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Predictors of Nonmedical ADHD Medication Use by College Students

Dr. David Rabiner, PhD, Dr. Arthur Anastopoulos, PhD, Dr. E. Jane Costello, PhD, Dr. Rick H. Hoyle, PhD; MSW, and Dr. H. Scott Swartzwelder, PhD*

*Center for Child and Family Policy and Dept. of Psychology and Neuroscience, Duke University (Drs Rabiner and Hoyle), Dept. of Psychology, University of North Carolina at Greensboro (Dr. Anastopoulos), Dept. of Psychiatry and Behavioral Sciences, Duke University Medical Center (Drs Costello and Swartzwelder), Substance Abuse Research Center and Institute for Research on Women and Gender, The University of Michigan, Ann Arbor, Michigan (Dr. Sean Esteban McCabe)

Abstract

Objective—To identify the predictors of nonmedical ADHD medication use by college students.

Participants—Eight hundred forty-three undergraduates attending one public or one private university in the southeastern US.

Methods—Students completed a web-based survey inquiring about ADHD medication use during the first semester freshman of their year and a second time during the second semester of their sophomore year.

Results—Forty-five (5.3%) reported the onset of nonmedical ADHD use between the two survey administrations. The majority of these students were high substance users as freshman. Attention difficulties also predicted the onset of nonmedical use, especially in the absence of excessive substance use. Compared to other nonmedical users of ADHD medication, those reporting attention difficulties had lower GPAs, greater academic concerns, and higher levels of depressive symptoms.

Conclusion—Attention difficulties contribute to the onset of nonmedical ADHD medication use in a significant minority of nonmedical users. These students may begin using ADHD medication to address attention problems they experience as undermining their academic success.

The nonmedical use of ADHD medication by US college students, i.e., using ADHD medication without a prescription, is now well documented (Babcock & Byrne, 2000; Johnston, O'Malley, & Bachman, 2003; Low & Gendaszek, 2002; McCabe, Knight, Teter, & Wechsler, 2005; Upadhyaya, Rose, & Wang, et al., 2005; Dupont, Coleman, Bucher, & Wilford, 2008), with past year prevalence rates above 20% reported at schools with highly competitive admission standards (McCabe, Knight, Teter, & Wechsler, 2005). Characteristics associated with nonmedical use include being Caucasian, membership in a sorority or fraternity, and elevated levels of alcohol and substance use (McCabe, Teter, & Boyd, 2006; Teter, McCabe, Boyd, & Guthrie, 2003). In research investigating the motives for nonmedical use, concerns related to academic performance such as help with studying and help with concentration, are most frequently reported, however a significant percentage of nonmedical users also report recreational motives such as the desire to “get high” (Teter, McCabe, Cranford, Boyd, & Guthrie, 2005; Upadhyaya, Rose, & Wang, et al., 2005; Teter, McCabe, LaGrange, Cranford, & Boyd, 2006; White, Becker-Blease, & Grace-Bishop, 2006; DuPont, Coleman, Bucher, & Wilford, 2008).

Although the most commonly reported motives for the nonmedical use of stimulant medication fall into the broad categories of enhancing academic performance and recreational use, it has also been suggested that those who misuse may be "...self medicating latent ADHD or underlying neuropsychological difficulties" (Wilens et al., 2008; p. 29). Evidence for this possibility is found in two recent studies. Poulin (2007) reported that a positive screening for ADHD was associated with the increased likelihood of nonmedical use of prescription stimulants among 12,990 Canadian students in grades 7, 9, 10 and 12. In more recent work conducted at two universities, self-reported attention difficulties were associated with nonmedical use of ADHD medications by students even after controlling for other known correlates of this behavior, including substance use, race, and Greek status (Authors, in press). Consistent with the suggestion raised by Wilens and his colleagues (Wilens et al., 2008), these authors noted that some students may turn to ADHD medication to address attention difficulties that they experience as undermining their academic success. This hypothesis follows logically from prior findings that enhancing academic performance is the most frequent motive students report for nonmedical ADHD medication use (Teter, McCabe, Cranford, Boyd, & Guthrie, 2005; Teter, McCabe, LaGrange, Cranford, & Boyd, 2006; White, Becker-Blease, & Grace-Bishop, 2006) and that most students using ADHD medication for this reason believe it is helpful (Authors, in press). Given these findings, one can imagine that some students who believe they have trouble attending would decide to try ADHD medication, particularly since they are likely to hear from peers that doing so can be helpful. Adequately testing this hypothesis would require a longitudinal design in which attention problems reported by students were shown to predict the onset of nonmedical ADHD medication use; to our knowledge, such a study has not been reported.

The primary objective of this study was thus to examine the onset of nonmedical ADHD medication by having students complete a web-based survey on the nonmedical use of ADHD medication on two occasions, during their first semester freshman year and their second semester sophomore year. Given prior findings that nonmedical ADHD medication use is strongly associated with other substance use (see Wilens et al., 2008 for a review) we expected that self-reported substance use at T1 would predict the onset of nonmedical ADHD medication use. Of particular interest was whether T1 attention difficulties reported by students would also predict the onset of nonmedical ADHD medication use, even when controlling for other substance use. This would suggest that some students do in fact initiate the nonmedical use of ADHD medication to address attention difficulties that they experience as undermining their academic success. We expected that such students would have lower GPAs, would be more concerned about their academic performance, and would report greater emotional distress than students who also engaged in the nonmedical use of ADHD medication, but who did not report elevated attention difficulties.

Methods

Participants

Participants were 843 undergraduates from one public or one private university located in the southeastern United States who submitted the web-based survey described below during the fall semester of their freshman year (T1) and the spring semester of their sophomore year (T2). The Institutional Review Board at each university approved the study protocol and all participating students provided informed consent online. The public university serves predominantly in-state students and has a female to male ratio of over 2 to 1. The private university is highly selective, admits a more geographically diverse student body, and enrolls an equivalent number of males and females.

At T1, surveys were submitted by 803 of 1572 students from the private university (51% participation rate) and 845 of 1648 students from the public university (42% participation rate). The overall participation rate of 46% is consistent with other college-based studies on this topic (Teter et al., 2005). Of the 1648 students who completed the survey as freshman, 843 (51%) completed it a second time at T2. This included 347 students from the public university (41% of the original participants) and 494 students from the private university (62% of the original sample). One reason why participation in the follow-up survey was lower at the public university is that approximately 25% of students did not return for their sophomore year. At the private university, this figure was less than 7%.

Table 1 presents the demographic characteristics of students who participated in both waves of the survey in relation to the demographics of the freshman class in Fall 2006. For example, at the private university, 44% of students completing the survey at both time points were males compared to 51% of the students in the entering class. As seen in Table 1, the demographic characteristics of participants were generally consistent with the characteristics of the overall population of freshman that we tried to recruit. African American students, however, participated at only half the expected rate.

Measures

Survey Overview—The survey was designed to elicit information on a variety of factors related to the nonmedical use of ADHD medications by college students. Some information was collected from all participants (e.g., drug and alcohol use, personality traits, ADHD symptoms, academic concerns, etc.), while other questions were only asked of students reported nonmedical use. Only those aspects of the survey that are central to the current study are described below. With the exception of questions added for the second administration that did not apply to first semester freshman (e.g., Greek status, GPA) the surveys administered at each time point were identical.

Demographics—All students were asked to provide their gender, ethnicity, race, and class standing; at the second administration students were asked whether they were in the Greek system and to report their GPA.

Nonmedical ADHD medication use—We defined nonmedical ADHD medication use as the use of ADHD medication without a prescription. At the initial administration (T1) students without a prescription for ADHD medication were shown a list of commonly prescribed ADHD medications and asked whether they had taken any of these medications during the prior six months. When the survey was re-administered the following spring (T2), students were asked whether they had used ADHD medication without a prescription since beginning college. Students answering ‘no’ to the former question and ‘yes’ to the latter comprised the group of new onset cases that we focus on below.

Attention difficulties—Because the DSM-IV-TR inattentive symptoms of ADHD may not adequately capture manifestations of ADHD in young adults (Barkley, Fischer, Smallish, & Fletcher, 2002), we developed items that inquired about attention difficulties related to academic tasks that were directly relevant to college students, e.g., “It is difficult for me to pay attention during classes.” The complete list of items can be found in Appendix A. Students responded on five-point scales anchored by *strongly disagree* and *strongly agree*; item responses were summed and then standardized with higher standard scores reflecting greater self-reported attention difficulties. Alphas for the scale exceeded .90 at both administrations and the correlation between the T1 and T2 scores was .61. The latter indicates a moderate degree of stability in students’ experience of attention difficulties over a roughly 17-month time span. In a prior study using this measure, average scores for

students with and without a self-reported diagnosis of ADHD differed by more than 1.25 standard deviations (Author, in press), suggesting that this is a valid measure of attention difficulties in college students.

Alcohol and drug use—Students were asked whether they had used alcohol, marijuana, cocaine, ecstasy, heroin, crystal meth, LSD, other hallucinogens, and inhalants during the past six months. A composite substance use variable was created by summing the substances that students reported using and standardizing this sum. Correlation between the T1 and T2 scores was .40, indicating a modest degree of stability.

Academic concerns—This four-item scale assessed students' concerns about their ability to succeed academically. Two items were framed positively, e.g., "I feel satisfied with how well I am doing academically," and two were framed negatively, e.g., "I worry that my grades will not be as good as I need them to be." Students responded to each item on a five-point scale ranging from *strongly disagree* to *strongly agree*. Positively worded items were reverse scored and the four items were averaged and standardized so that higher standard scores indicate greater academic concerns. In a prior study, the coefficient alpha for this scale was .76 and students with self-reported ADHD had significantly higher scores than other students (Authors, 2008). The alpha for the current sample was .75 at T1 and .79 at T2. Correlation between the T1 and T2 scores was .47, indicating a modest degree of stability.

Depressive symptoms—Depressive symptoms were assessed using an eight-item scale derived from the Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977). Students were asked how often in the past two weeks they had experienced various depressive symptoms, e.g., "felt sad, blue, unhappy or down in the dumps," "felt that you were not enjoying the activities you used to," and responded on five-point scales ranging from *never* to *most of the time*. Responses averaged and standardized such that higher standard scores reflects greater depressive symptoms. Coefficient alpha for the scale was .90 at both time points. Correlation between the T1 and T2 scores was .56, indicating a modest degree of stability.

Nonmedical use of other medications—We asked about students' use of other medications to test whether predictors of nonmedical ADHD medication use are specific to ADHD medications, or predict nonmedical use of prescription drugs more generally. Students were asked, "In the past six months, have you taken any of the following types of medications even though you do not have a prescription for the medication?" The categories listed were opiates, sedatives, antidepressants, mood stabilizers, and antipsychotics/neuroleptics with several well-known medications included as examples from each category. Students were categorized according to whether or not they reported the nonprescribed use of any of these medications.

Procedure

The initial survey administration was conducted over a five-week period beginning roughly nine weeks into students' first college semester during fall 2006. All freshmen older than 18 at the private and public university were sent a letter informing them of a Web-based survey to learn about the misuse and abuse of ADHD medications by college students. Several days later, students received an email explaining how to access the survey. Students were assured that their responses would remain confidential, that the researchers could not link individual students with their responses (students accessed the survey using a randomly generated ID number), and that a Certificate of Confidentiality to protect their privacy had been obtained. A \$10 campus bookstore gift card was offered as a participation incentive and participants also became eligible to win one of ten \$100 bookstore gift cards at each campus. Students

who neither responded nor opted out were sent up to 3 additional requests to complete the survey at weekly intervals. During the spring semester of 2007, sophomores at each school were invited to complete the survey a second time. Except for the initial letter which was not sent, the recruitment procedure was identical to that described above.

Because the participating universities have phone numbers for fewer than 25% of students – reflecting students' increasing reliance on cell phones – it was not feasible to conduct a telephone follow-up with non-respondents. A web-based follow-up with non-respondents was not attempted because these students had already demonstrated they were unlikely to reply and we were concerned about irritating students with additional requests to participate.

Results

Preliminary analyses

Table 2 presents the means and standard deviations for the different variables assessed. Although these variables were transformed to standard scores in the analyses reported below, raw score values are presented to provide a clearer understanding of the basic descriptive data. Entries for attention problems, depressive symptoms, and academic concerns represent average scores with higher scores reflecting greater self-reported difficulties. In all cases, the average was below the scale midpoint at each administration. Entries for substance use represent the mean number of substances that students reported using at each time point. Among students reporting any substance use (62% at T1 and 73% at T2) alcohol was the only substance used for approximately 70%. GPA is based on a 0 to 4.0 scale. The average sophomore year GPA was 3.30, roughly half-way between a B and B+.

Predicting the Onset of ADHD Medication Use

At the T2 survey administration, 45 students who had not reported nonmedical ADHD medication use at T1 indicated that they had done so since beginning college. These 'new onset cases' represented 5.3% of the sample. To identify factors predicting the onset of nonmedical use, we conducted a multivariate logistic regression analysis in which onset (yes vs. no) was the dependent variable, and predictor variables included T1 scores for substance use, self-reported attention problems, race (coded as Caucasian vs. non-Caucasian), and Greek status at T2. These variables were selected because all had shown an independent association with nonmedical ADHD medication use in a prior study using cross-sectional data (Authors, in press). The interaction between attention problems and substance use was included to test whether any relationship between attention difficulties and onset was moderated by students' level of substance use. Gender and site were included as controls. Of the 843 students who completed the survey at both time points, 777 were included in this analysis. Excluded students had either reported a current prescription for ADHD medication at Time 2 ($n=13$), and thus could not be a nonprescribed user ($n=13$), or because they omitted other items required for the analysis ($n=53$).

As seen in Table 3, gender, race, and site were not related to onset. However, students who joined the Greek system were more than twice as likely as non-Greeks to initiate use. Students' T1 report of attention difficulties and substance use also predicted the initiation of nonmedical ADHD medication use: the odds of becoming a nonmedical user increased by 1.78 times for each standard deviation increase in attention problems (95% CI=1.17–2.70) and by 3.81 times (95% CI=2.53–5.75) for each standard deviation increase in substance use. Main effects for substance use and attention difficulties were qualified by a significant interaction between them.

To probe this interaction, students were classified as elevated for attention difficulties and substance use if their score on these scales was one or more standard deviations above the sample mean. Those below this cut-off were considered to be in the “normal range.” These classifications were crossed to produce four groups: high substance use and high attention problems ($n = 23$); normal substance use and normal attention problems ($n = 554$); high attention problems and normal substance use ($n = 98$); and high substance use and normal attention problems ($n = 102$). A one standard deviation cut-off used to define these groups means that many students identified as high in attention problems or substance use have only moderate elevations in these areas that are unlikely to reflect clinical impairment. Although adopting a cut-off of one and a half or two standard deviations above the mean would have identified students more likely to have clinical impairments in these areas, it also yielded too few students in the high-high group to permit a meaningful analysis. For example, when a one and a half standard deviation elevation was required, only seven students exceeded this cut-off on both attention problems and substance use.

Among students who were high substance users, the incidence of nonmedical ADHD medication use was relatively similar regardless of whether they were also high for attention problems (four of 23, 17.4%) or in the normal range (24 of 102, 23.5%) for attention problems. For students who were not high substance users, however, those high on attention problems were nearly five times as likely to have initiated nonmedical use (seven of 98, 7.1% vs. 10 of 561, 1.8%).

Predicting the Onset of Nonmedical Use of Other Medications

A similar analysis was conducted to examine the onset nonmedical use of other prescription medications which was reported by 20 students. In contrast to the results obtained for ADHD medication, only T1 substance use predicted the nonmedical use of other prescription drugs ($OR=2.12$; 95% $CI=1.35-3.31$), with a one standard deviation increase in substance use more than doubling the odds of initiating this behavior.

Exploratory Analysis of Characteristics of Students who Became Nonmedical Users

Four groups were created to examine whether students who became nonmedical users of ADHD drugs and who differed in their level of substance use and attention difficulties also differed in other important characteristics, i.e., GPA, academic concerns, and depressive symptoms. The attention problems group ($n=11$) included students with T1 attention problem scores greater than one. This included four students who were also elevated on substance use because we hypothesized that attention difficulties, with or without substance use, would be the critical variable in relation to the other student characteristics we examined. The substance use group ($n=24$) included students with T1 substance use scores above one and attention difficulties within the normal range, i.e., less than one; the final group of nonmedical users ($n=10$) consisted of students who became nonmedical users and who reported ‘normal’ levels of both attention problems and substance use. The large group of nonusers ($n=758$) contained all students who had not initiated nonmedical use.

Table 4 presents the group means and standard deviations for GPA, academic concerns, and depressive symptoms; entries reflect standard scores so that the mean and standard deviation for nonusers (not shown) was essentially zero and one for all variables. Effect sizes for comparisons between the Inattentive group, computed as the difference between means divided by the pooled standard deviation, and the other two groups are also presented. GPA was collected at T2 only as it was not available during students’ first semester. Academic concerns and depressive symptoms are presented for each year. Planned comparisons between students in the attention problems group and the other two groups of nonmedical users were conducted within the context of an overall ANOVA. In all instances where

significant group differences are indicated, the overall F test was significant at $p < .05$ and the comparisons reported below are based on the overall error term.

As seen in Table 4, students with self-reported attention difficulties who became nonmedical users had lower GPAs than nonmedical users who were high substance users ($t=3.30, p<.01$) or in the normal range for substance use and attention problems ($t=2.50, p<.05$). The magnitude of the group difference was large in both cases, i.e., at least .85 standard deviations. Although differences in self-reported academic concerns were not present at T1, students in the AP group reported more concerns than the high substance users at T2 ($t=2.14, p<.05$). They also reported more depressive symptoms than high substance users at T1 ($t=2.42, p<.05$) and T2 ($t=2.39, p<.05$) and differed from students in the 'normal' group at T2 ($t=2.29, p<.05$).

Although differences between these groups of nonmedical users and the larger group of nonusers were not tested, it is noteworthy that average scores for the high substance users were close to the expected value of zero for all variables. Thus, other than being elevated for substance use, they did not appear to differ from other students on the dimensions that we examined. Similarly, scores for nonmedical users in the 'normative' group were also not appreciably different from zero. In a follow-up analysis in which these students were compared to non-users, differences in GPA, academic concerns, and depressive symptoms were all non-significant, i.e., all p 's $> .40$. At the T2 assessment, however, they reported higher rates of substance use than nonusers (average of .64 vs. -.07, $t=2.457, p<.05$).

Discussion

This study had two primary objectives. First, we examined whether substance use and self-reported attention difficulties, characteristics previously found to be associated with nonmedical ADHD medication use in cross-sectional samples (Authors, in press), also predicted the onset of this behavior. Second, because some students may become nonmedical users of ADHD medication to address latent ADHD (Wilens et al., 2008) or to compensate for attention difficulties they experience as undermining their academic success (Authors, in press), we examined whether they differ in their academic and emotional functioning from students who become nonmedical users but who do not report attention difficulties.

Consistent with results from several studies in which an association between substance use and the nonmedical use of ADHD medications has been reported (see Wilens et al., 2008 for a review), students' reports of substance use in their first semester predicted the onset of nonmedical ADHD medication use over the next 3 semesters. In fact, of the 45 students who initiated nonmedical use between the two survey administrations, 28 (62%) reported levels of freshman year substance use that was at least a standard deviation above the sample mean. That students prone to use multiple substances would be more likely to begin experimenting with ADHD medication is not surprising (Wilens et al., 2008; DuPont, Coleman, Bucher, & Wilford, 2008), and such students were also more likely to begin using other medications without prescriptions. As a group, these students were performing well, and reported no more than the expected level of academic concerns and depressive symptoms. For these students, it thus appears that initiating ADHD medication use represents an extension of their substance use to medications that are readily available on college campuses rather than being motivated by concerns related to academic performance.

Our hypothesis that attention difficulties would predict the onset of ADHD medication use, even after controlling for substance use, was also supported and attention problems were found to be an especially important predictor in students who were also not high substance

users. These students reported greater emotional distress as freshman, and as sophomores their GPA was more than a standard deviation below average. Not surprisingly, they had developed important concerns about whether they would make it academically. Unlike freshman year substance use, which predicted nonmedical ADHD medication use as well as the nonmedical use of other prescription drugs, attention difficulties only predated the onset of ADHD medication use. Collectively, these findings support the hypothesis that some students begin using ADHD medication in an effort to “treat” attention difficulties that they experience as undermining their academic success. Our results thus extend prior work documenting a cross-sectional relationship between attention difficulties and nonmedical ADHD medication use among college students (Authors, in press) as well as in middle and high school students (Poulin, 2007).

It is important to note that our findings do not speak directly to the issue of whether many students who begin nonmedical use of ADHD medication have undiagnosed ADHD, a question raised by Wilens et al., (2008). The items used to assess attention difficulties were specifically developed to targeted ways that such problems would be manifest in college students, and do not correspond to DSV-IV-TR diagnostic criteria for ADHD. Whether any students who were elevated on our measure of attention difficulties would meet ADHD diagnostic criteria if a comprehensive evaluation had been conducted is thus unknown. Related to this issue is the fact that we used a rather liberal cut-off, i.e., one standard deviation above the mean, to identify students as high on attention problems. Although this was necessary to identify enough students for exploratory analyses comparing nonmedical users with attention difficulties to other nonmedical users, some students so identified were reporting only moderate attention difficulties that were unlikely to reflect clinical impairments. While these two factors prevent any conclusions about the role of undiagnosed ADHD in students’ use of ADHD drugs from being made, the goal of our study to explore whether attention difficulties that students experience early in their college career, irrespective of the source of those difficulties, contributes to the onset of ADHD medication use, and our measure was appropriate for that purpose. We also note that given the anonymous nature of our survey, establishing an actual diagnosis for any of our participants would not have been possible, even if students had rated themselves using the ADHD symptoms as listed in DSM-IV-TR (American Psychiatric Association, 2000).

Although our results demonstrate that substance use and attention difficulties predict the onset of nonmedical ADHD medication use among undergraduates, it is important to note that the vast majority of students elevated on these characteristics did not become nonmedical users. We suspect that more of these students will begin using ADHD medication before completing college, as prior research indicates that this behavior is substantially more common among upper classman (Authors, in press). However, we expect that most of these students will never begin using ADHD medication and why some begin using ADHD medication while most do not remains an interesting and unanswered question. There were also a small number of students who initiated nonmedical use who did not differ from nonmedical users on any of the characteristics that we examined during their freshman year. Factors contributing to nonmedical use for these students is thus unknown.

Several limitations of this study are important to recognize. First, we sampled students from only two universities in the southeast and the extent to which our findings would generalize to other colleges and universities is uncertain. Second, within these universities, the sample from which we obtained longitudinal data represented only about 25% of the students originally invited to participate. It is likely that students who completed the survey on both occasions differ in significant ways from those who completed it only once, or who never completed it at all. Because we were not able to conduct a brief follow-up survey with non-responders, however, the dimensions on which they may differ cannot be determined. A

third limitation is that the number of students in our sample who initiated nonmedical use is small, particularly when examining characteristics of different groups of nonmedical users. Thus, our findings are clearly preliminary and require replication with a larger sample. Fourth, when asking students about ADHD medication use, we did not include common “street” names for ADHD medications, e.g., Ritalin = “Vitamin R,” Dexadrine = “dexies,” Adderal = “Altoids.” It is thus possible that some participants did not report use because they did not know the official pharmaceutical or marketing names. While this may have influenced the number on new onset cases identified, however, we think it is unlikely to have influenced the factors found to predict this onset, which was the primary focus of the study. Finally, because students were only followed to the end of their sophomore year, our study does not address factors that predict initiation of nonmedical medication use later in college.

Despite these limitations, this is the first prospective study on nonmedical use of ADHD medication by college students and thus extends current knowledge of this issue. Overall, it appears that for a significant minority of students who become nonmedical users of ADHD medication, attention difficulties are an important precipitating factor. Regardless of whether these students actually have ADHD, they would certainly benefit from a professional evaluation to determine the nature of their difficulties and the availability of ADHD medication from peers may prevent some from pursuing this. How colleges and universities can encourage these students to seek professional help, rather than experimenting with their own medical treatment, will be important to explore in future research.

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Appendix A – Attention problems scale items

It is difficult for me to pay attention during classes.

It is difficult for me to concentrate on my academic work.

Concentration difficulties keep me from doing as well academically as I am capable of.

I believe that most students in my courses concentrate better in class than I do.

I believe that most students in my courses can focus on their studies for longer than I can.

I have difficulty keeping track of my different school assignments.

Table 1

Percentage Distributions of Sample and (Population) Characteristics

Characteristic	Private <i>n</i> = 494	Public <i>n</i> = 349	Total Sample <i>n</i> = 843
<i>Gender</i>			
Males	44 (51)	18 (31)	34 (39)
Females	56 (49)	82 (69)	69 (61)
<i>Race/ethnicity</i>			
Caucasian	64 (65)	77 (73)	70 (70)
African-American	4 (9)	15 (22)	9 (18)
Asian	23 (21)	1 (4)	14 (10)
Hispanic	6 (3)	4 (1)	5 (2)
Other	<1 (<1)	2 (1)	2 (<1)

Note. Entries indicate the percent of respondents in each demographic group. Entries not in parentheses represent the percentage of respondents in our sample; entries within parentheses represent the percentage of students from this group who were in the freshman class at each university.

Table 2

Means and (standard deviations) of predictors and associated characteristics of nonmedical use

Variable	T1	T2
Attention problems	2.25 (.95)	2.63 (1.00)
Substance use	.80 (.77)	1.12 (1.38)
Depressive symptoms	2.50 (.85)	2.56 (.78)
Academic Concerns	2.89 (.92)	2.97 (.90)
GPA	NA	3.30 (.56)

Table 3

Logistic Regression Derived Odds Ratio (95% Confidence Interval) Predicting the Onset of Nonmedical ADHD Medication Use

Predictor	Odds Ratio	95% Confidence Interval
Gender	.91	.45 – 1.83
Race (not-white vs. white)	.50	.20 – 1.27
Site	.93	.43 – 2.00
Substance use	3.81 *	2.53 – 5.75
Attention Problems	1.78 *	1.17 – 2.70
Substance Use x Attention Problems	.70 **	.53 – .93
Greek status	2.32 **	1.12 – 4.78

*
 $p < .01$;

**
 $p < .05$

Table 4

Means and (SD) for Students who Became Nonmedical Users

	AP	SU	Normal	<i>d</i> AP vs. SU	<i>d</i> AP vs. Normal
GPA	−1.02 ¹ (1.63)	.15 ² (.81)	.06 ² (.71)	1.17	1.08
Year 1 Academic Concerns	.29 ¹ (.84)	.04 ¹ (.63)	.12 ¹ (.70)	.33	.17
Year 2 Academic Concerns	.82 ¹ (.87)	.03 ² (.85)	.22 ² (1.11)	.79	.56
Year 1 Depression	.90 ¹ (.81)	.04 ^{1, 2} (.63)	.21 ² (.91)	.86	.69
Year 2 Depression	.86 ¹ (.80)	−.01 (.85)	−.17 ² (1.03)	.87	1.03

AP=High Attention Problems; SU=High Substance Use; Normal = Normative range for AP and SU; Entries represent average standard score and (SD). Entries with different superscripts indicate contrast between groups significant at $p < .05$. *d* = effect size