

The Use and Misuse of Prescription Stimulants as “Cognitive Enhancers” by Students at One Academic Health Sciences Center

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Abstract

Purpose

Prescription stimulant use as “cognitive enhancers” has been described among undergraduate college students. However, the use of prescription stimulants among future health care professionals is not well characterized. This study was designed to determine the prevalence of prescription stimulant misuse among students at an academic health sciences center.

Method

Electronic surveys were e-mailed to 621 medical, pharmacy, and respiratory therapy students at East Tennessee State University for four consecutive weeks in fall 2011. Completing the survey was voluntary and anonymous. Surveys asked

about reasons for, frequency of, and side effects of nonprescription misuse of prescription stimulants. Given the sensitive material, an opportunity to win one of ten \$50 gift cards was used as an incentive.

Results

Three hundred seventy-two (59.9%) students completed the survey from three disciplines (47.6% medical, 70.5% pharmacy, and 57.6% respiratory therapy). Overall, 11.3% of responders admitted to misusing prescription stimulants. There was more misuse by respiratory therapy students, although this was not statistically significant (10.9% medicine, 9.7% pharmacy, 26.3% respiratory therapy; $P = .087$).

Reasons for prescription stimulant misuse included to enhance alertness/energy (65.9%), to improve academic performance (56.7%), to experiment (18.2%), and to use recreationally/get high (4.5%).

Conclusions

Prescription stimulant misuse was prevalent among participating students, but further research is needed to describe prevalence among future health care workers more generally. The implications and consequences of such misuse require further study across professions with emphasis on investigating issues of academic dishonesty (e.g., “cognitive enhancement”), educational quality, and patient safety or health care quality.

Misuse of prescription stimulant medications is a growing problem, particularly among high school students

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and college-aged young adults.^{1,2} According to the National Survey on Drug Use and Health, nonmedical prescription use (or misuse) is defined as use of prescription drugs not prescribed for the respondent or respondent use only for the experience of the feeling they caused.³ Often, people who misuse prescription stimulants are hoping to improve their ability to concentrate and also take advantage of potential side effects of the medications, including decreased need for sleep.

A recent review by Smith and Farah⁴ concisely summarized the use of prescription stimulants in normal individuals by evaluating a variety of studies using tasks designed to assess learning, working memory, and executive function. They concluded that prescription stimulants “appear to enhance retention of recently learned information and, in at least some individuals, also enhance working memory and cognitive control.” However, “there remains great uncertainty regarding the size and robustness of these effects

and their dependence on dosage, individual differences, and specifics of the task.”⁴ The only consensus regarding the use of these drugs is that people genuinely appear interested in cognitive enhancement.

At the undergraduate level, frequency of prescription stimulant misuse as “cognitive enhancers” by college students was estimated at 3% to 10% in a 2005 study, with the majority of responding students taking the medication to prepare for exams.⁵ However, evidence of prescription stimulant misuse among medical students and other future health care professionals is scant.

Tuttle and colleagues⁶ described a 10.1% lifetime incidence of nonmedical prescription stimulant misuse within one public college of medicine. Lord and colleagues⁷ reported a 6.7% incidence of prescription stimulant misuse at a private college of pharmacy. McNiel and colleagues⁸ surveyed dental and dental hygiene students and found that 10% of dental students and 18% of dental hygiene students reported misusing

prescription stimulants for nonmedical purposes at least once during their lifetime.

Whereas adverse event data from the prescribed use of stimulants are known from clinical trial data,^{9,10} the long-term consequences of prescription stimulant misuse are unknown, but worth considering. The use of prescription stimulants as cognitive enhancers to improve academic performance may constitute academic dishonesty in the eyes of some. It is possible that the misuse of prescription stimulants may make students dependent on these effects in order to function as competent health care professionals. We speculate that such dependence could affect a clinician's wellness and potentially have an impact on patient care.

On the basis of these concerns, we designed a survey to ask health care students within a single institution about their nonmedical misuse of prescription stimulants. Students from several disciplines were surveyed about their perceptions, history, and motives regarding prescription stimulant misuse. To our knowledge, this is the first study of its kind to survey multiple disciplines within the same institution.

Method

We collected data through the use of a voluntary, confidential online survey distributed to 786 students at East Tennessee State University. Faculty leaders within each discipline (medicine, pharmacy, advanced nursing, respiratory therapy, and physical therapy) were invited to distribute the survey. We only evaluated disciplines with a meaningful survey response rate (deemed by the investigators to be >40%) to protect the generalizability of data. All students received the survey link via campus e-mail. The link was distributed within each respective discipline for four consecutive weeks during the 2011 fall semester.

The survey was created by an interprofessional group of health care professionals (J.B., J.G., S.M., R.E.) from the divisions of medicine and pharmacy. The anonymous survey contained 23 unique items and incorporated mostly closed-ended, multiple-choice questions (see Appendix

1 for examples). We used question logic to minimize length of the survey and ask specific questions of nonmedical users. For example, only those who admitted to using prescription stimulants without a prescription were asked about side effects of stimulant use. Demographic information requested included student GPA, health care discipline, year(s) in professional program, and whether the participant had been diagnosed with a disorder requiring a prescription stimulant medication (i.e., attention deficit hyperactivity disorder [ADHD]). Anticipating a high degree of participant sensitivity to the topic and data collection process, we felt the study process should include inherent characteristics which promote data integrity and participant anonymity. To ensure anonymity, demographic data such as age, gender, and race were not collected. Additionally, the IP (internet protocol) address collection capability of SurveyMonkey was disabled.

Prescription stimulants available in the United States are

- amphetamine/dextroamphetamine (Adderall),
- dexamethylphenidate (Focalin),
- dextroamphetamine (Dexedrine),
- methamphetamine (Desoxyn),
- methylphenidate (Ritalin, Methylin, Metadate, Concerta), and
- modafinil (Provigil).

Survey sequencing addressed prescription stimulant misuse of these six drugs, motivation for nonmedical use, deceptive practices, frequency of use, consequences of nonmedical use, and peer group nonmedical use. Survey takers could select multiple answers and use a comment box where appropriate. We defined nonmedical misuse as using a prescription stimulant without a prescription or using more often than prescribed. Responders who noted that they had ADHD or narcolepsy were only considered misusers if they admitted to using prescription stimulants without a prescription or more often than prescribed. We also presented responders with a prescription stimulant use scenario and asked whether the scenario constituted academic dishonesty. They were also asked whether faculty knowledge of prescription stimulant use would adversely affect their education.

Survey development included an expert panel review and beta testing. Beta testing was initiated during the spring semester of 2011 in health care students prior to graduation. We did not include beta test results in the final analysis.

In an effort to encourage student participation, we offered the opportunity to win one of ten \$50 gift certificates as an incentive. Once a participant completed the survey, she or he was directed to an independent and secure Web site for submission of contact information which could not be connected to a responder's survey results.

We analyzed all statistics using PASW Statistics 18 (SPSS, Chicago, Illinois). Student *t* test and chi-square test were used to analyze continuous and categorical data. Because of large amount of data collected, we only present results related to the primary objective of this study, which was to describe the misuse of prescription stimulants by medical, pharmacy, and respiratory therapy students. Further data analysis is ongoing.

IRB approval was granted by East Tennessee State University prior to study initiation.

Results

A total of 372 out of 621 (59.9%) students responded to the survey from the medicine, pharmacy, and respiratory therapy (RT) disciplines, which comprises the set of data analyzed. Because only 10% of advancing nursing students responded and no faculty leader from physical therapy agreed to distribute the survey, these data (the remaining 165 of the 786 students) were not analyzed. The response rates were 47.6% (128/269) for medical students, 70.5% (225/319) for pharmacy students, and 57.6% (19/33) for respiratory therapy students.

Forty-four (11.3%) of responders admitted to nonmedical prescription stimulant misuse. Seven of these students reported having been diagnosed with ADHD in the past, yet admitted to misuse (use without a prescription). Additionally, 22 students with an ADHD diagnosis did not admit to misuse. Thirty-three (75%) responding nonmedical users obtained prescription

stimulants from a friend or acquaintance, whereas 13 (29.5%) had obtained prescription stimulants from classmates. Fourteen (10.9%) medical students, 22 (9.7%) pharmacy students, and 5 (26.3%) RT students admitted to using a prescription stimulant not prescribed to them. Three responders did not specify their discipline. Despite the numerically higher rate of nonmedical use in RT students, there was no statistical difference ($P = .087$) between the medicine, pharmacy, and respiratory therapy disciplines.

A total of 329 (52.9%) responders provided their GPA. The average GPA was similar ($P = .18$) between those who misused prescription stimulants (3.42) and those who did not (3.51).

Among the 44 nonmedical users, the reasons for misusing prescription stimulants included to improve academic performance (56.7%), to enhance alertness or energy (65.9%), to get high or to use recreationally (4.5%), and to experiment (18.2%). Because the survey did not address legitimate use of prescription stimulants (such as use with a valid prescription), a description of the frequency of prescription stimulant use cannot be made.

The most commonly reported adverse reactions by nonmedical users included lack of appetite (68.2%) and difficulty sleeping (54.5%).

Additional adverse drug reactions experienced by >5% of the 44 prescription nonmedical users were

- racing heart, 15 (34.1%),
- anxiety, 7 (15.9%),
- tremor, 7 (15.9%),
- headache, 6 (13.6%), and
- dependence on prescription stimulants for concentration, 4 (9.1%).

Additional negative consequences of prescription stimulant misuse included criticism from others (6.8%), increased physician visits (2.3%), excessive tobacco use (2.3%), and an inability to take some over-the-counter medications due to a drug–drug interaction causing the “heart to skip beats.” No responders had sought treatment for substance

abuse, experienced legal consequences, or needed urgent/emergent medical treatment secondary to prescription stimulant abuse.

Twenty-seven (61.4%) of the nonmedical users agreed with the statement “If I used prescription stimulants and faculty found out, it would adversely affect my education.” Only 12 (27%) responders disagreed with this statement. Five responders declined to comment.

Responders were presented with the following ethics-probing vignette and asked to answer “Yes” or “No” if the scenario constitutes academic dishonesty: “‘Annie’ is in her first year of a professional health program and is having trouble staying awake to do the required reading. She has a 4.0 GPA and experiences a lot of pressure from family to maintain this excellent performance. She decides to start using a prescription stimulant medication, Ritalin, during finals week so she can stay awake longer and concentrate better, despite having never been diagnosed with an illness requiring Ritalin.” A slight majority (55.8%) of the 372 responders believed this constituted academic dishonesty, and 59.9% agreed that using prescription stimulants provides an unfair advantage to health professions students.

Discussion

To our knowledge, this is the first multidisciplinary study of prescription stimulant misuse. One in 10 future health care professionals from the medical, pharmacy, and respiratory therapy disciplines completing our survey acknowledged their nonmedical misuse of prescription stimulants, or cognitive enhancers. The majority of responders (61.4%) perceived that if faculty found out about their nonmedical use, it would negatively affect their education. Therefore, it is reasonable to suggest that the true incidence of prescription stimulant misuse may be higher than reported in our voluntary survey. Given student concern over negative perceptions of misuse, it is very possible that many nonmedical users did not respond to the survey because of this fear. Therefore, one must consider this limitation when considering the validity of our data.

Prescription stimulants carry a risk for abuse and dependence.^{9,10} The incidence of psychosis or withdrawal-associated depression is not known for prescription stimulants when used as cognitive enhancers. Moreover, the high rates of insomnia and lack of appetite in our study raise concerns for student wellness as the short- and long-term effects of cognitive enhancement with stimulants are not known.

Most of the health science students who responded used cognitive enhancers to enhance alertness or energy (65.9%) or to improve academic performance (56.7%). It is unknown whether the misuse of prescription stimulants as cognitive enhancers leads to improved academic performance; this is an area for future research. In this study, we used GPA as a surrogate marker for academic performance. Although readily available, GPA may not be a good marker. Future placement in competitive residency programs, performance on standardized tests, or performance on clerkship rotations may be better markers of academic performance. Students appear divided on this issue, with 55.8% of responders believing the “Annie” vignette portrayed academic dishonesty and 59.9% believing that using cognitive enhancers provides an unfair academic advantage. This is likely to become a divisive and controversial subject within colleges of health sciences for three reasons.

First, the use of prescription stimulants as cognitive enhancers may challenge perceptions of academic dishonesty. One may argue that because cognitive enhancers improve energy and concentration for studying above and beyond what would normally be physiologically possible, this unfair academic advantage is tantamount to cheating.^{11,12} Yet cheating has been defined as “the intentional violation of a rule in order to gain an unfair advantage over others.”¹³ Because our institution does not explicitly forbid the use of cognitive enhancers, one could also argue that the use of cognitive enhancers (e.g., misuse of prescription stimulants) is not cheating. Institutions wishing to limit the nonmedical use of cognitive enhancers should consider explicit policies.

Also, specifying exactly what constitutes an unfair advantage is often difficult to

do: Does a student who lives in quiet apartment or who can afford a better computer have an unfair academic advantage? Does a caffeine drinker have an academic advantage over a non-caffeine drinker? Although caffeine is also a stimulant, it is not illegal to use without a prescription. Generally, health habits such as exercise, a nutritious diet, and adequate sleep have been suggested to be cognitive enhancing.² Therefore, questions about the use or misuse of cognitive enhancers pose a significant challenge to colleges of health sciences.

The second reason that the misuse of prescription stimulants as cognitive enhancers is a divisive and controversial subject for colleges of health sciences concerns the guidelines for prescribing these medications, schedule II controlled substances. Seven of the 44 (16%) responders who misused prescription stimulants claimed to have been diagnosed with ADHD. Although misuse of prescription stimulants by professional students with ADHD may be seen as no problem by some, such a diagnosis does not excuse using controlled substances without a prescription. Similar misuse has contributed to an epidemic of accidental and fatal overdoses from opioids, also controlled substances.¹⁴ Moreover, such illegal activity may prohibit or delay licensure for health care professionals. None of the misusers in our study experienced any legal consequences, but it is unknown from our survey whether our participants considered such legal consequences when deciding to misuse controlled substances. Colleges and universities should consider educating students on the potential legal and career ramifications of prescription stimulant misuse.

The guidelines and standards for physicians to prescribe these cognitive enhancers are also unclear. For example, the American Academy of Neurology¹⁵ recently published a guide for neurologists that concludes that the decision to prescribe cognitive enhancers to healthy patients ultimately rests on a neurologist's discretion. Therefore, physicians who have used such medications "off-label" or without a prescription may not be discriminating in prescribing cognitive enhancers for those

with and without legitimate medical purposes.

Last, and perhaps most important, the effects of the practice of "cognitive enhancing" on patient care are not known. Students misusing prescription stimulants as cognitive enhancers may begin to rely on them as a crutch to study and perform well on exams. The question of whether removal of this crutch affects clinical performance needs to be addressed by future research.

Conceivably, patients could argue that if a physician used cognitive enhancers during medical school, that physician should continue using them in the clinic or hospital. Further investigation of this would likely require longitudinal study of prescription stimulant users throughout school, postgraduate training, and professional practice.

One could argue that increased concentration ("enhanced" or otherwise) is more important in a clinical setting than the relatively safe environment of higher education. The same holds true for other health professions. This study did not differentiate between classroom misuse and clinic misuse. Further research is needed to better elucidate any differences. Colleges of health sciences must address these issues because they have a direct impact on the ethics of professionalism.¹⁶

Indeed, the results of this study suggest that some future health care professionals may start caring for patients with a "Do as I say, not as I do" mentality. Implicit in health care are ethical principles of patient welfare and safety. How can we justify self-prescribing cognitive-enhancing drugs, regardless of the profession, when we are reluctant to recommend these drugs to our patients for nonmedical use, especially because the long-term side effects are unknown?

In conclusion, our findings show the nonmedical misuse of prescription stimulants as cognitive enhancers by 1 in 10 students within three professions on the same campus. The generalizability of these data to other health sciences colleges requires validation. The nonmedical misuse of cognitive enhancers by future health care

professionals is an issue that demands further open discussion and investigation. The implications for student learning and advancement, student wellness, and the quality of patient care provided by nonmedical prescription stimulant users require further research as well.

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