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Robert T. Fairman Date

Assessing Prescription Stimulant Use Among Young Adult College Students: Who Uses, Why, and What are the Consequences?

By:

Robert T. Fairman

Behavioral Sciences and Health Education

Carla J. Berg, PhD, MBA, LP

Committee Chair

Regine Haardörfer, PhD, MS, MEd

Committee Member

Michael Windle, PhD

Committee Member

Milkie Vu, MA

Committee Member

Colleen McBride, PhD

Department Chair

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By

Robert T. Fairman

BS in Public Health Studies

University of North Carolina Wilmington

2017

Thesis Committee Chair: Carla Berg. PhD, MBA, LP

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Abstract

Assessing Prescription Stimulant Use Among Young Adult College Students: Who Uses, Why, and What are the Consequences?

By Robert T. Fairman

Background/Objective: The use of prescription stimulants (PS), commonly used to treat Attention Deficit Disorder (ADD), is higher in the United States compared to any other country. Among college students, the use of PS in ways other than prescribed is common and is a concerning public health problem. The current study used a Socioecological Model and the Social Cognitive Theory to examine PS use, particularly use with versus without a prescription or ADD-diagnosis, accounting for important individual, interpersonal, and community level factors, particularly sociodemographics, outcome expectancies, behavioral factors, and school setting.

Methods: Cross-sectional data from a longitudinal study of students at seven colleges and universities in Georgia were analyzed to address the study aim. Measures included sociodemographic characteristics, psychosocial factors, substance use, ADD-specific factors, prescription stimulant use, access to prescription stimulants, mode of use, reasons for stimulant use, and side effects of use. Bivariate analyses and multivariable regression were conducted examining differences between PS users with versus without a prescription or ADD diagnosis.

Results: Of the 219 students who reported using PS, almost half (N=100, 45.7%) did not have a prescription or ADD diagnosis. Correlates of use includes parental education less than a bachelor's degree, attending a private school compared to a technical college, not being diagnosed with depression, not being diagnosed with anxiety, marijuana use in the past 30 days, and tobacco use in the past 30 days. Results also show that those who use without a prescription are more likely to use PS to stay awake longer, have more enjoyable time, and to party longer.

Conclusions: Investigating the correlates of PS among college and university students may help identify those at risk for using PS without a prescription or diagnosis – either because they are using recreationally or because they may lack access to healthcare. In either case, this study highlights the need for college campuses to address this public health concern through educational campaigns highlighting ADD, its symptoms, its treatment, and the adverse consequences of recreational PS use.

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INTRODUCTION

The use of prescription stimulants (PS), commonly used to treat Attention Deficit Disorder (ADD), is higher in the United States (US) compared to any other country. Internationally, the US accounts for 83.1% of all PS use. Between 7%-34% of college students report having a prescription (A. D. DeSantis, Webb, & Noar, 2008; Rozenbroek & Rothstein, 2011), and an estimated 11.2% of college students use PS for non-medical reasons (Arria et al., 2017). Among those without a prescription, 74% report obtaining PS from a friend for free, with nearly 50% purchasing PS from a family member or friend (Ross et al., 2018). With non-medical prescription stimulant use (NMPS) increasing among college and university students (Scheffler, Hinshaw, Modrek, & Levine, 2007), there is also increasing concern among post-secondary institutions about NMPS use (Arria et al., 2017). Not surprisingly, academic performance is a key motive for NMPS use (Arria et al., 2013).

The current study utilizes the Socioecological Model (SEM) and the Social Cognitive Theory (SCT). The SEM highlights multiple levels of influence on a behavior or outcome, including individual, interpersonal, community, and societal levels (Dahlberg & Mercy, 2002). The use of the SCT allows for the assessment of cognitive influences, environmental influences, and supporting behavioral factors on health behaviors (Glanz, 2015). These frameworks are key, as individual, interpersonal, and behavioral factors are key correlates of NMPS use. For example, NMPS use has been associated with sociodemographic characteristics (e.g., race/ethnicity, socioeconomic status), psychosocial factors (e.g., adverse childhood events, depressive symptoms), and other substance use (A. DeSantis, Noar, & Webb, 2009; McCabe, Knight, Teter, & Wechsler, 2005; Rabiner et al., 2009; Teter, McCabe, LaGrange, Cranford, & Boyd, 2006). Other factors at the broader community-level, such as school type, or rural or urban setting, may

be important correlates. SCT is particularly relevant, as it highlights the importance of outcome expectations; such expectancies as motives for use and adverse consequences (e.g., side effects of use) are key in characterizing NMPS use.

Though PS use is widely studied among college students, few studies examine PS use in the southern US, and almost no studies examine correlation among diverse types of post-secondary institutions. Guided by the use of SEM and SCT, the current study aimed to: 1) characterize students using PS; 2) characterize PS use, reasons for use, and adverse outcomes related to use among PS user; and 3) examine correlates of use of PS without a prescription or diagnosis of ADD.

LITERATURE REVIEW

Prescription Stimulant Use among US College Students

Prescription stimulants (PS) are commonly used to treat Attention Deficit Disorder (ADD). ADD is a mental disorder that affects nearly 8.4% of children and 3.6% of adults in the US, with prevalence increasing over the past 30 years (Danielson et al., 2014; Matte et al., 2015; Simon, Czobor, Bálint, Mészáros, & Bitter, 2009). Estimates of the prevalence of ADD among full-time college and university students vary, as colleges and universities do not require students to register their disabilities with the school. Estimates range from 2% to 8%, based on self-report; however, 4% meet the Diagnostic Statistical Manual IV (DSM-IV) criteria for ADD (DuPaul, Weyandt, O'Dell, & Varejao, 2009).

The use rates of PS is higher in the US compared to any other country, accounting for 83.1% of global prescription stimulant medication consumption (Scheffler et al., 2007). A 2012 study indicated that approximately 8.1% of college students were prescribed PS medication for ADD in the past year (Garnier-Dykstra, Caldeira, Vincent, O'Grady, & Arria, 2012). However, A. D. DeSantis et al. (2008) found that, while 34% of students reported using PS, only approximately 4% of students reported having a prescription for stimulants (referred to here as nonmedical PS [or NMPS] use). Not surprisingly, a majority of stimulants used without a prescription are sold or shared by students who are prescribed stimulants (Arria & DuPont, 2010). Schulenberg et al. (2018) showed that, in a national sample of 900 students, 9.8% of college-aged people used PS that were not prescribed to them during the past 30 days. Similarly, Arria et al. (2017) found that in a sample of 8,039 full-time undergraduate students, 11.2% of the sample engaged in NMPS use in the past six months. NMPS use by college students peaked in

2012 with 11.1% of respondents reporting using NMPS. The prevalence has declined since (Schulenberg et al., 2017).

In the southern US, college students are more likely to report using PS and are more likely to report NMPS use compared to students in the western and north central regions in the US (McCabe et al., 2005), but less likely compared to the northeastern region of the US (Schulenberg et al., 2018).

Characteristics of and Concerns Regarding PS Use

These statistics are concerning because of a range of consequences. For example, the Substance Abuse and Mental Health Services Administration (SAMHSA) reported recent increases in emergency department visits related to PS, from 13,379 in 2005 to 31,244 in 2013 (Substance Abuse and Mental Health Services Administration, 2013). Of these emergency department visits, 50% were due to non-prescription use, 29% were due to adverse reactions, and the remaining 21% were due to either suicide attempts or accidental ingestion (Substance Abuse and Mental Health Services Administration, 2013). In regard to the latter, PS are typically consumed orally; however, NMPS users might ingest PS through snorting, smoking, inhaling or injecting PS (Teter et al., 2006), a concern given that the form of ingestion may alter PS pharmacokinetics and increase the risk of dependence.

Among PS used to treat ADD, Adderall and Ritalin are the two most common among college students (Schulenberg et al., 2018). Nearly 75% of college students that use PS report using Adderall, with 17% using Ritalin, and others using undisclosed stimulants (McNiel et al., 2011). This is a shift, because before 2006, Ritalin was the most used PS (Teter et al., 2006). This shift may be due to adverse side effects of these earlier PSs and pharmaceutical industry efforts to reduce such effects. Teter (2006) suggests that Adderall has become the stimulant of

choice because of the extended release, lower occurrence of "ups and downs," as well as the higher rate of prescriptions. Users also believe that Adderall causes fewer emotional ups and downs and generally works better (Teter et al., 2006). Despite advances in PS, side effects of PS use continue to include sleeplessness, heart papulations, racing thoughts, and anxiety (Prosek et al., 2018).

Motives for NMPS Use

The literature has documented that academic performance is a prominent motive for NMPS use. For example, one study found that the most commonly reported reasons for NMPS use were to improve concentration and to improve academic performance (Arria et al., 2013). Approximately 51% of nonmedical users use PS to stay awake, 81% use PS to study, 54% use to help with academics, and approximately 40% of users use to increase alertness (Hartung et al., 2013). Students with lower GPAs are more likely to engage in NMPS use because they feel the need to stay awake and alert in order to catch up in their academic performance, complete coursework, and study for exams (McCabe et al., 2005). This may be related to the fact that NMPSU rates have been shown to be associated with more selective college admission criteria (A. DeSantis et al., 2009; McCabe et al., 2005).

Correlates of PS Use

Correlates of NMPS use include sociodemographic characteristics. For example, greater likelihood of NMPS use is associated with being White compared to being Black, Asian, or Hispanic (McCabe et al., 2005; Rabiner et al., 2009).

In addition to sociodemographic factors, psychosocial factors also are associated with NMPS use. Adverse Childhood Events (ACEs) have been shown to be associated with PS use and NMPS use (Forster, Gower, Borowsky, & McMorris, 2017). In addition to ACEs, depression

has been found to be associated with NMPS use, as well as misuse of prescription drugs more broadly (Benson & Flory, 2017). Research has indicated that those who misuse PS, compared to those who do not misuse PS, are more likely to feel sad, depressed, and consider suicide (Zullig & Divin, 2012).

Moreover, those who use PS and have significant ADD symptoms may have greater rates of alcohol, tobacco, and other drug use (Upadhyaya et al., 2005). A 2009 study indicated that 98% of NMPS users used alcohol in the past six months, 50% used cigarettes, 74% used marijuana, and 25% used cocaine (Rabiner et al., 2009). Sweeney, Sembower, Ertischek, Shiffman, and Schnoll (2013) reported that 95.3% of NMPS users report the use of at least one illicit drug. Weyandt and DuPaul (2006) found that 26% of NMPS users have either a drug or alcohol dependency or both, which is higher than their non-using peers. Additionally, NMPS use may be associated with increased risk of polydrug use (Arria, O'Grady, Caldeira, Vincent, & Wish, 2008).

Theoretical Framework

The current study utilizes the Socioecological Model (SEM) and the Social Cognitive Theory (SCT). The SEM highlights multiple levels of influence on a behavior or outcome, including individual, interpersonal, community, and societal levels (Dahlberg & Mercy, 2002). The use of the SCT allows for the assessment of cognitive influences, environmental influences, and supporting behavioral factors on health behaviors (Glanz, 2015). These frameworks are key, as individual, interpersonal, and behavioral factors are key correlates of NMPS use. For example, NMPS use has been associated with sociodemographic characteristics (e.g., race/ethnicity, socioeconomic status), psychosocial factors (e.g., adverse childhood events, depressive symptoms), and other substance use (A. DeSantis et al., 2009;

McCabe et al., 2005; Rabiner et al., 2009; Teter et al., 2006). Other factors at the broader community-level, such as school type or rural or urban setting, may be important correlates. SCT is particularly relevant, as it highlights the importance of outcome expectations; such expectancies as motives for use and adverse consequences (e.g., side effects of use) are key in characterizing NMPS use.

Research Aims

Though PS use is widely studied among college students, few studies examine PS use in the southern US, and almost no studies examine correlation among diverse types of post-secondary institutions. In examining PS use among college and university students, the current study aimed to: 1) characterize students using PS; 2) characterize PS use, reasons for use, and adverse outcomes related to use among PS users; and 3) examine correlates of use of PS without a prescription or diagnosis of ADD.

METHODS

Procedures

Project Documenting Experiences with Cigarettes and Other Tobacco in Youth (DECOY) is a quantitative, longitudinal assessment of data regarding tobacco use among college students. This two-year longitudinal cohort study involves 3,418 young adults attending seven Georgia colleges and universities, which includes two public universities, two private universities, two technical/community colleges, and a historically black college and university. These campuses were selected to obtain a broad range of young adults in terms of sociodemographic backgrounds. Inclusion criteria for participants were between the ages of 18 to 25 years of age, and the ability to read English.

College email addresses were obtained from the registrar's office from each college or university for students meeting eligibility criteria (i.e., age 18-25-year old, ability to read English). Three thousand 18–25-year old were selected randomly from one private and 2 public universities. The remainder of the schools had 18–25-year-old student populations of less than 3000; thus, the entire student population of that age range at those schools was included in recruitment. Response rates varied, with a total response rate of 22.9% (n= 3574/15,607). Seven days after initial recruitment and completion of the baseline survey, we asked participants to confirm their participation by clicking a "confirm" button included in an email sent to them. The email reiterated the tasks involved in the study and its timeline. Once participants clicked "confirm", they were enrolled into the study and sent their first incentive in the form of a $30 gift card via email. The confirmation rate was 95.6% (N=3418/3574).

Data collection began in Fall 2014 and consisted of individual assessments every four months for the duration of two years (during Fall, Spring, and Summer). Current analyses focused on those participants who completed Wave 2 assessments (Spring 2015; N=2,969, 86.9% of the baseline sample) who also had complete data for the analyses (N=2,927, 98.6% of the Wave 2 participants). Subsequently, analyses focused on those participants who reported any use of prescription stimulants in the past 4 months (N=219, 7.5% of the analytic sample).

Measures

The survey assessed a range of factors including sociodemographic characteristics, psychosocial factors, substance use behaviors, ADD symptoms and diagnosis, and factors related to PS use (e.g., age of first use, types of PS used, modes of use, access to PS, reasons for PS use, adverse side effects of PS use).

Sociodemographic Characteristics

For the current analyses, we included age, sex, sexual orientation, race, ethnicity, and parental education (as a proxy for socioeconomic status). We also included the type of college or university attended as well as if the school was located in a rural or urban area.

Psychosocial Factors

ACEs were measured at Wave 2 utilizing a ten-item scale developed by the Centers for Disease Control and Prevention (CDC) (Centers for Disease Control and Prevention, 2014; Felitti et al., 1998). Cronbach's alpha in the present study was .75.

Depressive symptoms were assessed at Wave 2 using the PHQ-9, a 9-item scale that indicates major depressive disorder if 5 or more of the 9 depressive symptoms are present more than half the days of the last 2 weeks and if depressed mood is one of the symptoms (Kroenke, Spitzer, & Williams, 2003). Cronbach's alpha in the present study was .87.

Having diagnoses of depression and anxiety was assessed at Wave 2 by asking, "Has any healthcare provider ever told you that you have: depression? anxiety disorder?"

Substance Use

Substance use was assessed by asking the number of days of use in the past 30 days of the following: alcohol, marijuana, cigarettes, little cigars/cigarillos, smokeless tobacco, e-cigarettes, and hookah. These items were operationalized as current (past 30-day) use of alcohol, marijuana, or any tobacco, respectively.

ADD-Specific Factors

Past 4-month use of PS was assessed at Wave 2 by asking, "How many days in the past 4 months have you used prescription ADD stimulants such as Ritalin, Concerta, Metadate, Dexedrine, Vyvanse, Adderall, Cocaine, Methamphetamine, or Amphetamine Methedrine?"

Having a diagnosis of ADD was assessed at Wave 2 by asking, "Has any healthcare provider ever told you that you have ADD?"

ADD symptoms were measured at Wave 2 utilizing the six-item Adult ADHD Self-Report Scale Symptom Checklist (Kessler et al., 2005). Cronbach's alpha in the present study was .74.

PS Use

These factors were assessed at Wave 2. *The type of PS used* was assessed by asking, "In the past 4 months, what type of stimulant did you use most often? Amphetamine, Methylphenidate (Ritalin, Concerta, Metadate), Dexmethylphenidate (Focalin), Dextroamphetamine (Dexedrine), Lisdextroamphetamine (Vyvanse), Mixed Amphetamine salts (Adderall), Other, Refuse."

Mode of PS use was assessed by asking, "Which of the following ways did you consume stimulants: orally? snorting? smoking? inhaling? other? refuse."

Access to PS was assessed by asking, "How did you obtain the stimulant(s) you took? (Check all that apply.) It was prescribed to me by a healthcare provider, I bought it online, I bought it from someone, someone gave it to me, other, or I don't know." Participants were also asked, "Have you ever: Been approached for prescription stimulants? Shared prescription stimulants for free? or Shared prescription stimulants for money?"

Motives for PS use was assessed by asking, "For which of the following reasons did you take stimulants: Because it was prescribed for my ADD, To help me be less bored by work, To help me be more productive with my schoolwork, To help me concentrate better, To help me stay awake longer or all night, To help me feel more focused, To help me get my work done more efficiently, To make me feel less distracted, To make me feel more sociable and outgoing, To make me have a more enjoyable time, To make people feel more energetic, To make me feel

happier and more content, To make me feel less hunger, To help me lose weight, or To be able to party longer."

Side effects of PS use were assessed by asking, "Indicate if you have had any of these problems as a result of taking stimulants: Difficulty falling asleep, Difficulty staying asleep, Poor sleep quality, Headaches, Heart palpitations, Fidgety feeling, Feeling too focused on something, Feeling anxious, Feeling jittery and shaky, Not feeling hungry, and Feeling like I need to crash after taking them."

Data Analysis

Descriptive statistics were conducted to characterize the sample. We then conducted bivariate analyses examining differences between PS users versus non-users and between users who had a diagnosis of ADD or prescription for their stimulant versus those who did not. We then conducted multivariable logistic regression comparing these two groups (i.e., users who had a diagnosis of ADD or prescription for their stimulant versus those who did not), first entering only sociodemographic factors and then including psychosocial factors and substance use. We then characterized types of PS used, modes of use, access, reasons for use, and adverse side effects of use among users and examined differences in regard to these factors between users who had a diagnosis of ADD or prescription for their stimulant versus those who did not. All analyses are based on SPSS 24.0.

RESULTS

Participant Characteristics

Of the 2,927 participants, 7.0% (n=205) reported a diagnosis of ADD, and 7.5% (n=219) reported use of PS in the past 4 months. Among PS users, 54.3% (n=119) reported they were

either diagnosed with ADD (43.8%, n=96) and/or prescribed PS (51.6%, n=113). **Table 1** displays additional characteristics of participants in the sample.

Table 1 also displays bivariate analyses examining correlates PS use. Correlates of PS use (versus no use) included being male (p=.002), being a sexual minority (p=.040), higher parental education (p=.011), being in a rural environment (p=.001), having a higher GPA (p=.033), having higher ACEs score (p=.001), having higher depressive symptoms (p<.001), having higher ADD symptoms (p<.001), being diagnosed with depression (p<.001), being diagnosed with anxiety (p<.001), alcohol use in the past 30 days (p<.001), marijuana use in the past 30 days (p<.001), and tobacco use in the past 30 days (p<.001). There were significant differences in race (p<.001) and school type (p<.001) in relation to no PS use versus use.

PS Use Characteristics

Average age at first PS uses among PS users was 15.8 (SD=5.5). The most often used stimulant was mixed amphetamine salts (Adderall) (42.9%), followed by lisdextroamphetamine (Vyvanse) (27.4%) and methylphenidate (Ritalin, Concerta, Metadate) (13.2%). Most common modes of consuming stimulants were oral consumption (91.8%) and snorting (12.3%). In terms of the methods in which stimulants are obtained, 44.3% reported being prescribed the stimulant, 30.1% were given the stimulant, and 17.8% bought the stimulant from someone. When asked if they had ever been approached for stimulants, 35.6% of respondents said yes, 19.6% of respondents reporting sharing stimulants for free, and 9.1% reported sharing their stimulants for money.

The top five reasons for stimulant use (**Figure 1**) were to be more productive with schoolwork (61.6%), to concentrate better (64.4%), to feel more focused (61.6%), to get work done more efficiently (54.8%), and to feel less distracted (53.0%). In terms of adverse

experiences related to PS use (**Figure 2**), users of PS faced problems such as difficulty falling asleep (54.3%), not feeling hungry (52.1%), feeling fidgety (30.6%), feeling anxious (30.9%), or feeling jittery and shaky (30.9%).

Correlates of PS Use Without an ADD Diagnosis or Prescription

Among the 219 users of PS, correlates of using PS without being diagnosed with ADD or without being prescribed PS included being male (p=.020), being diagnosed with depression (p<.001), being diagnosed with anxiety (p=.001), alcohol use in the past 30 days (p=.003), marijuana use in the past 30 days (p<.001), and tobacco use in the past 30 days (p<.001).

In the multivariable model (**Table 2**) examining correlates of use of PS without an ADD diagnosis or without a prescription for the stimulant, significant correlates included: parental education less than a bachelor's degree (p=.008), attending a private school compared to attending a technical college (p=.032), not being diagnosed with depression (p=.014), not being diagnosed with anxiety (p=.033), marijuana use in the past 30 days (p=.008), and tobacco use in the past 30 days (p=.015).

In regard to use characteristics, motives for use, and adverse effects of use, few differences were identified between users who had a diagnosis of ADD or prescription for their stimulant versus those who did not. Compared to those with an ADD diagnosis or prescription, those not diagnosed or not prescribed their PS were older at the time of first using PS (15.07, SD=5.40 vs. M=16.75, SD=5.59, p=.025) and were more likely to indicate that they snorted their PS (5.9% vs. 20.0%, p=.001). Those not diagnosed with ADD or not prescribed their PS were more likely than those with a diagnosis or prescription to indicate reasons for use including "to stay awake" (46.0% vs. 15.1%, p<.001), "to have a more enjoyable time" (15.0% vs. 4.2%, p=.005), and "to party longer" (13.0% vs. 2.5%, p=.003). They were also less likely to report the

following adverse effects: difficulty falling asleep (46.0% vs. 61.3%, p=.016), headaches (19.0% vs. 30.3%, p=.039), feeling fidgety (24.0% vs. 36.1%, p=.036), feeling anxious (21.0% vs. 37.8%, p=.005), and not feeling hungry (43.0% vs. 59.7%, p=.010).

DISCUSSION

This study used Socioecologic Model (SEM) and Social Cognitive Theory (SCT) to characterize PS use among students from diverse institutions in Georgia. Similar to the literature, Adderall was used most commonly used; however, the second most utilized PS in the sample was Vyvanse, which differs from other research (Schulenberg et al., 2018; Teter et al., 2006).

In terms of motives for use, the most commonly reported reasons for taking stimaulants included to help concentrate better, to be more prodctive with school work, to help feel more focused, and to help get work done more efficiently, all of which have previously documented in the literature (Arria et al., 2013; McCabe et al., 2005; Rabiner et al., 2009; Teter et al., 2006). Those who had a prescription versus those who did not differed in regard to being younger at the first time of use, being less likely to indicate they snort their medication, and reasons for use such as to stay awake, have more enjoyable time, or to party longer.

Regarding side effects of PS, students commonly reported difficulty falling asleep, feeling fidgety, feeling anxious, heart palpitations, and not feeling hungry; these have also been documented previously (Prosek et al., 2018). Prior research indicated that approximately 7%-34% of students are prescripbed stimulants; however, in our sample, we found over 50% are prescribed stimulants over the past four months (A. D. DeSantis et al., 2008; Rozenbroek & Rothstein, 2011). Those who had a prescription versus those who did not differed in regard to difficulty falling asleep, headaches, feeling fidgety, feeling anxious, and not feeling hungry.

In terms of correlates of NMPS use among PS users, consistent with the literature, attending a private school (relative to a technical school) was a correlate of PS use (McCabe et al., 2005; Teter et al., 2006). This may be due to a higher-socioeconomic status (SES), which has been associated with higher rates of NMPS use (Arria et al., 2013; Teter, McCabe, Boyd, & Guthrie, 2003). We also found that higher parental education was associated with decreased likelihood of using PS without a prescription. Teter et al. (2003) found that individuals that came from families with a family income greater than $100,000 US dollars (USD) are more than two times more likely to illicity use stimilants, compared to those with family incomes less than $99,999 USD. PS use without a prescription or diagnosis was also associated with not being diagnosed with depression and not being diagnosed with anxiety. PS may be used to elevate mood, reduce suicidal ideations, or to treat symptoms of anxiety; it is also noteworthey that PS have also been used, in some cases, to treat depression which is resistant to traditional anti-depressant drug therapy (Caplan, Epstein, Quinn, Stevens, & Stern, 2007). Collectively, these findings may all indicated that higher socioeconomic status, parental education and perhaps knowledge of mental health risks, and overall access to healthcare may be critical factors related to PS use without a prescription or a diagnosis of ADD.

In addition to psychosocial factors, tobacco and marijuana use in the past 30 days were correlated with NMPS use. This aligns with literature stating that not only is tobacco and marijuana use higher among those diagnosed with ADD, but also among those who choose to self-medicate or use PS non-medically (Arria et al., 2008; McCabe et al., 2005; Upadhyaya et al., 2005; Weyandt & DuPaul, 2006; Whalen, Jamner, Henker, Delfino, & Lozano, 2002).

Strengths and Limitations

Limitations include limited generalizability given the sample was drawn from colleges/ universities in Georgia, as well as the cross-sectional nature of the data. However, it is important to note that the sample was drawn form diverse schools, including private, public, technical, and historically black colleges and universities in both rural and urban settings. Second, the measures included important measures related to tobacco use, though they were not intended for use in understanding prescription stimulant use, which may limit the generalizability of the data.

Implications for Research and Practice

The current findings have implications for research and practice. Our study highlights correlates of PS use among students attending different types of institutions, including those that have not been extensively studied such as technical colleges. Additional reasearch is needed to further understand PS use of individuals who are not diagnosed with ADD but are still prescribed PS. Qualitative research should also examine the experiences of college students with PS use (eg., reasons for use, access, sharing of stimulants) , particularly among students who are not diagnosed with ADD, or prescribed stimulants. In practice, supportive measures should be put into place to ensure students in need of mental health services receive them, and are appropriately diagnosed and treated. Campus-based services must educate students about the adverse affects of NMPS use, as well as provide resources for students who may be struggling academically or who may not be able to handle their courseload.

Conclusion

With the US using more prescription stimulants than any other country, the use of PS without a prescription on college campuses is concerning. This study provides data on correlates of PS use without a prescription and characteristics of PS use among a diverse sample of post-secondary students across a southeastern state. Future research should take into account the

access of prescription stimulants on campuses, as well as evaluating resources on campus that will aid in reducing academic related stress. In addition, we highlight the need for progressive policies in addressing non-medical prescription stimulant use on college and university campuses.

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APPENDIX

Table 1. Participant Characteristics and Bivariate Analyses Examining Correlates of Prescription Stimulant Use

		Use			Prescribed or Diagnosed		
	All N=2927 M (SD) or N (%)	No N=2708 M (SD) or N (%)	Yes N=219 M (SD) or N (%)	p	Yes N=119 M (SD) or N (%)	No N=100 M (SD) or N (%)	p
ADD Factors							
Diagnosed with ADD, N (%)							
No	2722 (93.0)	2599 (96.0)	123 (56.2)		--	--	
Yes	205 (7.0)	109 (4.0)	96 (43.8)		--	--	
ADD symptoms, M (SD)	9.53 (4.37)	9.34 (4.28)	11.74 (4.84)	<.001	12.79 (4.81)	10.50 (4.60)	<.001
Sociodemographics							
Age, M (SD)	20.54 (1.94)	20.52 (1.93)	20.72 (2.0)	.158	20.92 (2.067)	20.47 (1.915)	.095
Sex, N (%)				.002			.020
Male	1034 (35.3)	935 (34.5)	99 (45.2)		45 (37.8)	54 (54.0)	
Female	1893 (64.7)	1773 (65.5)	120 (54.8)		74 (62.2)	46 (46.0)	
Sexual Orientation, N (%)				.040			.409
Heterosexual	2663 (91.8)	2471 (92.1)	192 (88.1)		106 (89.9)	86 (86.0)	
Other	237 (8.2)	211 (7.9)	26 (11.9)		12 (10.1)	14 (14.0)	
Race, N (%)				<.001			.092
White	1882 (65.1)	1703 (63.7)	179 (82.1)		99 (83.9)	80 (80.0)	
Black	655 (22.7)	641 (24.0)	14 (6.4)		6 (5.1)	8 (8.0)	
Asian	184 (6.4)	177 (6.6)	7 (3.2)		1 (0.8)	6 (6.0)	
Other	170 (5.9)	152 (5.7)	18 (8.3)		12 (10.2)	6 (6.0)	
Ethnicity, N (%)				.295			.501
Non-Hispanic	2682 (92.2)	2485 (92.3)	197 (90.4)		106 (89.1)	91 (91.9)	
Hispanic	228 (7.8)	207 (7.7)	21 (9.6)		13 (10.9)	8 (8.1)	
Parental Education, N (%)				.011			.167
< Bachelors	1368 (47.3)	1283 (48.0)	85 (39.0)		41 (34.7)	44 (44.0)	
≥ Bachelors	1522 (52.7)	1389 (52.0)	133 (61.0)		77 (65.2)	56 (56.0)	
School Type, N (%)				<.001			.167
Private	1217 (41.6)	1105 (40.8)	112 (51.1)		55 (46.2)	57 (57.0)	
Public	817 (27.9)	752 (27.8)	65 (29.7)		33 (27.7)	32 (32.0)	
Technical college	572 (19.5)	532 (19.6)	40 (18.3)		30 (25.2)	10 (10.0)	
HBCU	321 (11.0)	319 (11.8)	2 (0.9)		1 (0.8)	1 (1.0)	
Rural/urban, N (%)				.001			1.00
Rural	1378 (47.1)	1250 (46.2)	128 (58.4)		70(58.8)	58 (58.0)	
Urban	1549 (52.9)	1458 (53.8)	91 (41.6)		49 (41.2)	42 (42.0)	
Psychosocial Factors							
GPA, M (SD)	2.37 (1.02)	2.35 (1.01)	2.52 (1.06)	.033	1.02 (.10)	2.46 (.12)	.463
ACEs, M (SD)	1.3 (1.94)	1.26 (1.77)	1.71 (2.09)	.001	1.84 (.17)	2.36 (.24)	.524
Depressive symptoms, M (SD)	14.5 (5.26)	14.30 (5.12)	16.86 (6.35)	<.001	6.57 (.60)	6.10 (.61)	.467
Diagnosed with depression, N (%)				<.001			<.001
No	2595 (88.7)	2444 (90.3)	151 (68.9)		68 (57.1)	83 (83.0)	
Yes	332 (11.3)	264 (9.7)	68 (31.1)		51 (42.9)	17 (17.0)	
Diagnosed with anxiety, N (%)				<.001			.001
No	2606 (89.0)	2446 (90.3)	160 (73.1)		76 (63.9)	84 (84.0)	
Yes	321 (11.0)	262 (9.7)	59 (26.9)		43 (36.1)	16 (16.0)	
Substance Use, Past 30 Day							
Alcohol, N (%)				<.001			.003
No	1096 (37.4)	1066 (39.4)	30 (13.7)		24 (20.2)	6 (6.0)	

Yes	1831 (62.6)	1642 (60.6)	189 (86.3)		95 (79.8)	94 (94.0)	
Marijuana, N (%)				<.001			<.001
No	2462 (86.2)	2343 (88.5)	119 (56.7)		85 (73.3)	34 (36.2)	
Yes	395 (13.8)	304 (11.5)	91 (43.3)		31 (26.7)	60 (63.8)	
Tobacco, N (%)				<.001			<.001
No	2265 (77.4)	2159 (79.7)	106 (48.4)		74 (62.2)	32 (32.0)	
Yes	662 (22.6)	549 (20.3)	113 (51.6)		45 (37.8)	68 (68.0)	

Table 2. Multivariable Regression Analyses Examining Correlates of Prescription Stimulant Use Without a Prescription or Diagnosis

	OR	CI	p
Sociodemographics			
Age	0.93	0.77-1.12	.412
Sex			
Male	Reference	--	--
Female	0.81	0.37-1.77	.593
Sexual Orientation			
Heterosexual	Reference	--	--
Other	1.81	0.64-5.14	.266
Race			
White	Reference	--	--
Other	0.73	0.29-1.84	.501
Ethnicity			
Non-Hispanic	Reference	--	--
Hispanic	0.40	0.12-1.37	.143
Parental Education			
< Bachelors	Reference	--	--
≥ Bachelors	0.34	0.16-0.76	.008
School Type			
Private	Reference	--	--
Public	1.06	0.49-2.27	.886
Technical college	0.28	0.09-0.90	.032
Rural/urban			
Rural	Reference	--	--
Urban	1.06	0.49-2.27	.886
Other Diagnoses	--	--	--
Depression	0.35	0.15-0.81	.014
Anxiety	0.37	0.15-0.92	.033
Substance Use, Past 30 Day			
Alcohol	2.53	0.79-8.09	.118
Marijuana	2.83	1.31-6.13	.008
Tobacco	2.59	1.20-5.59	.015
Nagelkerke R-Square		.394	

Figure 1. Reasons for Taking Stimulants, N=219

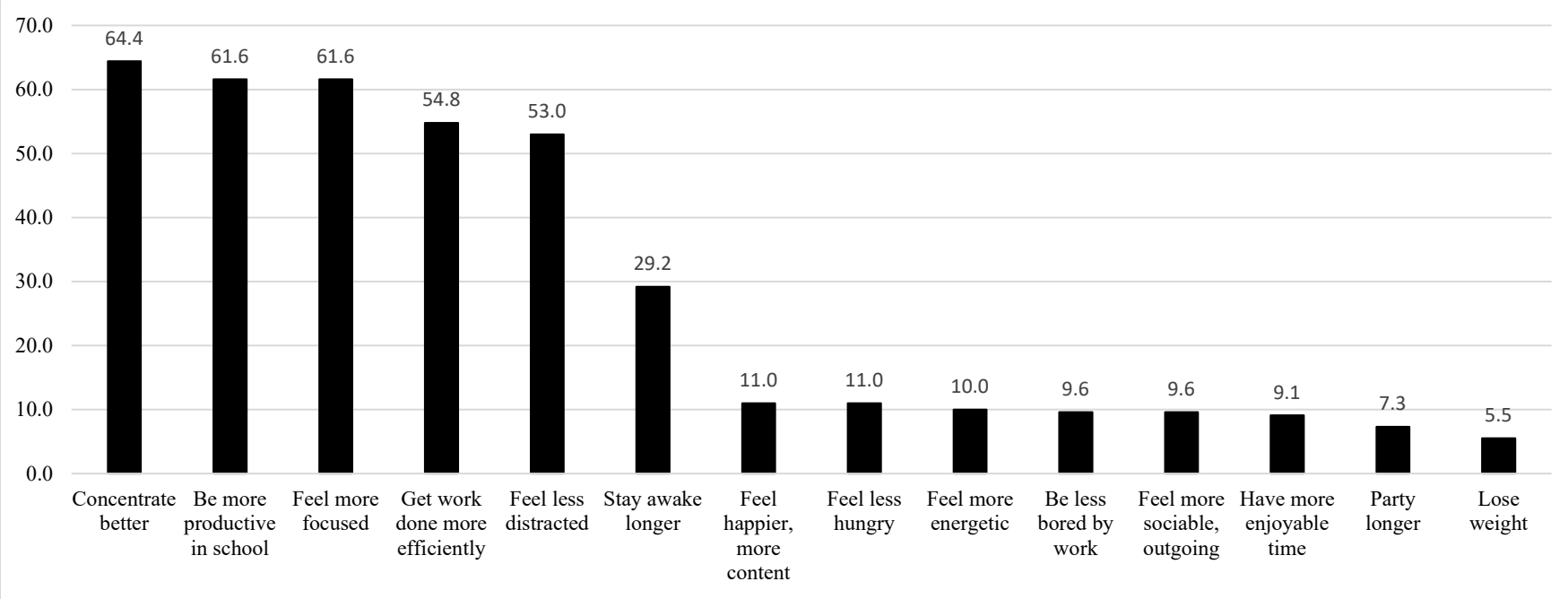

Figure 2. Problems Associated with Taking Stimulants, N=219