

Non-Medical Use of Prescription Stimulants among College Students: An Updated Report

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1.0 Introduction

Research suggests that non-medical use of prescription stimulants (NPS), or medication misuse, among college students continues to be a serious issue (Arria & DuPont, 2010; Garnier-Dykstra, Caldeira, Vincent, O'Grady, & Arria, 2012; Looby, De Young, & Earleywine, 2013; McCabe, West, Teter, & Boyd, 2014; Substance Abuse and Mental Health Services Administration, 2009; 2013). Prescription stimulant medication, primarily methylphenidate found in Ritalin and Adderall, has been used for some time on college campuses, but continued misuse and apparent rises in misuse seem especially linked to an increase in prescriptions for ADHD, resulting in more students having the drug available (Hall, Irwin, Bowman, Frankenberger, & Jewett, 2005; McCabe et al., 2014). For example, the 2011 the University of Michigan's national "Monitoring the Future" study found prevalence for Adderall prescriptions to be 9.8% among college students across the country (Johnston, O'Malley, Bachman, & Schulenberg, 2012) in comparison to non-college respondents of similar age (6.7%). One study noted that the prevalence of ever engaging in illicit use of prescription stimulants during college was 25.6%, (Bavarian, Flay, Ketcham, & Smit, 2013) while others described estimates of NPS between 13.5-19% at various colleges/universities in the US (Arria et al., 2008; Teter, McCabe, Cranford, Boyd, & Guthrie, 2005; White, Becker-Blease, & Grace-Bishop, 2006), with lifetime NPS estimated somewhere between 5-35% (Wilens et al., 2008). Supporting evidence for prescription stimulant demand from all sources, including through legitimate prescription and use as well as through diversion, can be seen in data from the United States Drug Enforcement Administration (DEA), which found that production of methylphenidate (Ritalin) in the US increased almost 361% from 2002 to 2013 (*Final Adjusted Aggregate Production Quotas for Schedule I and II Controlled Substances and Assessment of Annual Needs for the List I Chemicals Ephedrine, Pseudoephedrine*, 2013).

For college students the most common sources of prescription stimulant medication for nonmedical use appear to be peers (McCabe, Cranford, Boyd, & Teter, 2007)(McCabe & Boyd, 2005). Garnier et al. (2010) found that within college students prescribed a stimulant medication, 35.8% reported diverting the medication at least once by sharing or selling the medication. The drug with the highest rate of diversion in this study was ADHD medications (61.7%). The Drug Enforcement Administration (DEA) considers stimulant medications a Schedule II controlled substance due to their high potential for abuse, potentially leading to physical and psychological dependency. As a result it is illegal to possess these medication unless they are prescribed, with penalties varying state to state (DEA, 2011; NIDA, 2014).

In addition to being illegal and potentially addictive, misusing prescription stimulants also has health consequences for individuals. The National Institute of Drug Abuse (NIDA, 2014) list acute health effects as increased alertness, attention, energy; suppressed appetite; increased wakefulness; irregular heartbeat, dangerously high body temperature, and potential risk for cardiovascular failure or seizures (NIDA, 2014).

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Long-term health effects listed include anxiety, hostility, paranoia, psychosis and addiction, especially at high doses, or with alternate routes of administration (e.g., snorting, injecting). When used with alcohol, as reported by students when "partying" (White et al., 2006), NIDA reports that NPS can result in alcohol overdose because of it masks the depressant effects of alcohol. Finally, withdrawal can result in depression, sleep disorders, and fatigue (NIDA, 2014).

The Food and Drug Administration (FDA) in 2007 required manufactures of prescription stimulants to put a "black box" warning label, meaning that medical studies indicate these drugs carry a significant risk of serious, or even life-threatening, adverse effects. The warning label states that "amphetamines have a high potential for abuse", and that misuse of amphetamines may cause "sudden death and serious cardiovascular adverse events" and that the "administration of amphetamines for prolonged periods of time may lead to drug dependence" (FDA, 2009).

According to the 2013 Drug Abuse Warning Network (Substance Abuse and Mental Health Services Administration, 2013) the number of Emergency Department (ED) visits involving ADHD stimulant medications increased between 2005 and 2010 from 13,379 to 31,244 visits. Although the number of ED visits involving ADHD stimulant medications did not increase significantly for children younger than 18 between 2005 and 2010, there were increased visits from 2,131 to 8,148 visits among persons aged 18 to 25. Between 2005 and 2010, the number of ED visits related to ADHD stimulant medications that involved nonmedical use increased from 5,212 to 15,585 visits; those involving adverse reactions increased from 5,085 to 9,181 visits (Substance Abuse and Mental Health Services Administration, 2013).

Students, however, do not appear aware of the risk and the potential adverse side effects attributed to the misuse of prescription stimulant medication (DeSantis & Audrey, 2010; DeSantis, Webb, & Noar, 2008; Weyandt et al., 2013; Weyandt et al., 2009). In one study of undergraduates on a college campus, 79% of reported illicit users surveyed were not at all concerned about using these drugs (Sussman, Pentz, Spurijt-Metz, & Miller, 2006). DeSantis et al., and others (DeSantis, Noar, & Webb, 2009; DeSantis et al., 2008; White et al., 2006) also reported a similar lack of concern in different student samples, while also reporting that students perceived their use of prescription stimulants as a safe alternative to other drug use, and that some students believed that prescription stimulants should be available without a prescription. Moreover, others found that college students who perceived prescription stimulants as harmless were 10 times more likely to use them than those who perceived these drugs as harmful (Arria et al., 2008).

Studies that have investigated non-medical use of prescribed stimulants suggest that there are two general categories into which NPS falls for most college students: either for academic or recreational purposes. Some of the most common academic motives for NPS appear to be to increase concentration and alertness (McCabe, Knight, Teter, & Wechsler, 2005; Arria et al., 2008) and to decrease fatigue while studying (Hall et al., 2005; White et al., 2006). Others confirmed academic motives as a primary motivation as well (Looby et al., 2013). Recreational use purposes include wishing to stay awake longer to party and "have fun" (Arria et al., 2008; White et al., 2006).

Students most at risk for NPS tend to be between 21-25 years, white, members of fraternities/sororities, those who may have symptoms---diagnosed or self-perceived--- of attention problems, as well as students who perceive themselves to be at risk academically (Labbe & Maisto, 2010; Looby et al., 2013; Substance Abuse and Mental Health Services Administration, 2013; Wilens et al., 2008). Most appear to believe that stimulant medications will afford them academic benefit such as concentration improvement and increased alertness (Judson & Langdon, 2009). However, research examining whether the use of prescription stimulants enhances cognitive abilities or improves academic performance suggests that they may not (Weyandt et al., 2013). While students are exposed to misinformation about the performance enhancing aspects of prescription stimulants as they are often referred to as "smart drugs" in the popular media, more recent studies challenge this view (Advokat, 2010; Arria & DuPont, 2010) suggesting that study benefits may be short-lived, with little effect on knowledge retention and understanding of material. Further, some research suggests that it may be the *expectations* of benefit rather than stimulant medications alone that produces academic enhancement (Mommaerts et al., 2013), in a way supporting self-efficacy theory (Bandura, 1997; Snyder & Lopez, 2007).

In summary, there is a significant amount of literature suggesting that college students continue to misuse stimulant medications and that their reasons generally focus on academic enhancement and attempts to manage academic stress, and to a lesser degree, partying. Students most at risk for NPS appear to be those under perceived academic stress, with lower overall GPAs. The purposes of this mixed methods study were twofold. The first purpose was to study the current prevalence estimates of stimulant medication misuse at an institution we had previously studied 9-10 years prior. We added additional questions about stress perception, anxiety, and hours of sleep in order to explore whether these life attributes co-existed with stimulant medication misuse/abuse. The second purpose was to extend our study into qualitative methods, interviewing a small sample of known users regarding their reasons for and perception of stimulant medication misuse/abuse.

Methods

Participants

This mixed-methods study applied both quantitative (survey) and qualitative (phone interviews) procedures to collect data from 936 undergraduate students ranging in age from 18-34 years. All respondents were students currently attending the university. For the survey portion of the study, a total of 930 respondents, 91% of whom were undergraduates and recruited to participate through posted flyers in common areas (e.g. dining halls) as well as through class announcements completed an online questionnaire. While respondents represented all colleges and disciplines at the university, a higher percentage of health and human service majors responded as well as a majority of females. We did not ask about ethnicity; however, In AY 2013-14, there were approximately 12,000 undergraduates at UNH, 92% of whom identified as white. An incentive to be entered into a drawing for one of four \$50 gift cards was offered to those who completed the study. See Table 1 for participant characteristics (survey portion).

Table 1. Participant Characteristics: Survey (N = 930)

Age (range 18-34 years)		Year in college		GPA	
18-21 years	748 (80%)	1 st year	166 (17.8%)	<=2.5	46 (5%)
22-25 years	134 (14%)	2 nd year	230 (24.7%)	2.6- 3.00	193 (21%)
>25 years	48 (6%)	3 rd year	204 (22%)	>3.1	691 (74%)
				Gender	
				Female	Male
				790 (85%)	140 (15%)
Students diagnosed with ADHD					
73 (total 8%: males 53%; females 47%)					

Participants for the qualitative portion of the study consisted of six undergraduate students (three males and three females) at the same university, recruited through posted flyers on campus. All six were between 18-24 years of age. Participants called in anonymously using *67 on their cellphones to block numbers, and gave verbal anonymous consent. Pseudonyms were assigned at the beginning of the conversation and to ensure confidentiality, no identifying questions were asked. An undergraduate student under the supervision of the first author completed the phone interviews in partial fulfillment of the thesis requirements for the McNair Scholars (USA TRiO) Program. Phone interviews were recorded; once the transcribing and analyses of the narratives were completed, the audio recordings were erased. The University's Institutional Review Board (IRB) approved both methods of data collection from participants.

Online questionnaire (survey method) and interviews (qualitative method)

The online questionnaire portion of the study was completed first, prior to the qualitative portion, beginning in fall semester 2011, through fall semester 2013. Data were anonymously collected using Qualtrics survey software (Version 2013, Provo, Utah). To examine whether prevalence rates at the university had remained the same or changed, we deployed a similar questionnaire to one used previously (White et al., 2006).

However, in addition to asking about stimulant medication use for medical and non-medical (NPS) purposes, we added additional questions about stress perception, anxiety, and hours of sleep in order to explore whether these life attributes were co-existing with stimulant medication misuse/abuse. This paper focuses primarily on data related to NPS, stress perception/anxiety, and academic concerns including attention disorders.

Preliminary results from the first round of the survey portion of the study helped shape the guiding questions for the qualitative portion, conducted in summer 2012, in which participant narratives (phone interviews) were recorded, transcribed, and thematically organized. Guiding questions were designed to elicit conversation about stimulant medication use/misuse, and students were encouraged to elaborate as much as they were able to each question. Guiding questions included:

- How long have you used stimulant medications and for what purposes?
- Can you tell us about your overall experiences with and feelings about taking these medications?
- Have you ever had any concerns about taking these medications?
- Describe the level of social and/or academic pressure you feel generally?
- In what ways do you feel as though you need help from stimulant medications?
- Describe whether you think stimulant medication misuse/abuse is a problem on college campuses?
- Can you describe any risks with taking stimulant medications in ways not prescribed?
- What are your thoughts on continuing (or not) to use stimulant medications?
- What would you like to tell us about using stimulant medications that we haven't asked?

Results

Survey

Descriptive statistics were applied, using SPSS v.21 (IBM Corp. Released 2012. IBM SPSS Statistics for Windows). A conservative response rate of 37% was calculated, based on requests to participate sent to an estimated 2500 random students enrolled in approximately 18 classes as well as from flyer announcements posted in the campus union building. Missing data were not scored or counted.

Table 2 presents an overview of findings related to non-medical use of prescription stimulants (NPS). Overall, nearly a third (30%) of all respondents reported that finding stimulant medications on campus was "easy or somewhat easy." Respondents reported slightly higher NPS (23.5%) than our findings in the 2002 study in which students reported 16% stimulant medication misuse/abuse. Of NPS reporters, a fair percentage (36%) misuse at least monthly, and more than half (59%) have GPA's above 3.0. Similar to what we found previously, the majority of students report NPS primarily for academic purposes (74%) while a smaller percent (26%) report NPS for partying. Also similar to what we found previously, the majority of students participating in NPS were not diagnosed with attention disorders nor did they hold prescriptions for stimulant medications (95%). Only a small number of students with ADHD reported NPS (5%).

Table 2. Description of non-medical use of prescription stimulants (NPS), in Percentages

Characteristic	%
Students reporting easy/somewhat easy to obtain stimulant medication (n=279)	30
Students reporting misuse/abuse (n = 219; females = 105)	23.5 (males 52%; females 48%)
GPA (NPS only, n = 219)	
= \geq 3.1 (n = 129)	59
2.6–3.0 (n = 63)	29
= $<$ 2.5 (n = 27)	12
Frequency of NPS:	
Weekly/monthly: n = 79	36
A number of times per year: n = 140	64
Students reporting primary reason for NPS:	
Academic-performance related (n = 161)	74
Partying (n = 58)	26
Students with ADHD who report NPS (n = 12; females = 6)	5
Note:	
Total sample N = 930.	
Misuse/abuse = using stimulant medications in ways not prescribed by a physician;	
ADHD = attention deficit hyperactivity disorder	

Table 3 presents descriptive information among stress/anxiety variables, sleep, and NPS. The stress perception (SP) variable was calculated by summing responses on four questions asking specifically about stress perception and ability to cope in the past month. A descriptive analysis revealed a score range of 4-12, with a mean of 7.62 (SD 2.35) for the entire sample. High stress perception was defined as those students who scored at or above 1SD from the mean (≥ 10). Ten percent of students within the entire sample reported being diagnosed with anxiety problems, and 23% (n = 212) reported high stress perception, using the criteria above. In both of these variables, female students were in the majority. Within the anxiety disordered/higher stressed groups, 19% reported NPS. Of note, 86% of the highly stressed students (n = 212) reported getting fewer than 7 hours of sleep (n = 182) compared to students reporting within the average stress perception range, for which only 18% (n = 124) reported sleeping fewer than 7 hours per night.

Table 3. Description of Students reporting High Stress Perception, Sleep and Anxiety Problems, and non-medical use of prescription stimulants (NPS), in Percentages

Characteristic	%
Students reporting high stress perception* (n = 212/930; females = 197)	23 (93% female)
High stressed students reporting fewer than 7 hours of sleep per night (n = 182/212)	86%
Students diagnosed with anxiety problems/having anxiety medication prescription (n = 97; females = 80)	10 (82% female)
Students with high stress perception/anxiety reporting NPS (n = 41/219; females = 10)	19 (24% female)
Students with high stress perception diagnosed with ADHD** (n = 23; females = 18)	11 (78% female)
Total sample N = 930	

*High stress perception was defined as 1 SD above mean composite stress score in the sample.

**ADHD = attention deficit hyperactivity disorder.

Student Interviews

Table 4 presents findings from the interviews conducted as the second portion of this study, which sought to more deeply investigate reasons for NPS. Narrative data from the phone interviews were analyzed by the first two authors independently and clustered into recurring themes. Two participants held or had held prescriptions for stimulant medications but still used the drug in ways not prescribed (e.g. only for tests/studying or partying). Four participants procured the medication from others, by illegally purchasing or being given the drug from someone who had a prescription. Four similar themes emerged from the independent narrative reviews: (1) It's around and it's easy to get; (2) Perceived Stress and Academics; (3) Concerns about use; and (4) Perspectives on Morality/Cheating. A fifth theme (5) "It's not drug abuse" was identified following discussion by the researchers. After final confirmation of the five themes, exemplar statements were identified.

Table 4. Narrative themes and exemplary statements (N = 6 respondents)

Theme 1: *It's around and easy to get*

All six students described how easily they could get these medications without a prescription or even get a prescription of their own.

Frank: *"I know some people that do it for almost all tests. And I know that it's pretty easy to access, because if one kid has them then his whole group of friends kind of has them. And then (even) their friends could get it."*

Eric: *"So I went to Google to find a doctor who would give them to me without doing it (administering a drug test). And that's what I found, there's actually a lot of doctors who prescribe without administering a drug test. You know how you can find ratings for restaurants and stuff? You can also find them for doctors, so I read all the ratings and reviews that said 'oh this doctor gives you a lot of pills.' ... That's what I wanted so that's who I went to."*

Alice: *"Surprisingly easy... I honestly didn't expect it from the person I got it from... I was selling them my notes from um chemistry and with the money he also gave me this... he was like 'try this, it will help you study.' And I was like 'alright.' So I didn't actually go looking for it but I know the people to ask if I want to go get it"*

Theme 2. Reasons for use: Academic stress.

All six students reported high levels of perceived stress around academics at the time of their use, and stated that the primary reason they use stimulant medications was to enhance their academic work either through studying or taking tests. Three users reported that it was academic pressure that drove them to use for the first time.

Eric: *"I'm really bad-I don't get stressed very often but with a big assignment... I get very stressed, and like, I'm not good at dealing with stress... The more stressed I feel the more likely I am to take it, and the more I am likely to repeat it and the higher amount I'll end up taking. "*

"That's the beauty of stimulants. They buy you time in a way because you can stay up a lot longer, you can still do things that you like doing and do well in school."

Alice: *"It was the epitome of my entire sophomore year coming down on me in one day that made me take it."*

Frank: *"Like normally without it I'd be skipping around on exams and doing questions out of order... Whereas if I'm taking it, I could just go through an exam in order and do fine."*

Bonnie: *"I can go a long time without taking it and I feel fine, but if I have to do (a lot of) work that's when the 'need' will come. It's kind of like I've conditioned myself to think that I need it."*

Chris: *"it (concern) didn't deter me (from taking them) because the same week I took three midterms and I wrote a paper and I got A's on all of them. So you know, it was kind of a trade off. I got A's on everything and then a bit of a panic attack."*

Theme 4. Perspectives on morality and cheating.

Five of the students felt that taking stimulant medication, as a “study aid” was not a form of cheating. One felt that it was similar to athletes taking steroids.

Chris: *“Um, I wouldn’t say its cheating, I mean you don’t have any access to information in your head that you wouldn’t have normally.”*

Frank: *“I wouldn’t consider it cheating. I consider cheating I guess like...copying answers directly off someone’s test. I think its kind of just like-I don’t know, kind of just something to help you study. I guess some would say it’s cheating but I wouldn’t say its cheating, no. I think cheating is stealing someone else’s knowledge without giving them credit for it.”*

Dee Dee: *“My personal opinion in terms of people who use it for studying who don’t need it...for tests and things, I think its an unfair advantage for people to do that because not everyone has access to it. In my opinion it’s similar to using steroids for athletics”.*

Theme 5. It’s not drug abuse.

A few students stated that taking stimulant medications without a prescription was not drug abuse given the reasons (e.g. academic performance) behind taking the medication. Most (5/6) described positive perceptions of stimulant medications.

Bonnie: *“I was reluctant to take it...but at that point the pressure I was feeling to get the work done at that moment made me take it. Just from hearing people’s stories about how it helps, so I took it.”*

Chris: *“Um...I think it’s totally different (to other illegal drug use)...I mean it depends on how you’re using it I guess. I mean I know a ton of people who would just take it for the speedy effects and I guess that’s the same as other recreational drugs, but when you’re just taking it because you think its going to help you do better on a test that’s a different situation.”*

Dee Dee: *“In my opinion it’s different because cocaine is on a different level because it’s completely illegal over all and really dangerous. I mean you can die if you do it incorrectly on the first go. And for certain pain killers its also dangerous...I feel that its different because as far as I know, (stimulants are) not as dangerous to your health and the people around you.”*

Frank: *“I think those (ex. Cocaine, painkillers) are like a different field. I know kids personally who have taken those and gotten addicted and gone to rehab and had a tough time. And I’ve never heard of anyone I know getting that far (addicted) with like Adderall or Ritalin. So I guess its not the same...”*

Discussion/Comments

Results from both the quantitative and qualitative portions of this study suggest that university students continue to use stimulant medications in ways not prescribed, and that the majority of users are not individuals who have been diagnosed with an attention disorder nor prescribed stimulant medication. In fact, only a small fraction of students diagnosed with ADHD and holding prescriptions reported NPS. Further, respondents in the study reported that stimulant medications were generally easy to obtain, suggesting a variety of sources including: a) students with prescriptions are selling their stimulant medication to others; b) students are finding lenient physicians who write prescriptions carelessly; or c) students are getting the medication through illegal channels. Both men and women engaged in NPS in similar percentages, aligned with what others (Garnier et al., 2010; Garnier-Dykstra et al., 2012; Looby, Kassman, & Earleywine, 2014) have identified. However, we found more females reporting high stress perception, as well as reported anxiety disorder, than males in the study, which is consistent with the expansive literatures on both.

Consistent with other studies, the primary reason students reported NPS was for academic purposes. Moreover, of those students who reported high-perceived stress, close to 20% of them reported NPS. This makes sense, although, we were surprised the percentage was not higher. The comments made by students in the qualitative portion of the study suggested that more students might participate in NPS due to academic-related stress. This was even more interesting to us, when we found that unlike a number of studies in which NPS is associated with lower overall academic performance, we found that the majority of NPS users in this study were students with GPAs above 3.1 (59%).

It appears that in our study, the pressure to succeed and maintain success may have driven students to NPS. Whether NPS contributed to their academic success is unknown, but it may be that the expectation of what NPS would afford them academically was a contributing factor.

As presented earlier in the introduction, there is emerging research from Mommaerts and colleagues (2013) who conducted a well-controlled placebo trial suggesting that stimulant medications may not be, in fact, as effective for academic enhancement as is assumed; rather, the *belief* that they may be effective appears to exert a powerful placebo effect. Mixed concern about use existed according to the narratives we collected, and in previous work by us and by others, the majority of students reported little concern with NPS. Findings from prior research support that low concern increases the likelihood of NPS. However, in this study the qualitative narratives about concern revealed an interesting interaction among those students who had used for a longer time versus recent users. Recent users were less concerned, while experienced users reported concerns about long-term side effects, and in one case a hospital ER visit for cardiac symptoms the student described as anxiety-related. An interesting finding was that the majority of students reporting high stress perception also reported sleeping fewer than 7 hours per night. This was in sharp contrast to the remaining non-highly stressed students who reported more typical sleep patterns of 7 or more hours per night. This may be a side effect of stress-related rumination keeping students up at night, side effects of stimulant medications or other non-prescription stimulants such as caffeine doing the same, or related to other factors that are unknown. However, future studies may wish to include this variable and investigate further.

Strengths/Limitations

Strengths of this research include the collection of both survey and narrative data about college student stimulant medication misuse, as well as a repetition of similar method nearly 10 years following a similar study at the same institution. Thus, we were able to confirm how, why, and how many students continue to misuse medications. Further, the random sampling provided some control over response bias, although we had more female respondents than males. Several limitations exist, including the lack of ethnic diversity in the sample, which limits generalizability to other populations. Further, this study was conducted in the northeast, an area that has a higher percentage of stimulant medication prescriptions than other parts of the country, making the medication possibly more available. Another possible limitation is that a higher percentage of respondents on the questionnaire were women and also in the health sciences college (37% of sample). Anecdotally, this group tends to be a more health conscious group at the university, and we wondered whether this might have led to a degree of under-reporting of NPS.

Conclusions

Results from this study suggest that college students continue to misuse stimulant medications, obtain them illegally, and hold minimal awareness of and concern for health risks associated with misuse. The primary purpose for misuse continues to be for academic reasons, which seems associated primarily with academic stress and perceived pressure to do well academically. Implications of this research include suggestions that Campus Health Centers must continue to educate prescribing clinicians about the treatment of mental health issues including attention disorders; to explore other treatment options, including academic supports other than drugs and medications; and to carefully monitor prescription medication use in their patients. In particular, campus health and counseling centers should screen students for misuse of their own prescription medication, ask about whether they sell medications to others or obtain medications from other students. Further education should include how to use medications as prescribed, as well as teaching the risks are associated with stimulant medication misuse, including both health and legal ones. Further students need to know how to protect their medication from theft, and how to dispose of them safely if they choose to longer take them.

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