academic benefit was relatively high, with the majority either endorsing such beliefs or at least remaining open-minded about them (20.6% agree + 3.5% strongly agree + 39.6% unsure=63.7%).

3.3. Intercorrelations

All correlations amongst the three hypothesized explanatory variables were modest (all *r*s<0.3) but statistically significant (all *p*s<.001; data not shown in a table).

3.4. Logistic regression on NPS

All three of the hypothesized explanatory variables were significantly and positively associated with NPS (see Table 3, Model A). Even accounting for the effects of school, demographics, and alcohol and marijuana use, students with higher perceived academic benefit of NPS were significantly more likely to engage in NPS (*AOR*=2.17, *95% CI*=1.99 to 2.37, *p*<.001).

Post-hoc analysis—Examination of the model predicted probabilities of NPS suggested a non-linear relationship between perceived academic benefit and NPS (see Figure 1), such that the magnitude of change in risk varied depending on the level of perceived academic benefit. To elucidate this relationship, an alternative model was developed with perceived academic benefit entered as a categorical variable (see Table 3, Model B). With the sole exception of the contrast between Disagree and Strongly disagree, each increase in perceived academic benefit was associated with a significant increase in the adjusted odds of NPS, ranging from 1.89 (*95% CI*=1.41 to 2.54) for Unsure relative to Disagree, to 2.52 (*95% CI*=2.10 to 3.03) for Agree relative to Unsure.

4. Discussion

In the present study, college students with the highest perceived academic benefit of NPS were more likely to report use, even after accounting for other factors. However, the belief of students observed in this study is in direct contrast to what is known from the scientific literature, namely, that no academic advantage or benefit of NPS seems to exist (Arria et al., 2017). Simply alerting students to this finding will likely not result in behavior change.

However, when prevention opportunities and even successes with other substances, including alcohol, are considered, some potential opportunities to address NPS emerge.

On a broader scale, colleges and universities could consider targeting injunctive norms related to perceived academic benefit of NPS (e.g., “Most students don't think misusing prescription stimulants will help get better grades…They are right…Research shows no increase in GPA when people start or keep taking ADHD prescription stimulants that aren't prescribed to them”). Certainly, if a contributor to initiation of use is the belief that “everyone” does this during midterms and finals a social norms campaign highlighting that the majority of students on campus refrain from engaging in NPS could be implemented as well to address those descriptive norms. Although recent literature suggests that social norms campaigns have varying degrees of success in reducing excessive drinking during college, several studies support their impact (DeJong et al., 2006; Fitzpatrick, Martinez, Polidan, & Angelis, 2016; Scribner et al., 2011). Of course, such efforts require appropriate “dosing” (i.e., proper visibility for a media campaign), and could be evaluated for impact at potential high-risk times (e.g., prior to exams or project deadlines at the end of the quarter or semester).

The college student alcohol prevention and intervention literature is replete with examples of how increasing knowledge alone is insufficient to change behavior (National Institute on Alcohol Abuse and Alcoholism, 2015). However, information still has a place, particularly when delivered in the context of a motivational enhancement approach (National Institute on Alcohol Abuse and Alcoholism, 2015). Applications of Miller and Rollnick's (2013) Motivational Interviewing have consistently shown that developing discrepancies between values and goals (e.g., “I want to do better academically”) and the status quo (e.g., “it looks like nonmedical use of prescription stimulants isn't really resulting in better grades for me”) could prompt contemplation of or commitment to change within the context of a brief intervention. One means of connecting students to a brief intervention involves screening.

Using a public health framework to intervene early with students who have initiated NPS could be accomplished through Screening and Brief Intervention (SBI). SBI is a strategy through which college students are screened for alcohol and other drug use via assessment tools that can be presented via interview or online, and such screenings are recommended for integration into routine health visits (Moyer, 2013). They could also be integrated into counseling visits and dedicated screening days on campus. If screening results in positive identification of students engaging in NPS, they could be referred for follow-up interventions as indicated, either on or off campus. There is a voluminous literature on the efficacy of brief interventions with both general and target populations of college students in reducing or mitigating alcohol and drug use and its consequences (Carey, Scott-Sheldon, Carey, & DeMartini, 2007; Carey, Scott-Sheldon, Garey, Elliott, & Carey, 2016; National Institute on Alcohol Abuse and Alcoholism, 2015; Scott-Sheldon, Carey, Elliott, Garey, & Carey, 2014).

Once connected with a provider, a motivational interviewing-based brief intervention could be offered. This study observed that perceived academic benefit is one of the distinctions between individuals who engage in NPS and those that do not. Utilizing such information

could be an important aspect of a motivational enhancement intervention because if the student is genuinely seeking academic improvement or success, findings that demonstrate a discrepancy (i.e., NPS is not providing this improvement) could result in behavior change. Especially during periods of high stress around midterms and final exams—times during which students are likely to seek services from campus health, counseling, and academic assistance centers for academic performance-related concerns—students might be even more likely to be receptive to such valuable information, particularly if paired with alternative behavioral strategies when they are of interest to the student. Expanding screening and intervention for substance use beyond traditional health and counseling centers to academic assistance centers would increase the likelihood of identifying students in need of such interventions. Because personalized feedback interventions have demonstrated success with reducing alcohol use and associated consequences (National Institute on Alcohol Abuse and Alcoholism, 2015) and similar interventions have shown promise with reducing cannabis use and related harms (Lee et al., 2013), such approaches to impact NPS can be developed and evaluated.

Finally, if academic motives are primarily driving NPS, connecting students who might be struggling academically to support services should be prioritized. Among a sample of students who screened positive for depression who felt like they needed help, but did not get help, the primary factor associated with not getting support was not knowing what was available to them (Eisenberg, Golberstein, & Gollust, 2007). If similar trends hold for NPS, raising student awareness of on-campus support services could be a step in the right direction, as could informing students of these services following a positive screen in a health or counseling center setting.

Study findings must be interpreted in the context of the limitations. Despite the variation in location, size, and type of the nine schools sampled, all of the schools were four-year institutions. Two-year institutions could provide a unique comparison given that community college students might have additional financial or familial responsibilities that could put additional pressures on their academic success. Future studies should compare the perceived academic benefit of NPS among students of both traditional four-year colleges and community colleges. The present study did not include students who ever had a diagnosis of ADHD. This is a potentially valuable population for future research, including both students who are not on medications and students with prescriptions who might divert their medication to students without an ADHD diagnosis. The perceived academic benefit of NPS is likely to be high among students with prescribed medication, but these students might not be aware that there are no cognitive benefits of prescription stimulant use among students without an ADHD diagnosis. Therefore, measuring the perceived academic benefit of NPS, alcohol use, and marijuana use among students with prescribed stimulants might be a useful way to identify the individuals most at risk for diversion. These students could be targeted in education and social norms campaigns to encourage them to not share their medication. The cross-sectional nature of the data collected prevents the researchers from making any inferences about the relationship between NPS and the perceived academic benefit of NPS, alcohol use, or marijuana use over time. Moreover, our measure of perceived academic benefit is novel, and has yet to be fully validated. Expanding the assessment of the construct beyond our single item measure would be useful to more fully understand nuances in student

perceptions. Despite the diversity of our sample, representativeness is uncertain given the modest response rates; nevertheless, we are encouraged by the broad distribution of substance use patterns represented among this sample. Finally, NPS was dichotomized as using at least once versus no use during the last six months. This does not allow for analysis of different levels of NPS which might reveal important differences in perceived academic benefit, alcohol use, or marijuana use between frequent and occasional users.

The present study holds promise for both future research and practice. Future studies could examine the efficacy of SBI for students at risk for NPS, targeting perceived academic benefit of NPS, as well as alcohol and marijuana comorbidity with NPS. It could also be beneficial to examine the efficacy of such early interventions if and when offered within academic advising settings as part of routine meetings with college students focused on academic planning. Possible outcomes of such interventions might be altering the trajectory of intent to use stimulants nonmedically or actual NPS. Additional longitudinal research to further explore the relationship of perceived benefits (and harms) to future use and academic outcomes would also be beneficial.

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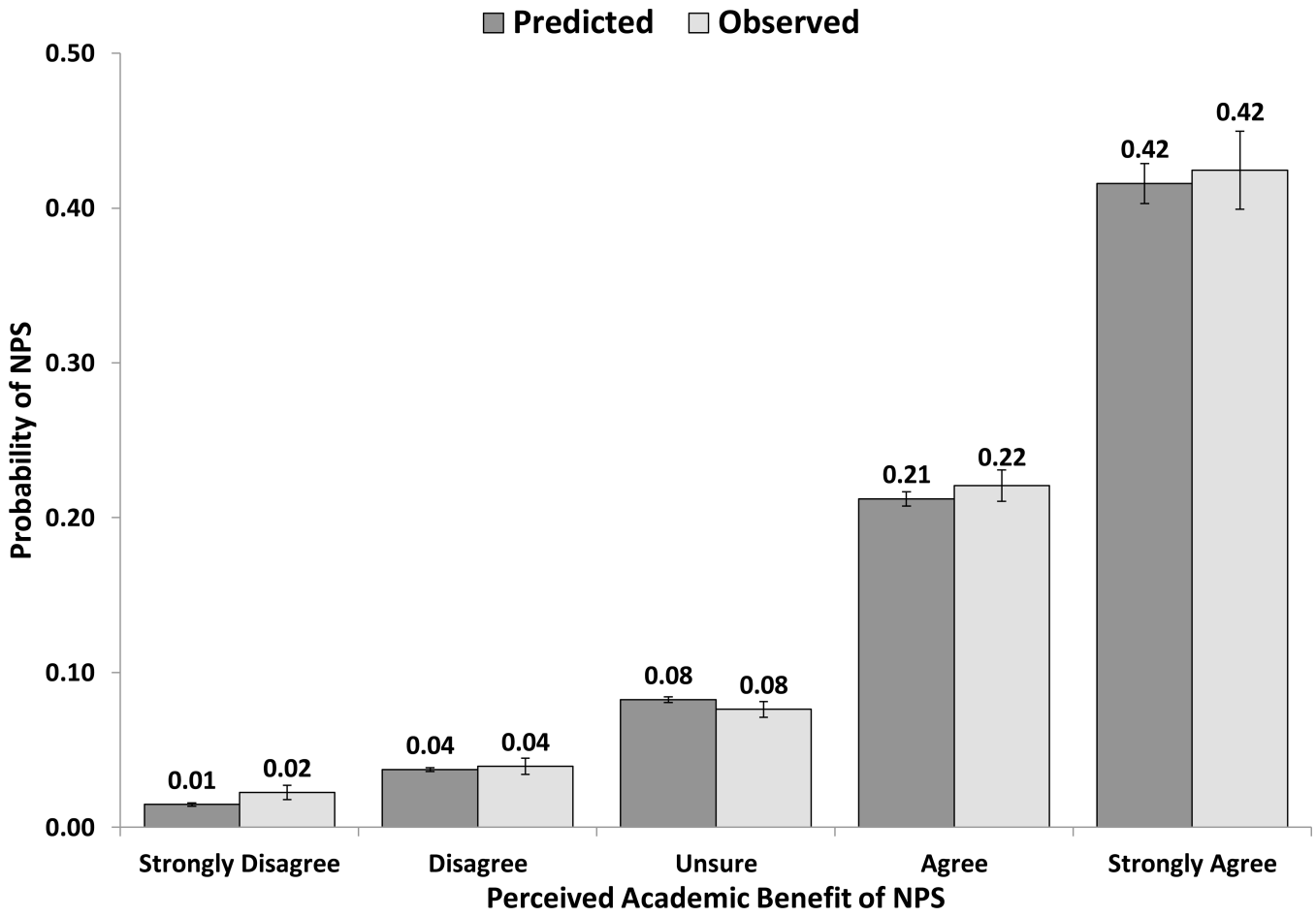

Fig 1. Predicted and observed probabilities of engaging in nonmedical use of prescription stimulants (NPS) at least once during the past six months, by perceived academic benefit of NPS (*N*=6929)

Note. Model predicted probabilities are adjusted for the effects of alcohol use, marijuana use, school, gender, race, and ethnicity.

Table 1

Sample size and response rate, by site

School	Description	*N*	Response rate	*n* for present analysis
A	Large public university, Pacific Northwest	1538	28.7%	1390
B	Large public university, Mid-Atlantic	3892	40.4%	3312
C	Large public university, Northeast	1258	21.6%	1108
D	Small private college, Mountain-West	128	32.8%	102
E	Small private college, Northeast	106	20.8%	92
F	Large public university, Southeast	388	10.1%	339
G	Medium-sized public university, Mountain-West	138	21.4%	114
H	Large public university, Southeast	440	15.6%	369
I	Small private college, Pacific Northwest	151	39.0%	136
Overall		8039	27.3%	6962

Table 2

Sample characteristics by nonmedical use of prescription stimulants (NPS) during the past six months

	Total (*N*=6962)	No NPS (*n*=6180)	NPS (*n*=782)
Race			
% (*n*) White	62.1 (4320)	60.4 (3734)	74.9 (586)
% (*n*) Asian	19.5 (1358)	20.6 (1275)	10.6 (83)
% (*n*) Black or African-American	9.9 (692)	10.4 (645)	6.0 (47)
% (*n*) Multiple or other races	8.5 (592)	8.5 (526)	8.4 (66)
Gender: % (*n*) Male	40.9 (2844)	39.7 (2455)	49.7 (389)
Ethnicity: % (*n*) Hispanic or Latino/a	9.3 (644)	9.1 (560)	10.7 (84)
Perceived academic benefit of NPS			
% (*n*) Strongly disagree	13.6 (948)	15.0 (929)	2.4 (19)
% (*n*) Disagree	19.7 (1372)	21.3 (1319)	6.8 (53)
% (*n*) Unsure	38.0 (2648)	39.6 (2446)	25.8 (202)
% (*n*) Agree	23.3 (1623)	20.6 (1271)	45.0 (352)
% (*n*) Strongly agree	5.3 (371)	3.5 (215)	19.9 (156)
Mean (*SD*) perceived academic benefit score	2.9 (1.1)	2.8 (1.1)	3.7 (0.9)
Mean (*SD*) total drinks per week	6.9 (8.3)	5.9 (7.4)	15.0 (10.4)
Mean (*SD*) days used marijuana during the past six months	10.8 (32.3)	6.8 (24.8)	42.9 (56.8)

Note. Perceived academic benefit of NPS was scored 1 (strongly disagree) through 5 (strongly agree).

Table 3

Results of logistic regression predicting nonmedical use of prescription stimulants (NPS; *N*=6929)

	Model A				Model B			
	AOR	95% CI		*p*	*AOR*	95% CI		*p*
		LB	UB			LB	UB	
Race								
Multiple, Other	1.05	0.78	1.41	0.755	1.05	0.78	1.40	0.768
Asian	0.93	0.72	1.19	0.539	0.94	0.73	1.20	0.611
Black or African-American	0.75	0.55	1.03	0.078	0.76	0.55	1.04	0.086
White (Ref.)	1.00				1.00			
Gender								
Female	1.20	1.02	1.42	0.026	1.21	1.03	1.42	0.024
Male (Ref.)	1.00				1.00			
Ethnicity								
Hispanic	0.93	0.71	1.22	0.591	0.94	0.71	1.23	0.628
Non-Hispanic (Ref.)	1.00				1.00			
Alcohol use (drinks/week)	1.08	1.07	1.08	<.001	1.08	1.07	1.09	<.001
Marijuana use (frequency during the past six months)	1.01	1.01	1.02	<.001	1.01	1.01	1.02	<.001
Perceived academic benefit of NPS (score)	2.17	1.99	2.37	<.001				
Perceived academic benefit of NPS (categorical)								
Disagree vs. Strongly disagree					1.57	0.95	2.57	0.077
Unsure vs. Disagree					1.89	1.41	2.54	<.001
Agree vs. Unsure					2.52	2.10	3.03	<.001
Strongly agree vs. Agree					2.14	1.67	2.74	<.001

Note. Results adjusted for school and all other effects shown. The overall effect of school was statistically significant (Wald $X^2 > 47.5$, $df=8$, $p<.001$).

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