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College Students' Perceived Benefit-to-Risk Tradeoffs for Nonmedical Use of Prescription Stimulants: Implications for Intervention Designs

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Abstract

OBJECTIVES—Few studies have examined the benefit-to-risk tradeoffs undergraduate students perceive when engaging in the nonmedical use of prescription stimulants (NPS). This study examined the variation in college students' perceived risks and benefits for NPS.

METHODS—An online survey was administered to 259 college students (ages 18-25) at six public universities who had engaged in NPS in the past year. A best-worst scaling (BWS) instrument assessed the relative importance of 12 perceived benefits and risks of NPS. Probabilities of selection of each factor and 95% confidence intervals were estimated for the aggregate sample and latent preference subgroups were derived using latent class analysis (LCA).

RESULTS—For the aggregate sample, the strongest motivators for NPS were better grades ($m=2.33$, $p<0.05$) and meeting deadlines ($m=1.62$, $p<0.05$). The LCA generated four subgroups: 1) assuredly performance-driven ($n=64$; 25%), who prioritized academic performance and nonacademic responsibilities; 2) cautiously grade/career-oriented ($n=117$; 45%), who balanced academic improvements with expulsion and limiting future career opportunities; 3) risk-averse ($n=64$; 25%), who prioritized expulsion above academic improvements; and 4) recreational ($n=14$; 5%), who most valued having fun partying.

CONCLUSIONS—These findings identify subgroups of college NPS users that could have vastly different trajectories in terms of future drug use and college performance. Given this heterogeneity among students regarding perceived risks and benefits of NPS, interventions should be designed to assess motives and provide personalized feedback. Further research is needed with larger, more diverse samples and to assess the prospective stability of perceived risks and benefits.

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Keywords

nonmedical use; prescription stimulants; college students; tradeoffs; perceptions; motives

1. INTRODUCTION

During the past decade there has been a steady increase in the number of prescriptions for stimulant medications for the treatment of Attention-Deficit/Hyperactivity Disorder (ADHD).¹ Individuals diagnosed with ADHD can experience symptoms into adulthood and often remain on medication to control these symptoms.^{2,3} Recent estimates of the prevalence of college students who are prescribed stimulants ranges from about three to five percent,⁴⁻⁷ and of those, more than one-third report diversion, defined as giving, loaning, or selling a prescribed stimulant medication to someone.⁸ The United States Drug Enforcement Agency classifies prescription stimulants as Schedule II controlled substances because of their high potential for abuse, misuse, and addiction.⁹⁻¹² As many as one third of all college students report having ever nonmedically taken a prescription stimulant.^{13,14} Nonmedical use is defined as taking a prescription medication other than the way it was prescribed, or by a person for whom the drug was not prescribed.¹⁵

The use of psychoactive drugs, including nonmedical use of prescription stimulants, to alter perception or behavior has been well documented in the literature. Specifically, people often use psychoactive drugs as instruments to improve social interactions, improve cognitive performance and counteract fatigue, to regulate emotional states, and to experience euphoria or satisfy a curiosity.¹⁶ In the alcohol literature, there is evidence to suggest that different motives for drinking are associated with varying trajectories of future use, some more problematic than others.^{17,18}

Consistent with the theory of instrumentalized psychoactive drug use, previous studies have identified several motives for NPS among college students, including cognitive enhancement to improve focus while studying, doing schoolwork, attending a class, or taking an exam;¹⁹⁻²¹ to stay awake;^{20,22} to be social;²¹ peer pressure;²⁰ curiosity;^{19,20} and weight loss.²³ However, there is evidence to suggest that the belief that NPS improves academic performance is erroneous.^{13,20,24,25} Academically, NPS is positively associated with skipping class and inversely associated with time spent studying and grade point average (GPA).^{13,25,26}

Previous studies have not fully explained the heterogeneity of the benefit-to-risk tradeoffs college students make when deciding to engage in NPS. The purpose of the current study is to assess college students' perceived benefit-to-risk tradeoffs and identify distinct subgroups of students who might have different priorities for NPS. Knowing more about the variation in college students' benefit and risk perception profiles for NPS might help in efforts among college campuses to reduce this behavior.

2. METHODS

2.1. Study Design and Procedures

Undergraduate students were recruited for participation in a cross-sectional Internet-based survey between September and December 2016 from six public four-year colleges in Maryland via study flyers posted on campus bulletins and distributed via emails. The flyers stated that: 1) students were invited to take a 10-minute online survey about the nonmedical use of prescription stimulants (medications commonly used to treat ADHD); 2) nonmedical use means taking a medication that is not prescribed to you or taking your own prescription in a higher dose than prescribed by a doctor; 3) \$20 gift cards would be given to the first 100 participants to complete the survey; 4) participants had to be deemed eligible in a phone screening to receive the link and access code to the online survey; 5) if a student had taken a prescription stimulant nonmedically in the past year and was interested in participating, he/she should contact the PI by phone or email; and 6) each participant's identity and responses would be kept confidential and participation was voluntary. The University of Maryland Baltimore Institutional Review Board (IRB) approved this study and each of the six universities' IRBs granted permission for recruitment on their campuses. The PI emailed the president of each of the student organizations at the six schools requesting that they forward the study flyer to the organizations' members.

Undergraduate students who were interested in participating in the survey contacted the PI directly by phone or email, and were assessed for the following eligibility criteria: 1) enrolled as a full-time undergraduate student at one of the six universities, 2) 18-25 years old, and 3) used a prescription stimulant nonmedically at least once in the past year. Eligible students were sent the link to the survey and a unique survey access code via email. After clicking the link, participants indicated whether they consented to participate (yes or no). Survey access codes were only sent to individuals with a unique telephone number and a unique university-issued email address in an attempt to prevent individuals from participating more than once and/or individuals not enrolled at one of the six universities from participating in the survey. The first 100 individuals who completed the survey received a \$20 gift card. Confidentiality was maintained through the use of the study identifier and storage of all information regarding eligibility screening and gift card reimbursement in password protected files only accessible to the PI on a secure server.

2.2. Response Rate

Figure 1 displays response rates at each stage. Four hundred eighty-one undergraduate students contacted the PI expressing interest in participating in this study. Of those expressing interest, 408 completed a telephone eligibility screening. The 73 students who expressed interest but did not complete a telephone screening were contacted up to seven times by the PI to schedule a screening call; however, they were never reached or did not reply. Of the 408 undergraduate students who were screened, 144 were not eligible for these reasons: 11 were not 18-25 years of age, 17 were not full-time undergraduate students, and 116 had not engaged in NPS in the past year. Two hundred sixty-four were deemed eligible and sent the survey link and a unique access code. The final analytic sample was 259 undergraduate students who completed the online survey.

2.3. Survey Instrument

The survey gathered self-reported information regarding age, race/ethnicity, gender, college attended, year in school, major, GPA, scholarships, financial aid, on-campus residency, state of permanent residence, sorority/fraternity membership, and employment status. Participants also reported their history of ADHD, prescribed stimulant use, NPS, and use of alcohol, cigarettes, other prescription drugs and illicit drugs. Information gathered on ADHD history included if the participants thought they had ADHD, if a physician had ever diagnosed them with ADHD and/or prescribed them a stimulant, and if so, when they were first prescribed a stimulant medication, and if they currently had a prescription for a stimulant.

A best-worst scaling (BWS) instrument elicited undergraduate students' most and least important concepts related to NPS. The BWS instrument evaluated the relative importance of 12 attributes, perceived benefits and risks related to NPS. The items were derived from a preliminary study of 30 undergraduate students who identified, refined, and vetted the 12 attribute statements through eight in-depth interviews, four focus groups, and five cognitive interviews. The five cognitive interview participants tested the survey and provided feedback, prior to use in the present study.²⁷ Each BWS question displayed five of the 12 attributes from which participants selected one as most important and one as least important when considering NPS. Figure 2 shows an example of a BWS question. Every participant completed eight unique BWS questions.

2.4. Data Analysis

Data on participants' demographics, academics, history of ADHD and prescribed stimulant use, NPS, and use of other substances were summarized using descriptive statistics. The research team categorized the participant-reported free-text college major(s) based on the United States Census Bureau's fields of Bachelor's Degrees, which categorizes majors into five broad fields of study: 1) Science and Engineering, 2) Science- and Engineering-Related, 3) Business, 4) Education, and 5) Arts, Humanities, and Other.²⁸

Mean importance scores for each attribute from the BWS instrument for the overall sample and each latent subgroup were estimated using Latent Gold Choice® 5.1 Software, which uses a hybrid of Expectancy Maximization and Newton-Raphson algorithms.²⁹ The mean importance scores were ranked in order of relative preference for the aggregate sample. Larger absolute values indicated that the attribute had a significant influence on participants' priorities. Positive scores indicate attributes related to NPS perceived by undergraduate students to be important whereas negative scores were perceived to be unimportant.

The presence of latent subgroups with different priorities for concepts related to NPS was assessed for one through five latent classes, with a continuous scale adjustment to allow independence of intra-subject variability. The number of latent classes present was determined by model fit indexes, including Bayesian Information Criterion (BIC) and Akaike Information Criterion (AIC) as well as theoretical interpretability of class differences. The statistical significance of each subgroup-specific attribute mean score was assessed based on Z-scores and associated p-values ($p < 0.05$). Chi-square and Analysis of

Variance (ANOVA) tested for statistically significant differences between the descriptive characteristics of each latent class ($p < 0.05$).

3. RESULTS

3.1. Demographic Characteristics

Slightly more than half of the participants were female (57%), about two-thirds were white, and the mean age was 20 (Table 1). The participants were mostly juniors (32%) or seniors (39%) in college and half of the participants majored in a Science and Engineering field. The average reported GPA was 3.2 and 37% lived on campus. Nearly half (47%) received financial aid and 36% was an academic scholarship recipient.

More than half the participants reported engaging in NPS no more than once in the past month, and one-third of the participants reported more than 10 instances of NPS in the past year (Table 2). The average age of first NPS use was 17.9. Almost half (45%) of the participants believed that they had ADHD; however, only 19% had been diagnosed by a physician. Fifty-eight (22%) participants were ever prescribed a stimulant and 50 (19%) were prescribed a stimulant at the time of the survey. Twenty-two percent of the participants nonmedically used their own prescription, 74% reported that a friend had given them prescription stimulants to use nonmedically, and 49% reported purchasing them from a friend or family member (not mutually exclusive categories).

3.2. Attribute Importance

Table 3 presents the rank order mean importance scores for each attribute. The most important motives for engaging in NPS were getting better grades ($m = 2.33$, $SE = 0.10$) and meeting deadlines ($m = 1.62$, $SE = 0.08$); participants also prioritized the risk of being expelled from college ($m = 0.61$, $SE = 0.07$) and the risk of limiting future career opportunities ($m = 0.57$, $SE = 0.07$). In general, health-related and social concepts were less important relative to the other attributes related to performance enhancement and punitive consequences.

3.3. Latent Subgroups

A scale-adjusted four-class model fit the data best and was the most theoretically interpretable. The four latent classes were labeled assuredly performance-driven ($n = 64$; 25%), cautiously grade/career-oriented ($n = 117$; 45%), risk-averse ($n = 64$; 25%), and recreational ($n = 14$; 5%). Undergraduate students in the assuredly performance-driven group were most concerned with getting better grades ($m = 3.20$, $SE = 0.29$), meeting deadlines ($m = 2.70$, $SE = 0.24$), and fulfilling nonacademic responsibilities ($m = 1.00$, $SE = 0.21$); they were least concerned with being arrested ($m = -1.17$, $SE = 0.19$). Students in the risk-averse group were most concerned with the risk of college expulsion ($m = 2.18$, $SE = 0.18$), followed by getting better grades ($m = 1.72$, $SE = 0.17$), being arrested ($m = 1.68$, $SE = 0.18$), and limiting future career options ($m = 1.38$, $SE = 0.18$). The cautiously grade/career-oriented group was most concerned with getting better grades ($m = 3.63$, $SE = 0.23$) and meeting deadlines ($m = 2.46$, $SE = 0.13$), balanced by their concerns about the risk of college expulsion ($m = 0.54$, $SE = 0.13$) and limiting future career opportunities ($m = 0.47$, $SE = 0.13$). The recreational

group was most influenced by having more fun partying ($m=1.65$, $SE=0.33$), but also the risk of being arrested ($m=0.73$, $SE=0.28$) or expelled from college ($m=0.59$, $SE=0.29$).

The four latent subgroups (Table 2) did not differ significantly with respect to demographic characteristics. However, students in the cautiously grade/career-oriented group were most likely to major in a science or engineering field and those in the assuredly performance-driven group were somewhat more likely to major in business or arts and humanities ($\chi^2=29.69$, $p=.01$). Students in the risk-averse group were most likely to have an academic scholarship ($\chi^2 = 9.67$, $p=.02$) and had a slightly earlier age of first NPS use ($F=3.9$, $p=.02$) than the other groups. More students in the assuredly performance-driven group engaged in NPS in the past month ($\chi^2 = 13.26$, $p=.04$) and engaged in NPS more frequently in the past month ($\chi^2=13.28$, $p=.04$) and the past year ($\chi^2=26.85$, $p=.01$) than other groups. The assuredly performance-driven group was most likely to have purchased a prescription stimulant from friends or family ($\chi^2=8.57$, $p=.04$) or a stranger ($\chi^2=10.66$, $p=.01$). The recreational group was most likely to engage in NPS for the purpose of socializing or partying in the past ($\chi^2=27.21$, $p<.0001$) and least likely to report academic motives for NPS ($\chi^2=64.29$, $p<.0001$). With respect to other substances, students in the assuredly performance-driven group and recreational group were more likely to have used cocaine in the past year ($\chi^2=14.56$, $p<.01$) compared to the other groups. The assuredly performance-driven group was more likely to report nonmedical use of antianxiety medications in the past year ($\chi^2=10.21$, $p=.02$) than the other groups.

4. DISCUSSION

This study identified four distinct subgroups of college students with respect to their benefit-to-risk tradeoffs profile for engaging in NPS. Improving grades was the main issue that motivated the majority of the sample to engage in NPS. Previous studies have shown that NPS typically occurs among college students during periods of high stress, such as the weeks immediately before midterm or final exams,^{14,21,30} and that NPS is associated with procrastination³¹ and low academic self-efficacy.³² Therefore, college students who engage in NPS might think this will improve their academic performance, might especially lack skills for managing academic stress, might have lower levels of academic self-efficacy, or could be procrastinators. These findings highlight the need to reduce misconceptions about the perceived benefits of NPS and help college students develop study and time management skills, as well as healthy ways of dealing with academic pressures and other responsibilities.

We acknowledge there is overlap between the assuredly performance-driven, cautiously grade/career-oriented, and risk-averse students with respect to their motives for engaging in NPS; however, the level of risk these students are willing to accept for perceived benefits varies. Understanding variability in college students' priorities regarding the perceived benefits and risks of NPS can be useful for customizing feedback in NPS interventions. The use of personalized feedback in interventions to reduce alcohol use among college students has shown to be effective at preventing and reducing alcohol use.^{33,34} Assessing priorities and then addressing misconceptions or unrealistic expectations in personalized feedback approaches might be a prudent way to design interventions to reduce NPS. Interventions might need to be tailored to specific subgroups of students. Although represented by only a

small proportion of the sample in this study, the recreational group made vastly different benefit-to-risk tradeoffs compared to the other three subgroups. Identifying subgroups of students based on variation in their risk/benefit tradeoff profiles could also help in the design of other interventions for substance use in general. For instance, the assuredly performance-driven group was more likely than other subgroups to use cocaine and to have taken prescription anxiolytics in the past year. Therefore, these students may benefit from interventions that target substance use in general, rather than simply NPS in particular. Lastly, the students in the risk-averse group were more likely than the other groups to have academic scholarships. Although additional pressure to maintain a certain GPA could put these students at risk of NPS, because these students are typically thought of as being high achieving, their risk for NPS might be overlooked. Thus, these findings may help to elucidate which students may be at risk for NPS and should be targeted for interventions.

Several study limitations should be acknowledged. First, generalizability is limited to students attending colleges with characteristics similar to the sample studied. It is possible that motives and concerns around NPS could differ for college students in other regions, attending private colleges, and attending community colleges. Second, the use of convenience sampling also limits generalizability of the findings. It is possible that eligible students who did not elect to participate in this study weigh the benefits and risks of NPS differently than those who did participate. Third, although all participants had engaged in NPS in the past year, the frequency of NPS use varied from once (12%) to more than 200 times ($\approx 1\%$) in the past year. Fourth, both students who had nonmedically used their own prescription stimulant and students who had never been prescribed a stimulant were included in this study. It is possible that students who nonmedically use their own prescription may exhibit nuanced differences in their priorities around NPS, however these differences were not statistically significant in this sample.

This study also is limited by its cross-sectional design. Future research using prospective methods could be helpful for understanding the temporal and developmental stability of these benefit-to-risk tradeoffs. Future studies should also examine whether the subgroups identified in this sample differ with respect to mental health problems, learning disabilities and academic self-efficacy, which may place youth at risk for NPS.

Despite these limitations, this study has notable strengths. This study used a best-worst scaling instrument, a robust survey methodology. The research was patient-centered in that all of the items used in the best-worst scaling were elicited from and tested with undergraduate college students, the population of interest prior to administration in the current study. Additionally, this study fills a gap in the literature by identifying variation in what motivates subgroups of college students to engage in NPS, based on perceived benefits and risks of NPS. These differences in prioritized benefits and risks correlated with varying frequency of NPS and misuse of other licit and illicit drugs.

5. CONCLUSION

This study reveals the level of perceived tradeoffs that college students are willing to accept to achieve the desired benefits of NPS. There is substantial heterogeneity among past-year

NPS users with regard to their prioritized tradeoffs regarding NPS. Some students more influenced by the perceived academic benefits of NPS than negative consequences, while others are concerned with negative legal and academic consequences but accept this risk in an attempt to improve their grades through NPS. Still others are primarily motivated to engage in NPS for recreation. Although there is overlap across these groups, tailoring of interventions to address these differences might be a promising approach to reduce NPS.

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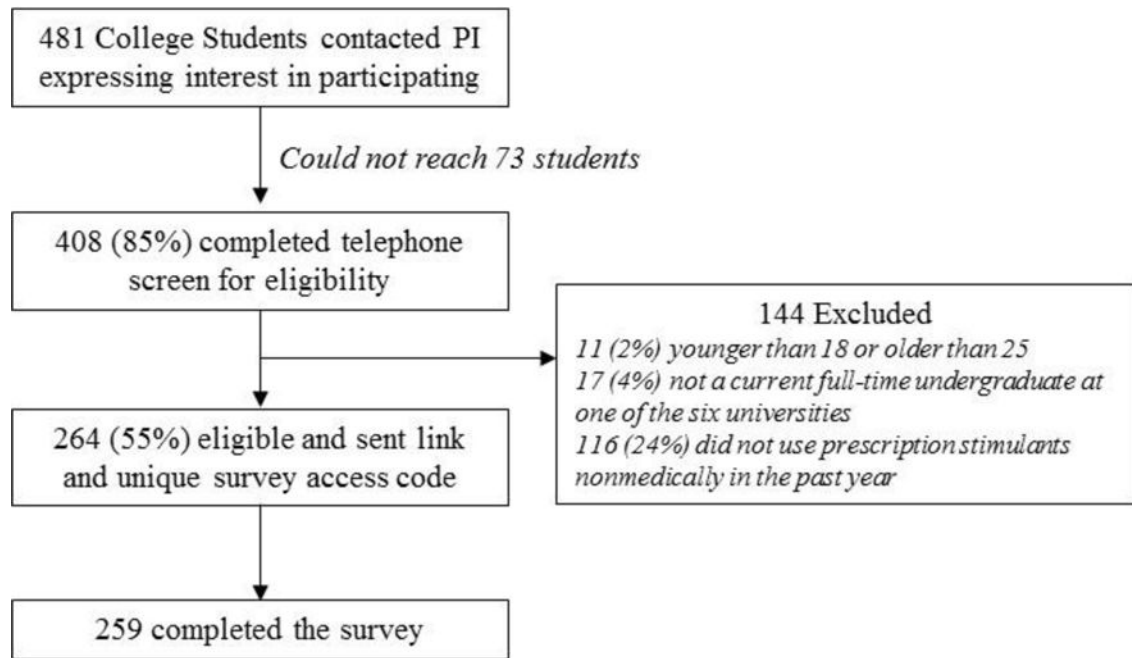


Figure 1.
Diagram of Eligibility Screening

This study is focused on the **nonmedical** use of prescription stimulants. This is defined as either: a) taking a prescription stimulant that is **not** prescribed for you; or b) taking a prescription stimulant more frequently **or** in a higher dose than prescribed.

Which of the 5 concepts related to nonmedical use of prescription stimulants is MOST important to you and which is LEAST important to you?

Please select just one concept that is **MOST important** and just one concept that is **LEAST important** to you.

(1 of 8)

| Most Important | | Least Important |
|----------------------------------|-------------------------------|----------------------------------|
| <input type="radio"/> | I could get arrested. | <input type="radio"/> |
| <input type="radio"/> | I will meet my deadlines. | <input type="radio"/> |
| <input checked="" type="radio"/> | I will get better grades. | <input type="radio"/> |
| <input type="radio"/> | I will be able to skip meals. | <input checked="" type="radio"/> |
| <input type="radio"/> | My friends are okay with it. | <input type="radio"/> |

Figure 2.
Example of a BWS Question

Table 1

College Student Characteristics, Overall and Stratified by Latent Subgroup

| Characteristics | Overall Sample (n=259) n (%) | Assuredly Performance-Driven (n=64) n (%) | Cautiously Grade/Career-Oriented (n=117) n (%) | Risk-Averse (n=64) n (%) | Recreational (n=14) n (%) | p |
|------------------------------------|---------------------------------|---|--|-----------------------------|------------------------------|-------------|
| Gender | | | | | | 0.16 |
| Male | 111 (43) | 32 (50) | 50 (43) | 21 (33) | 8 (57) | |
| Female | 148 (57) | 32 (50) | 67 (57) | 43 (67) | 6 (43) | |
| Age in Years, Mean (SD) | 20.0 (1.3) | 20.1 (1.3) | 20.3 (1.2) | 19.8 (1.3) | 20.0 (1.7) | 0.18 |
| Race | | | | | | 0.22 |
| White | 170 (66) | 47 (73) | 69 (59) | 42 (66) | 12 (86) | |
| Asian | 29 (11) | 2 (3) | 16 (14) | 10 (16) | 1 (7) | |
| Black, not Hispanic | 4 (2) | 0 (0) | 3 (3) | 1 (2) | 0 (0) | |
| Hispanic Black | 21 (8) | 4 (6) | 12 (10) | 5 (8) | 0 (0) | |
| Hispanic | 19 (7) | 6 (9) | 12 (10) | 1 (2) | 0 (0) | |
| 1 < race | 16 (6) | 5 (8) | 5 (4) | 5 (8) | 1 (7) | |
| In State (Maryland) Student | 198 (76) | 43 (67) | 93 (79) | 49 (77) | 13 (93) | 0.13 |
| Year in School | | | | | | 0.14 |
| Freshman | 31 (12) | 5 (8) | 9 (8) | 13 (20) | 4 (29) | |
| Sophomore | 45 (17) | 13 (20) | 22 (19) | 9 (14) | 1 (7) | |
| Junior | 83 (32) | 22 (34) | 36 (31) | 22 (34) | 3 (21) | |
| Senior ⁺ | 100 (39) | 24 (38) | 50 (42) | 20 (31) | 6 (43) | |
| Major | | | | | | 0.01 |
| Science and Engineering | 131 (51) | 27 (42) | 69 (59) | 29 (45) | 6 (43) | |
| Science-/Engineering-Related | 40 (15) | 5 (8) | 22 (19) | 12 (19) | 1 (7) | |
| Business | 36 (14) | 15 (23) | 10 (9) | 7 (11) | 4 (29) | |
| Education | 11 (4) | 3 (5) | 4 (3) | 4 (6) | 0 (0) | |
| Arts, Humanities, Other | 35 (14) | 13 (20) | 12 (10) | 8 (13) | 2 (14) | |
| Undecided | 6 (2) | 1 (2) | 0 (0) | 4 (6) | 1 (7) | |
| Double Major | 41 (16) | 11 (17) | 17 (15) | 9 (14) | 4 (29) | 0.55 |
| GPA, Mean (SD) | 3.2 (0.5) | 3.2 (0.4) | 3.2 (0.4) | 3.2 (0.7) | 3.4 (0.5) | 0.70 |
| On-Campus Resident | 97 (37) | 21 (33) | 39 (33) | 33 (52) | 4 (29) | 0.06 |

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| Characteristics | Overall Sample (n=259) n (%) | Assuredly Performance-Driven (n=64) n (%) | Cautiously Grade/Career-Oriented (n=117) n (%) | Risk-Averse (n=64) n (%) | Recreational (n=14) n (%) | p |
|----------------------------|---------------------------------|---|--|-----------------------------|------------------------------|-------------|
| Financial Aid | 123 (47) | 27 (42) | 59 (50) | 32 (50) | 5 (36) | 0.56 |
| Academic Scholarship | 92 (36) | 17 (27) | 38 (32) | 28 (44) | 9 (64) | 0.02 |
| Sorority/Fraternity Member | 126 (49) | 36 (56) | 55 (47) | 28 (44) | 7 (50) | 0.52 |
| Employment | | | | | | 0.65 |
| Not Employed | 97 (37) | 22 (34) | 43 (37) | 24 (37) | 8 (57) | |
| <10 hours/week | 65 (25) | 15 (23) | 28 (24) | 19 (30) | 3 (21) | |
| 10–19 hours/week | 72 (28) | 19 (30) | 32 (27) | 18 (28) | 3 (21) | |
| 20+ hours/week | 25 (10) | 8 (13) | 14 (12) | 3 (5) | 0 (0) | |

[†]Including 5th year seniors. **Bolded** p values are statistically significant at p<0.05.

Table 2
College Students' History of ADHD and use of Stimulants and Other Substances

| Characteristics | Overall Sample (n=259) n (%) | Assuredly Performance- Driven (n=64) n (%) | Cautiously Grade/Career- Oriented (n=117) n (%) | Risk-Averse (n=64) n (%) | Recreational (n=14) n (%) | P |
|--|---------------------------------|---|---|-----------------------------|------------------------------|------------------|
| Think they have ADHD | 116 (45) | 31 (48) | 51 (44) | 29 (45) | 5 (36) | 0.83 |
| Diagnosed with ADHD | 50 (19) | 17 (27) | 22 (19) | 8 (13) | 3 (21) | 0.24 |
| Ever prescribed stimulant | 58 (22) | 17 (27) | 25 (21) | 12 (19) | 4 (29) | 0.68 |
| Currently prescribed stimulant | 50 (19) | 16 (25) | 23 (20) | 9 (14) | 2 (14) | 0.44 |
| Age at first NPS, Mean (SD) | 17.9 (1.9) | 17.7 (1.9) | 18.2 (1.4) | 17.4 (2.6) | 17.6 (1.8) | 0.02 |
| Time Since Most Recent NPS | | | | | | 0.04 |
| <1 month ago | 118 (46) | 40 (63) | 49 (42) | 24 (37) | 5 (36) | |
| 1–6 months ago | 95 (37) | 17 (27) | 48 (41) | 23 (36) | 7 (50) | |
| 7–12 months ago | 46 (18) | 7 (11) | 20 (17) | 17 (27) | 2 (14) | |
| Past month frequency of NPS | | | | | | 0.04 |
| 1 time | 157 (61) | 28 (44) | 75 (64) | 46 (72) | 8 (57) | |
| 2–5 times | 80 (31) | 26 (40) | 34 (29) | 15 (23) | 5 (36) | |
| 6+ times | 22 (8) | 10 (16) | 8 (7) | 3 (5) | 1 (7) | |
| Past year frequency of NPS | | | | | | 0.01 |
| 1 time | 30 (12) | 1 (2) | 14 (12) | 12 (19) | 3 (21) | |
| 2–5 times | 93 (36) | 18 (28) | 41 (35) | 28 (44) | 6 (43) | |
| 6–10 times | 52 (20) | 13 (20) | 27 (23) | 9 (14) | 3 (21) | |
| 11–20 times | 43 (17) | 14 (22) | 22 (19) | 7 (11) | 0 (0) | |
| 21+ times | 41 (16) | 18 (28) | 13 (11) | 8 (12) | 2 (14) | |
| Ever used for: | | | | | | |
| Academic reasons | 246 (95) | 64 (100) | 114 (97) | 61 (95) | 7 (50) | <.0001 |
| Athletic reasons | 27 (10) | 11 (17) | 7 (6) | 7 (11) | 2 (14) | 0.12 |
| Socializing/partying | 105 (41) | 39 (61) | 36 (31) | 19 (30) | 11 (79) | <.0001 |
| Weight loss | 46 (18) | 16 (25) | 19 (16) | 10 (16) | 1 (7) | 0.29 |
| Ever obtained prescription stimulants from: | | | | | | |
| Own prescription | 56 (22) | 15 (23) | 26 (22) | 12 (19) | 3 (21) | 0.93 |

| Characteristics | Overall Sample (n=259) n (%) | Assuredly Performance- Driven (n=64) n (%) | Cautiously Grade/Career- Oriented (n=117) n (%) | Risk-Averse (n=64) n (%) | Recreational (n=14) n (%) | P |
|--------------------------------------|---------------------------------|---|---|-----------------------------|------------------------------|-----------------|
| Family member, for free | 23 (9) | 6 (9) | 11 (9) | 5 (8) | 1 (7) | 0.98 |
| Friend, for free | 192 (74) | 47 (73) | 87 (74) | 48 (75) | 10 (71) | 0.99 |
| Purchased from friend/family | 126 (49) | 41 (64) | 52 (44) | 26 (41) | 7 (50) | 0.04 |
| Purchased from stranger | 27 (10) | 12 (19) | 10 (9) | 2 (3) | 3 (21) | 0.01 |
| Purchased online | 4 (2) | 3 (5) | 0 (0) | 1 (2) | 0 (0) | 0.10 |
| Stolen | 5 (2) | 2 (3) | 2 (2) | 1 (2) | 0 (0) | 0.84 |
| ~Past 30 day use of: | | | | | | |
| Alcohol | 241 (93) | 60 (94) | 110 (94) | 57 (89) | 14 (100) | 0.42 |
| Cigarettes | 76 (29) | 25 (39) | 33 (28) | 12 (19) | 6 (43) | 0.05 |
| Marijuana | 150 (58) | 40 (63) | 69 (59) | 32 (50) | 9 (64) | 0.48 |
| ~Past year use of | | | | | | |
| Marijuana | 168 (65) | 46 (72) | 75 (64) | 39 (61) | 8 (57) | 0.53 |
| Cocaine | 68 (26) | 27 (42) | 27 (23) | 9 (14) | 5 (36) | <0.01 |
| Ecstasy | 33 (13) | 11 (17) | 15 (13) | 5 (8) | 2 (14) | 0.46 |
| LSD | 35 (14) | 10 (16) | 16 (14) | 7 (11) | 2 (14) | 0.89 |
| Heroin, Inhalants, Meth | 10 (4) | 2 (3) | 5 (4) | 2 (3) | 1 (7) | 0.88 |
| None | 79 (31) | 13 (20) | 37 (32) | 23 (36) | 6 (43) | 0.16 |
| ~Past year nonmedical use of: | | | | | | |
| Antianxiety Medication | 53 (20) | 22 (34) | 18 (15) | 11 (17) | 2 (14) | 0.02 |
| Opioids | 40 (15) | 11 (17) | 14 (12) | 13 (20) | 2 (14) | 0.49 |
| None | 182 (70) | 35 (55) | 91 (78) | 45 (70) | 11 (79) | 0.01 |

~Categories are not mutually exclusive. **Bolded** p values are statistically significant at p<0.05.

Table 3

Scale-Adjusted Mean Importance Scores (SE) Overall and Stratified by Latent Subgroup

| Attributes/Domain* | Overall Sample (n=259) | Latent Subgroups | | | |
|---|---------------------------|--|---|-----------------------|------------------------|
| | | Assuredly Performance-Driven (n=64) | Cautiously Grade/Career-Oriented (n=117) | Risk-Averse (n=64) | Recreational (n=14) |
| I will get better grades | PE 2.33 (0.10) | 3.20 (0.29) | 3.63 (0.23) | 1.72 (0.17) | -0.02 (0.28)~ |
| I will meet my deadlines | PE 1.62 (0.08) | 2.70 (0.24) | 2.46 (0.18) | 1.06 (0.17) | -0.31 (0.27)~ |
| I could get expelled from college | PUN 0.61 (0.07) | -0.68 (0.21) | 0.54 (0.13) | 2.18 (0.18) | 0.59 (0.29) |
| My future career opportunities could be limited | PUN 0.57 (0.07) | 0.18 (0.19)~ | 0.47 (0.13) | 1.38 (0.18) | 0.41 (0.31)~ |
| I could get arrested | PUN 0.11 (0.07)~ | -1.17 (0.19) | -0.01 (0.13)~ | 1.68 (0.18) | 0.73 (0.28) |
| I will be able to fulfill my nonacademic responsibilities | PE 0.02 (0.07)~ | 1.00 (0.21) | -0.46 (0.16) | 0.15 (0.18)~ | -0.37 (0.27)~ |
| My health will be negatively affected | HTH -0.07 (0.07)~ | -0.88 (0.16) | 0.24 (0.21)~ | 0.13 (0.20)~ | -0.23 (0.29)~ |
| I will become dependent | HTH -0.33 (0.07) | -1.05 (0.17) | -0.08 (0.16)~ | -0.62 (0.20) | -0.06 (0.27)~ |
| My parents would not approve | SOC -0.59 (0.06) | -0.85 (0.21) | -0.80 (0.15) | -0.58 (0.19) | 0.02 (0.26)~ |
| My friends are okay with it | SOC -1.23 (0.07) | -0.72 (0.16) | -1.78 (0.17) | -2.04 (0.20) | -0.31 (0.27)~ |
| I will be able to skip meals | HTH -1.39 (0.07) | -1.04 (0.22) | -1.72 (0.15) | -2.36 (0.21) | -2.11 (0.37) |
| I will have more fun partying | SOC -1.65 (0.08) | -0.70 (0.27) | -2.49 (0.18) | -2.70 (0.22) | 1.65 (0.33) |

* PE – Performance Enhancement; PUN – Punitive Consequences; HTH – Health-related; SOC – Social.

~ Not statistically significant (p>0.05). The most important ranked mean scores for each latent subgroup are **bolded**. Least important ranked mean scores for each latent subgroup are *italicized*.