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PRESCRIPTION STIMULANT MISUSE: THE RELATIONSHIP BETWEEN EXECUTIVE FUNCTIONING AND ACADEMIC OUTCOMES

BY

BAILEY MUNRO

A DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF

DOCTOR OF PHILOSOPHY

IN

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DOCTOR OF PHILOSOPY DISSERTATION

OF

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ABSTRACT

Prescription stimulant misuse is a growing problem among college students. Students found to be at greatest risk for misusing prescription stimulants are those who are male, Caucasian, members of a fraternity or sorority, and who have a lower grade point average (GPA). The primary reason reported for stimulant misuse among college students is academic enhancement. Preliminary findings investigating executive functioning (EF) in college students has revealed that individuals with deficits in EF are more likely to have educational difficulties and take part in risky behavior, and that executive functions are substantially improved in students with attention-deficit/hyperactivity disorder and EF deficits when taking prescription stimulants. It is possible that students who have greater difficulty with planning, organization, self-motivation, and interference control (i.e., EF deficits) are misusing prescription stimulants to help them overcome these deficits to succeed academically. Therefore, the purpose of the present study was to examine the relationship between prescription stimulant misuse, EF, and academic outcomes among a sample of college students. Results revealed 18.8% of the sample reported misusing prescription stimulants. In addition, participants with clinically significant EF deficits reported significantly higher rates of misuse, compared to those without deficits in EF. Prescription stimulant misuse, however, did not moderate the relationship between EF and GPA. The present findings have implications for identifying sub-populations of college students who may be at risk for misusing prescription stimulants and to improve prevention and intervention strategies aimed at reducing misuse. Limitations and suggestions for future research are discussed.

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PREFACE

This dissertation is in Manuscript Format.

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Prescription Stimulant Misuse: The Relationship between Executive Functioning and Academic Outcomes

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INTRODUCTION

Prescription stimulant misuse, defined by Weyandt et al. (2014) "as the use of stimulant medication in the absence of a valid prescription and use of prescription stimulants other than as prescribed" (p.225), is a growing problem among college students. Research suggests that 5.3% (Dupont et al., 2008; Poulin 2001) to 43% (Benson et al., 2015; DeSantis, Webb & Noar, 2008; Weyandt et al., 2013a; 2014) of college students have misused prescription stimulant medication in their lifetime. Students found to be at greatest risk for misusing are those who are male, Caucasian, members of a fraternity or sorority and who have a lower grade point average (GPA; DuPaul et al. 2009; Dussault & Weyandt, 2013; Rabiner et al., 2009). Although those with a lower than average GPA have been found to be at a heightened risk for misuse, the academic consequences of misusing are largely unknown. Furthermore, research also suggests deficits of executive functioning (EF) are associated with lower academic achievement (Biederman et al., 2006) and increased likelihood of engaging in risky behaviors (Pharo et al., 2011). It seems possible, therefore, that some students who struggle academically may have problems with EF and are using prescription stimulants to overcome EF deficits to succeed academically.

ADHD and Prescription Stimulant Use among Students

Stimulants such as Adderall and Ritalin are frequently prescribed for the treatment of attention-deficit/hyperactivity disorder (ADHD), a disorder characterized by clinically significant difficulties with inattention, impulsivity and/or hyperactivity. ADHD is estimated to affect 3 - 7% of the school-aged population and 2.5 - 4.4% of the adult population (American Psychiatric Association, 2013; Kessler et al., 2006).

This chronic and pervasive disorder, contrary to popular belief, is not outgrown by adulthood and typically persists across the lifespan (Wilens, Farone, & Biederman, 2004). Interestingly, it is estimated that approximately 2% to 5% of college students report clinically significant levels of ADHD symptomatology (DuPaul et al., 2001; Janusis & Weyandt, 2010; Pryor et al. 2010; Weyandt et al., 2013b) and recent estimates suggest that 5.9% of incoming college freshman have been diagnosed with ADHD (Eagan et al., 2014). Research has repeatedly found that college students with ADHD have poorer academic functioning compared to their non-diagnosed peers. Heiligenstein et al. (1999) found that college students with ADHD had a significantly lower mean GPA, were more likely to be on academic probation, and reported significantly more academic problems compared to a non-ADHD. A recent study conducted by Weyandt et al. (2013b) found that college students with ADHD reported significantly lower grades on course assignments than non-ADHD control participants. Research has also found that college students with ADHD had significantly lower high school and college GPA, ACT scores, and withdrew from significantly more classes than did non-ADHD students (Advokat, Lane, & Luo, 2011) and were less likely to graduate from college (Murphy, Barkley, & Bush, 2002).

For individuals who have ADHD, a plethora of research supports that stimulant medications can be an effective treatment (eg. Kolar et al., 2008; Weyandt, 2006). In 2011, nearly 14 million monthly prescriptions for ADHD were written for Americans ages 20-39 - two and a half times the amount written only four years earlier (Schwarz, 2013). Corresponding with the growing number of prescriptions written for stimulant medications, however, is a growing problem of misuse of these medications,

i.e., using stimulant medication without a valid prescription or other than as prescribed. Specifically, studies have found between 2.3% to 4.1% lifetime prevalence for prescription stimulant misuse among high school students (Boyd, McCabe, Cranford, & Young, 2006; McCabe, Teter, & Boyd, 2004) and between 5.3% (Dupont et al., 2008; Poulin 2001) to 43% (Benson et al., 2015; DeSantis et al., 2008; Weyandt et al., 2013a) of college students have reported misusing prescription stimulants during their lifetime.

Prevalence, Risk Factors and Motivations of Prescription Stimulant Misuse

Numerous studies have documented that prescription stimulant misuse is a growing problem among college students and that these medications are easily accessible on college campuses. Studies consistently indicate that students commonly obtain stimulants from peers and friends (DeSantis et al., 2008; Garnier et al., 2010; McCabe et al., 2006; McNiel et al., 2011; Weyandt et al., 2013a). The first study to assess prescription stimulant misuse was conducted in 2000 by Babcock and Byrne, which reported that 16.4% of college students at a northeastern university endorsed taking methylphenidate (MPH) for nonmedical purposes. More recent studies exploring the misuse of prescription stimulants have reported prevalence rates among college students that range from 5.3% to 43% (Benson et al., 2015; DeSantis et al., 2008; Dupont et al., 2008; Weyandt et al., 2013a). For example, Garnier et al. (2010) examined the prevalence of prescription medication diversion (defined as sharing, selling, or trading to others who do not have a prescription) among college students and found the most commonly diverted medication were prescription ADHD medications (61.7% diversion rate). Similarly, Gallucci et al. (2015) found 58.9% of

college students with a current prescription had diverted their stimulant medication during their lifetime and 32.4% had done so during the previous 30 days. Research has found a higher rate of stimulant misuse associated with college students who are Caucasian, male, members of sororities or fraternities and who have a lower GPA (DuPaul et al., 2009; Dussault & Weyandt, 2013; Rabiner et al., 2009). A number of psychological risk factors have been associated with prescription stimulant misuse, including symptoms of inattention (Arria et al., 2011; Rabiner et al., 2009), anxiety, stress, internal impulsivity, and internal restlessness (Dussault & Weyandt, 2013). Indeed, a recent meta-analysis found ADHD symptoms were significantly associated with prescription stimulant misuse (Benson et al., 2015). Further, Van Eck and colleagues (2012), found disinhibition and conduct problem symptoms moderated the association between ADHD symptoms and misuse of prescription stimulants among college students. Researchers have also reported higher rates of prescription stimulant misuse among students who engaged in substance use and other risky behaviors such as drinking and driving (McCabe et al., 2005). The identification of predictors, such as the academic and psychosocial functioning of students, is particularly important for prevention and intervention strategies.

Although the misuse of prescription stimulants among college students is well documented, the age at which individuals first start misusing prescription stimulants is unclear and in fact, students may begin misusing prescription stimulants prior to college. For example, White et al. (2006) conducted a study among college students, and found 49% of students reported first misusing prescription stimulants in high school and 51% reported first misusing in college. Furthermore, the study found a

significant trend of misuse of prescription stimulants by students who attended a private high school than by those who had attended a public high school. In a separate study, Kroutil et al. (2006) found that individuals between ages 12 and 25 reported the highest levels of prescription stimulant misuse in a sample of adolescents and adults. A study conducted among medical students found students reported their first use of prescription stimulants was in college (57%), followed by medical school (22%) and then high school (12%; Emanuel et al., 2013). However, an important question that remains unaddressed is whether the age of onset of prescription stimulant misuse is related to a student's academic outcomes (i.e., do students who begin misusing prescription stimulants at a younger age have different academic outcomes compared to students who begin misusing at older ages or not at all?). The present study attempted to address this question.

Similarly, questions remain regarding the potential relationship between frequency of misuse and academic outcomes. Preliminary studies suggest that a wide range of frequency of prescription stimulant misuse exists; however, whether frequency of misuse is related to academic outcomes has been unexplored. Regarding frequency, White et al. (2006) found that 15.5% of college students who reported misusing prescription stimulants did so 2 to 3 times per week, approximately half of students (50.6%) did so 2 to 3 times per year and 33.9% of students did so 1 to 2 times per month. A separate study also conducted among college students, found that 44.0% of students who had misused prescription stimulants had only done so once or twice in their lives, and the majority (85.3%) had used fewer than 12 times (Arria et al., 2008b).

Recently, a meta-analysis conducted by Benson and colleagues (2015) found that of 15 studies that asked about motives for misuse, all of them reported that the most commonly endorsed reasons were for academics. Similarly, a recent systematic review by Weyandt et al. (2013a) found that 15 of 18 relevant studies identified the primary motivation of college students misuse was for academic/cognitive reasons. For example, Bossaer et al. (2013) found the top reason for prescription stimulant misuse was to enhance alertness/energy (65.9%), followed by to improve academic performance (56.7%) among students at an academic health sciences center. Furthermore, Weyandt et al. (2009) found the highest reported reasons for stimulant misuse among a sample of college students was to perform better on schoolwork, perform better on tests and focus better in class. Judson and Langdon (2009) also identified the primary motivations for misuse were to improve concentration and to increase alertness and further suggested that academic performance pressures significantly influence illicit use of prescription stimulants. In summary, research investigating prescription stimulant misuse indicates significant numbers of college students are misusing prescription stimulants for academic/cognitive enhancement; yet, there is a lack of information regarding frequency of misuse and academic outcomes.

Prescription Stimulant Misuse and Academic Performance

Although academic enhancement has consistently been reported as the primary motive for students to engage in misuse of prescription stimulants, studies have found misuse to be negatively associated with academic performance (Advokat et al., 2008; McCabe et al., 2005; Weyandt et al., 2009). For example, Arria et al. (2008)

conducted a study among first-year college students and found that those who engaged in misuse of prescription stimulants had poorer study skills (e.g., skipped classes more often, spent less time studying, and more time socializing) and poorer academic performance (e.g., lower GPAs in high school and college) compared to those who had never misused. Furthermore, results indicated past-year misuse of prescription stimulants predicted lower GPA by the end of the first year of college, which was mediated by skipping class (Arria et al., 2008). Procrastination and difficulty with time management have also been shown to relate to stimulant misuse among college students (Moore et al., 2014).

In addition to students with low GPAs being among those at the highest risk for misuse, research suggests that high-achieving students may also be attracted to and engage in misuse of prescription stimulants due to the perceived effectiveness in increasing alertness and academic productivity. Support for this is provided by studies that have found the prevalence rates of prescription stimulant misuse were higher at colleges with more restrictive admissions (McCabe et al., 2005). Specifically, McCabe et al. (2005) examined the prevalence rates of prescription stimulant misuse among students from 119 nationally represented 4-year colleges in the United States and found the aggregate past year prevalence rates of misuse at individual colleges ranged from 0% to 25%, with 12 schools having a prevalence of 10% or higher. More than 80% of those schools with a prevalence of 10% or higher had highly competitive admissions standards. Medical students have also been suggested to be at high risk for misusing prescription stimulants. Tuttle et al. (2010) found 10% of medical students reported using stimulants to improve academic performance. Similarly, the misuse of

prescription stimulants appears to be high among student pharmacists (6.7%; Lord et al., 2003) and dental and dental hygiene students (12.4%; McNiel et al., 2011).

Collectively, research indicates significant numbers of students are misusing prescription stimulants to enhance their academic performance. Students who perceive themselves as struggling academically (i.e. receiving low grades, having difficulty attending class and studying) appear to be particularly vulnerable to misuse. Indeed, researchers have suggested "students may turn toward ADHD medication in an effort to treat their attention difficulties" (Rabiner et al., 2008, p. 10). Given the fact that EF skills are necessary for time management, organization, problem solving and motivation, all of which are critical abilities for college students to succeed academically, it is plausible that students experiencing deficits in EF are using prescription stimulants in an effort to self-treat their difficulties. Furthermore, research has found that individuals with EF deficits often tend to engage in more risky behavior (such as misusing drugs) compared to those without EF deficits (Pharo et al., 2011). Although multiple risk factors for misusing prescription stimulants have been identified, the possible contribution of EF deficits and academic outcomes has not been investigated.

Executive Functioning among College Students

Executive functioning (EF) has been defined as "higher-order cognitive abilities that allow for strategic planning, cognitive flexibility, self-regulation and goal-directed behavior" (Weyandt, 2005, p. 1). EF includes abilities such as components of attention, reasoning, planning, inhibition, set-shifting, interference control and working memory (Pennington & Orzonoff, 1996; Weyandt & Willis,

1994) and are considered critically important for complex human behavior (Biederman et al., 2011). Although researchers have found significantly more adults with ADHD, compared to non-ADHD participants, suffer from EF deficits, it is important to note that EF deficits are not unique to ADHD (Weyandt, 2009; Weyandt et al., 2014). For example, individuals with bipolar disorder have been found to perform poorly on EF tasks (Dickstein et al., 2004) as well as individuals with schizophrenia (Hedge et al., 2013). Irrespective of clinical status, however, deficits of EF are associated with lower academic achievement (Biederman et al., 2006). For example, Biederman et al. (2006) examined the association between deficits in EF and functional outcomes among young adults with ADHD and a comparison non-ADHD group and found deficits of EF were associated with lower academic achievement, independent of an ADHD diagnosis. The authors suggested "that deficits of executive functioning alone cause impairment in educational outcomes, and this is compounded by the impairment caused by ADHD" (p. 1736). Similarly, a study conducted by Dvorsky and Langberg (2014) found student-rated EF organizational skills and motivation longitudinally predicted the overall academic impairment of college students with ADHD. Given the demands college students often face, both academically and socially, key aspects of EF such as planning, organization and inhibition are crucial for their daily life.

In addition, individuals with EF deficits often also have deficits in response inhibition, act impulsively, and fail to consider the consequences of their actions. Thus, they tend to engage in more risky behavior (such as misusing drugs) compared to those without EF deficits (Pharo et al., 2011). Indeed, Janusis and Weyandt (2010)

found that college students with higher rates of sensation seeking were more likely to misuse prescription stimulants. Furthermore, a recent study by Langberg et al. (2015) found that EF deficits in self-motivation mediated the relationship between ADHD symptoms and negative consequences of alcohol use among a sample of college students. Given the impaired abilities of students suffering from EF deficits, it follows that they may be at a heightened risk to engage in prescription stimulant misuse in college. Clearly, further research is needed to evaluate a possible role that EF plays in prescription stimulant misuse and academic outcomes. Specifically, if students with EF deficits are found to be more at risk to misuse, efforts could be made to identify those students and provide them with appropriate support and education.

Prescription Stimulants and Executive Function

Recent studies suggest that prescription stimulants are effective in not only reducing ADHD symptoms but may improve executive function in individuals diagnosed with ADHD. For example, the prescription stimulants methylphenidate and amphetamine/D-amphetamine have been associated with improved EF performance in children with ADHD and EF impairments (Kempton et al., 1999). Specifically, Kempton et al. (1999) used computerized neuropsychological tests to assess EF in 30 children with ADHD (15 stimulant-naive and 15 stimulant-medicated) and 15 controls. Results indicated that the stimulant-naive ADHD children were impaired on tasks of EF, including planning ability, movement time, attentional set shifting and spatial working memory. In comparison, the group of medicated children with ADHD showed no impairment on any EF tasks except for deficits in spatial recognition memory. More recently, the first double-blind, placebo-controlled, crossover study

conducted with college students with ADHD found the stimulant medication, lisdexamfetamine dimesylate (LDX) was associated with significant improvement in both EF and ADHD symptoms (DuPaul et al., 2012). The study examined the effects of LDX in 24 students with ADHD compared to 26 students without the disorder who did not take LDX. Results from the study revealed LDX was associated with statistically significant main effects for specific aspects of EF related to task management, planning, organization, study skills and working memory compared to nonmedication baseline and placebo. In individuals with ADHD taking LDX, results revealed clinically significant reductions in ADHD symptoms, substantial improvements in EF, and positive effects of psychosocial functioning. Despite the large effect sizes and robust findings in the area of EF, what remains unknown is whether prescription stimulants improve EF of individuals, and in particular college students without ADHD. Weyandt et al. (2013a) and others have recommended that research explore whether prescription stimulants are truly neurocognitive enhancers. A recent study by Ilieva et al. (2013), found Adderall to have no more than small effects on cognition in a study of 46 healthy young adults, yet users believed the drug enhanced their performance.

Currently, the findings are mixed with regard to the effectiveness of prescription stimulants as neurocognitive enhancers. A recent meta-analysis (Marraccini, 2015) found that ADHD medication may act as a neuorocognitive enhancer, but only for specific domains of cognition. A review regarding the use of prescription stimulants for cognitive enhancement by Smith and Farah (2011) reported effects of prescription stimulants on executive functions of working memory and

cognitive control were mixed but have been found for some individuals on some tasks. Furthermore, the authors concluded prescription stimulants might have positive effects on learning for healthy adults. Similarly, a review by Advokat (2010) concerning cognitive effects of amphetamine and MPH in ADHD and non-ADHD individuals had mixed findings. Studies of adults without ADHD suggest prescription stimulants do not promote acquisition of new information or facilitate cognitive plasticity but they might improve retention of previously acquired information and facilitate memory consolidation (Advokat, 2010). It is not clear, however, if improvement occurs only for those having a baseline deficit in EF. A recent study found that MPH did not have an overall enhancing effect on attention in healthy adults but suggested that perhaps MPH enhances specific cognitive processes that were not assessed in their study (Ter Huurne et al., 2015). Recently, Weyandt and colleagues (2014) conducted a systematic review of the literature and found pro-stimulants were associated with improvement in EF tasks and some domains of cognition for adults including college students. Although science has not fully addressed the issue of whether stimulants are neurocognitive enhancers for those without ADHD, it is clear that college students without ADHD are misusing prescription stimulants for academic purposes and that the rates of misuse are continuing to rise (Benson et al., 2015; Rabiner, 2013; Smith & Farah, 2011; Weyandt et al., 2013a).

Purpose of the Study

Previous research has found that a significant number of college students in the USA and abroad are misusing prescription stimulant medication (Benson et al., 2015; Jensen, Forlini, Partridge, & Hall, 2016). Students who are at greater risk for misusing

prescription stimulants include those who are white, have low GPAs, and are members of fraternities and sororities (Dussault & Weyandt, 2013; Rabiner et al., 2009). The primary reason reported for stimulant misuse among college students is academic enhancement i.e., to perform better on schoolwork, perform better on tests and focus better in class (DeSantis et al., 2008; Dussault & Weyandt, 2013; Graff Low & Gendaszek, 2002; Judson & Langdon, 2009; Lookatch et al., 2012; Rabiner et al., 2009; Weyandt et al., 2009). It is possible that students who have greater difficulty with planning, organization, self-motivation, and interference control (i.e., EF deficits) are misusing prescription stimulants to help them overcome these deficits to succeed academically. Preliminary findings investigating EF in college students has revealed that individuals with deficits in EF are more likely to have educational difficulties and take part in risky behavior, and that executive functions are substantially improved in students with ADHD when taking prescription stimulants (Dupaul et al., 2012; Kempton et al., 1999). To date, however, no study has investigated the relationship between prescription stimulant misuse, EF, and educational outcomes among college students. Results from such a study would be useful in designing prevention and intervention programs. Therefore, the purpose of the present study was to examine the relationship between prescription stimulant misuse, EF and academic outcomes in a large sample of college students from five regions of the United States.

Specifically, it was hypothesized that:

1) Students who self reported EF deficits would be more likely to report misusing prescription stimulants than students who self reported normal EF skills (i.e., no EF deficits as measured by the total score on the Barkley Deficits in Executive Functioning Scale).

2) Students who reported below or above average academic outcomes would be more likely to report misusing prescription stimulants than students who reported average academic outcomes (average referring to C GPA; 2.0 on a 4.0 scale).

3) Prescription stimulant misuse would moderate the relationship between EF and academic performance. Specifically, prescription stimulant misuse was expected to alter the strength and/or direction of the relationship between EF and academic performance.

A secondary purpose of this study was to explore the onset of prescription stimulant misuse, frequency of misuse, and academic outcomes. It was predicted that the earlier the onset (pre-college) and the greater the frequency of prescription stimulant misuse, the more likely students would report lower academic outcomes i.e., it was hypothesized that there would be a negative correlation between years of prescription stimulant misuse and frequency, and academic performance.

METHODS

Procedures

The current study was approved by University of Rhode Island Institutional Review Board (IRB). University staff and faculty from six public universities located in regions of the United States: Northeast, Southeast, Central-Midwest, Northwest and Southwest were contacted via email with a description of the proposed study and a request to help with recruitment of participants. Schools from various regions were included in order to obtain a diverse, geographically representative sample of participants. Reported demographics of each university from the 2015-2016 Common Data Set (CDS) is included in Appendix F. Faculty and staff were asked to distribute the email containing the link to students who may be eligible and willing to participate. To further facilitate participant recruitment, the same information was posted on public university Facebook webpages. Interested participants were instructed to enter a secure and encrypted site and instructed to confirm they had read and understood the content by checking a statement of endorsement. The consent form (Appendix A) contained the researchers' contact information should participants have had questions or concerns and listed the requirements and responsibilities of participating in the study, including a description of the research project, as well as any potential for harm, confidentiality and benefits of participating. Participants were made aware that the survey was completely voluntary and anonymous and that they had the opportunity to discontinue participation in the study at any time. Participants who provided consent were presented with electronic versions of three measures, each of which is described in detail below: a demographic survey designed by researcher,

Stimulant Survey Questionnaire (*SSQ*; Weyandt et al., 2009) and Barkley Deficits in Executive Functioning Scale for Adults (*BDEFs for Adults;* Barkley, 2011). After completing all measures, students were debriefed and provided with information regarding how to contact the researcher directly if desired.

Participants

A total of 314 individuals completed the survey between November 2015 and March 2016. The present sample included N = 308 undergraduate participants from six public US universities. The remaining six participants reported being of graduate student status (n = 5), or reported attending a university not included in the study (n = 1). Sample size was calculated a priori based on the primary aim of the study. A power analysis using G Power 3.1 (Faul, Erdfelder, Lang, & Buchner, 2007) indicated a sample size of at least 128 is estimated to achieve 80% power to detect a medium effect size and assuming an alpha of .05. Thus, the sample size of the present study is sufficient.

The mean age of participants was 20.77 years (SD = 3.59; range 18-57 years). A little over half of the participants were enrolled at a university in the Northeastern United States (52.6%), 19.2% were enrolled at a university in the Central-Midwest, 18.2% were enrolled in a university in the Southwest, 5.8% were enrolled in a university in the Northwest, and 4.2% were enrolled in a university in the Southeast. The majority of participants were female (73.4%), and 26.6% identified as male. A large percentage of participants identified as White (74.0%), 3.6% identified as Black or African American, 7.8% identified as Asian, 0.3% identified as American Indian or Alaska Native, 1.0% identified as Native Hawaiian or Other Pacific Island and 13.3%

selected Other. Further information concerning participant demographics can be found in Table 1.

Measures

Demographic Information

A demographics questionnaire (Appendix B) was administered, which included questions about age, gender, ethnicity, degree program and current diagnosis of ADHD. Students were asked questions related to their academic performance in college for example, "What is your cumulative GPA?" "How many hours per week on average do you spend studying?" "How many classes do you skip per week?".

Stimulant Survey Questionnaire (SSQ)

The SSQ (Weyandt et al., 2009) is a 40-item questionnaire that measures the use and misuse of prescription stimulant medications in college students (Appendix C). Items on the survey are statements with a 5-point Likert-type scale response (1= never, 2 = rarely, 3 = occasionally, 4 = frequently, 5 = always) in the first section, and a yes-or-no response in the second section. The total score ranges from 40 to 170, with a higher score indicating more prescription stimulant medication use and misuse. Several additional questions were added to the SSQ to further investigate patterns of use related to onset and frequency of misuse (Appendix D). The SSQ has been found to have adequate internal consistency with a Cronbach's alpha coefficient of .85. (Weyandt et al., 2009). Based on factor analysis (Weyandt et al., 2009), the SSQ consists of four factors including Self-Reported Prescription Stimulant Misuse, Perception of Prevalence of Prescription Misuse among Peers, Knowledge of Atypical

Stimulant Misuse among Peers, and Perception of Safety of Stimulants (further information regarding the factors is included in Appendix E). The Self-Reported Prescription Stimulant Misuse score was used as a continuous outcome variable. For group analyses, self-reported prescription stimulant misuse (i.e., those who endorsed having misused prescription stimulants and those who did not) was used as a binary variable.

Barkley Deficits in Executive Functioning Scale (BDEFS for Adults)

The BDEFS for Adults (Barkley, 2011) is an empirically and theoretically based instrument used to evaluate dimensions of adult EF in daily life. The 89-item rating scale is intended for adults aged 18-81 years and used to generate a Total EF Summary Score, with higher scores indicating higher EF deficiencies thus poorer EF skills. Based on factor analysis, the BDEFS consists of five factors: Self-Management of Time, Self-Organization and Problem Solving, Self-Restraint, Self-Motivation, and Self-Regulation of Emotion. Each item is rated using a four- point scale (1 = never or rarely, 2 = sometimes, 3 = often, 4 = very often). The BDEFS for Adults has demonstrated good reliability as evidenced by high internal consistency (Cronbach's alpha ranging from .91 to .95 scores across the five scales); good inter-observer agreement (.66 to .79 across scales); and high test–retest reliability over a 2–3 week interval (ranging from .62 to .90 across scales and .84 for the Total EF Summary Score). The Total EF Summary Score was used as a continuous variable in correlation and regression analyses. For group analyses, clinically significant groups of high EF deficits were examined in comparison to the dependent variables.

RESULTS

Data Analyses

Preliminary assumption testing was conducted following guidelines by Tabachnick & Fidell (2007). Data were examined with regard to assumptions of unequal sample sizes, missing data, normality, linearity, outliers, homogeneity of variance, homogeneity of regression, ratio of cases to independent variables, normality, linearity, homoscedasticity, outliers and multicollinearity. Given the group endorsing prescription stimulant misuse was much smaller than the group not endorsing prescription stimulants, the sample sizes were unequal however they were sufficiently large to ensure normality of the sampling distribution (Tabachnick & Fidell, 2007). At the individual item level data, missing data ranged from 0% to 1%. Missing data were handled using listwise deletion.

Descriptive Statistics

Overall prevalence of lifetime prescription stimulant misuse was 18.8%. There were not significant differences in misuse based on gender, $F(1, 306) = .709$, $p = .401$), 17.7% of females reported misusing and 22.0% of males reported misusing. The three most frequently reported reasons for prescription stimulant misuse were academically related (see Table 4). A substantial number of participants reported knowing students who use prescription stimulants while studying (71.4%), during finals week (70.5%) and during tests (62.7%). In terms of availability, 44.1% of participants agreed that prescription stimulants were easy to get on their campus and 32.5% neither agreed nor disagreed. With regards to psychological conditions, participants reported a diagnosis of anxiety (32.1%), depression (27.6%), eating

disorder (7.8%), specific learning disability (3.2%) and 59.4% did not report any psychological conditions.

With regard to EF deficits, based on BDEFs score, 64.6% of participants were in the normal range of EF and 35.4% of participants displayed some level of clinical significant EF deficits (see Table 3). With regard to academic outcomes, reported GPA ranged from 1.50 to 4.00, the mean equal to 3.29 (SD = 0.48). Only three participants reported a GPA below 2.0. Hours spent studying per week ranged from 0 to 60 hours (M = 14.10, SD = 10.49). Classes skipped per week ranged from 0 to 9 (M = 0.47, SD =1.05). In order to standardize classes skipped across varying class sessions in schedule, the percent of classes skipped was calculated ([number of class sessions skipped/number of class session scheduled] x 100) (Arria et al., 2008). The majority of participants reported not skipping any class sessions (72.7%).

With regard to onset, only 1% of participants reported misusing prescription stimulants in elementary school, 2.9% reported misusing prescription stimulants in middle/ junior high school, 8.4% reported misusing in high school and 20.5% reported misusing in college (see Table 6). It is interesting to note that more participants (20.5%) reported misusing specifically in college than when asked about misusing prescription stimulants ever (18.8%).

Prescription Stimulant Misuse and Executive Functioning

To test the first hypothesis, that students who reported EF deficits would report misusing prescription stimulants more than students who reported normal EF skills (i.e., no EF deficits), an independent samples t-test was conducted with the independent variable group (EF deficits or no EF deficits; dichotomous) and the

dependent variable being the Self-Reported Prescription Stimulant Misuse subscale score of the SSQ (continuous). There was heterogeneity of variances, as assessed by Levene's test of homogeneity of variances ($p < .001$), therefore Welch's *t*-test, an alternative to the standard *t*-test, was run in addition to the *t*-test to account for this violation. Results revealed statistically significant group differences according to Welch's *t*-test, $t\ (143.787) = 4.707$, $p < .001$, Cohen's $d = 0.603$. The group with clinically significant EF deficits had higher scores on the Self-reported Prescription Stimulant Misuse (M = 35.31, SD = 14.56) compared to the group with no clinical EF deficiencies (M = 28.24, SD = 7.92). This finding supports the hypothesis and indicates students with self reported executive functioning deficits (i.e., lower executive functioning skills) were more likely to report misuse of prescription stimulants.

Prescription Stimulant Misuse and Academic Functioning

To test the second hypothesis, that students who reported below or above average academic outcomes would report misusing prescription stimulants more than students who reported average academic outcomes, a logistic regression was performed using GPA, hours spent studying and classes skipped as a predictor variables. A binomial logistic regression was performed to ascertain the effects of GPA, hours spent studying and classes skipped, on the likelihood that participants misuse prescription stimulants. To test the assumption of linearity, the linearity of the continuous variables with respect to the logit of the dependent variable was assessed via the Box-Tidwell (1962) procedure. Based on this assessment, all continuous independent variables were found to be linearly related to the logit (logit is the natural

logarithm of the odds, it reflects the probability of an event occurring; Cramer & Howitt (2004) p. 94) of the dependent variable, thus indicating the assumption of linearity was not violated. Outliers were assessed by standardized residuals greater than ±2.5 standard deviations; three outliers (standard residual values of 2.606, 2.841 and 2.936) were identified and included in the analysis. The regression model was found not to be statistically significant, $\chi 2(3) = 3.165$, $p = .367$.

Executive Functioning, Academic Functioning and Prescription Stimulants

To test the third hypothesis, that prescription stimulant misuse would moderate the relationship between EF and academic outcomes, a two-way between subjects ANOVA was performed. Prescription stimulant misuse (dichotomous) and EF groups (dichotomous) served as the independent variables and GPA (continuous) served as the dependent variable. Assumptions were tested prior to analysis in regard the assumption of independence, unequal group size, normality and homogeneity of variance. Outliers were assessed by standardized residuals greater than ±3 standard deviations; three outliers (standard residual values of -3.56, -3.20 and -3.21) were identified and included. The homogeneity of variance was assessed by Levene's test of homogeneity of variance, which was significant at the .05 level [$F(3, 301) = 3.321$, $p = .019$) indicating violation of this assumption. However, given the interest in the possible interaction, no modifications were made. Results revealed, there was a significant main effect for EF Clinical group [$F(1,301) = 7.316$, $p = .007$, partial $\eta^2 = .024$] but not a statistically significant main effect for misuse on GPA [$F(1,301) = .019$, $p = .890$, partial $\eta^2 = .000$]. Furthermore, there was not a statistically significant interaction effect [$F(1,301) = .194$, $p = .660$, partial $\eta^2 = .001$], suggesting the effect of

EF skills on GPA is the same for those who did and did not misuse prescription stimulants.

Onset and Frequency of Misuse and Academics

To test the secondary hypothesis that students who reported earlier onset and greater frequency of misuse of prescription stimulants would report poorer academic outcomes, a multiple regression was performed using age of onset and frequency of misuse as predictor variables. GPA served as the dependent variable. There was independence of residuals, as assessed by a Durbin-Watson statistic of 1.774 (Durbin-Watson statistic can range from 0 to 4, a value of approximately 2 indicates that there is no correlation between residuals; Cohen et al., 2003). Multicollinearity, which occurs when two or more independent variables are highly correlated with each other, was not an issue, as assessed by variance inflation factor (VIF) values, which were all below 10 (values above 10 are typically considered problematic), and by tolerance values, which were all above .10 (values below .10 are typically considered problematic; Cohen et al., 2003). The regression model did not statistically significantly predict GPA, F (6, 298) = 1.881, p = .084, R^2 = .036. Regression coefficients and standard errors can be found in Table 9. A multiple regression was also conducted, using hours spent studying as the dependent variable. Preliminary correlations revealed small negative correlations for onset and frequency of misuse and hours spent studying, however only frequency of misuse was found to be significant (r = -.134, p = .009). This finding suggests that the more frequently prescription stimulants were misused, the less number of hours spent studying. The regression model, using onset and frequency as predictor variables and hours spent

studying as the dependent variable, was not statistically significant, F (5, 302) = 1.651, p = .146).

Interestingly, descriptive statistical analyses revealed that 7.1% of participants agreed with the statement "Using prescription stimulants daily is harmless", yet 24.7% agreed with the statement "Using prescription stimulants occasionally is harmless". Furthermore, higher percentages of misuse were reported for each class year. More specifically, only 10.0% of freshman reported misusing prescription stimulants, 14.9% of sophomore, 22.4% of juniors and 25.0% of seniors reported misusing prescription stimulants.

Additional Post Hoc Analyses

Additional post-hoc analyses were conducted to explore potential variations in prescription stimulant misuse between universities and possible variations in motivations for self-reported prescription use. Specifically, a one-way ANOVA was conducted with university geographic region as the independent variable and Self-Reported Stimulant Misuse subscale of the SSQ as the dependent variable, however results were not significant suggesting no differences across universities.

In addition, preliminary Pearson product-movement correlations were calculated to explore relationships between total and subscale scores of the SSQ and the BDEFs (see Tables 10-14). Pearson product-moment correlations revealed that self-reported stimulant use, as measured by Factor 1 subscale score on the SSQ, was significantly correlated with all BDEFs subscales and total score, the strongest correlation being with Self-Restraint (r = .513, p < .01), followed by Total EF score (r = .421, p < .01), Self-Motivation (r = .400, p < .01), Self-Regulation of Emotions (r =

.335, $p < .01$), Self-Organization/ Problem Solving (r = .321, $p < .01$), and Self-Management of Time (r= .280, $p < .01$). The SSQ Total Score was correlated with all the subscales and total score of the BDEFs, the strongest correlation being with Self-Restraint (r = .435, $p < .01$). These findings indicate that students with EF deficits, (especially poor self-restraint as measured by the Self-Restraint subscale of the BDEFs) are at increased risk to misuse prescription stimulants.

DISCUSSION

A substantial body of research has found that a significant number of college students are misusing prescription stimulant medication (Benson et al., 2015; Weyandt et al., 2013a). Based on previous findings that suggest that college students are misusing prescription stimulants primarily for academic reasons and that executive functioning skills are crucial for academic success, the purpose of the present study was to examine the relationship between prescription stimulant misuse, EF, and academic outcomes A second purpose of this study was to explore the onset of prescription stimulant misuse, frequency of misuse, and academic outcomes. The study was the first to investigate the relationship between EF and prescription stimulant misuse and academic outcomes among a relatively large sample of college students from five regions of the USA.

The first hypothesis that students who reported executive functioning deficits would be more likely to report misusing prescription stimulants, as assessed by the Self-Reported Prescription Stimulant Misuse factor of the SSQ, than students who reported normal EF, as assessed by the BDEFS was supported. Specifically results revealed that students with self reported EF deficits had higher scores on the Self-Reported Prescription Stimulant Misuse factor, indicating greater self reported misuse of prescription stimulants. These findings are consistent with previous research reporting procrastination and difficulty with time-management were more likely to misuse prescription stimulants (Moore et al., 2014) and suggests that students with EF deficits are more likely to misuse prescription stimulants than students with normal EF. Although not causal, these findings suggest that individuals who have clinically

significant EF deficits may be at greater risk for misusing prescription stimulant medication. It is unknown if students with EF deficits are benefiting from prescription stimulants, or what the effects are on their overall functioning. Prior research has suggested that prescriptions stimulants may benefit those suffering from deficits, but not improve abilities in healthy individuals not suffering from deficits (Mehta et al., 2000; Smith & Farah, 2011). Future studies are needed to further understand the relationship between EF deficits and prescription stimulants.

The second hypothesis, that students who reported below or above average academic outcomes would be more likely to report misusing prescription stimulants than students who reported average academic outcomes was not supported. Results revealed, contrary to what was expected, that GPA, hours spent studying and classes skipped were not useful in predicting students report of prescription stimulant misuse. These findings are consistent with previous research by Advokat and colleagues (2008) who also found that GPA was not related to misuse in a study of 1,550 students at a public Southern university. However, these findings are inconsistent with studies that have found students with lower GPAs to be associated with prescription stimulant misuse (Arria et al., 2013; Garnier-Dykstra et al., 2012; Weyandt et al., 2013). It is unknown if the GPA of those who reported misusing would be lower had they not misused the prescription stimulants. In other words, it is unknown if the prescription stimulants were effective in increasing and aiding in academic outcomes, and had the students not misused, if their GPAs would be lower. A longitudinal study conducted by Arria et al. (2008) found that past-year misuse of prescription stimulants predicted lower GPA by the end of the first year of college, which was mediated by skipping

class. Given the small percentage of students who reported skipping class, it is unknown if this limited the present research findings. Future studies should investigate additional academic outcome variables and conduct additional longitudinal research in order to better understand the relationship between academic outcomes and prescription stimulant misuse.

The third hypothesis, that prescription stimulant misuse would moderate the relationship between EF and academic performance was partially supported. Specifically, prescription stimulant misuse was expected to alter the strength and/or direction of the relationship between EF and academic performance. As expected, participants with EF deficits had lower GPAs. However, results from a two-way ANOVA were not statistically significant for an interaction effect. Results were only significant for a main effect of EF Clinical group. These findings are consistent with previous research that found deficits of EF were associated with lower academic achievement (Biederman et al., 2006; Dvorsky & Langberg, 2014) and indicate that EF deficits are likely to cause impairment in academic outcomes. Furthermore, the effect of EF skills on GPA does not appear to be moderated by prescription stimulant misuse. It is unknown if the students reporting EF deficits received any additional academic skills assistance (such as time management or study skills assistance), and if so, it is unknown how academic skills assistance contributes to the relationship between EF, academic outcomes and prescription stimulant misuse. Future studies need to further explore the relationship other variables that may be affecting EF deficits, academic outcomes and misuse of prescription stimulants.

Onset and Frequency of Prescription Stimulant Misuse and Academic Outcomes

A second purpose of this study was to explore the onset of prescription stimulant misuse, frequency of misuse, and academic outcomes. The hypothesis that the earlier the onset (pre-college) and the greater the frequency of prescription stimulant misuse, the more likely students would be to report lower academic outcomes was not fully supported. It was predicted there would be a negative correlation between years of prescription stimulant misuse and frequency, and academic performance. Preliminary results revealed that while frequency and onset of reported prescription stimulant misuse were negatively correlated with hours spent studying, only frequency of reported misuse, was statistically significant. These findings are consistent with previous research that found college students who misuse prescription stimulants spent less time studying (Arria et al., 2008) and suggests that students may be misusing prescription stimulants to catch up on studying and cram last minute for an exam. It is unknown if students who misuse prescription stimulants more frequently, are actually benefitting from the drug and able to get their work done more efficiently, therefore do not need to study as long or as has been suggested, it students are misusing prescription stimulants to compensate for not studying till the last minute. Results from the regression models revealed that frequency and onset of prescription stimulant misuse were not statistically significantly in predicting hours spent studying or GPA. This finding is inconsistent with longitudinal research that has found misuse of prescription stimulants predictive of GPA (Arria et al., 2008). It is unknown the effects the prescription stimulants have on the students, it could be that the students who misused prescription stimulants were struggling academically when they began misusing, and use the drugs to achieve average academic outcomes. Future

longitudinal research is needed to determine if frequency and/or onset of prescription stimulants misuse are predictive of academic outcomes.

Furthermore, students appear to perceive occasional use of prescription stimulants safer than daily misuse. This finding is consistent with previous research that has found college students perceive prescription stimulants as safe (Low & Gendaszek, 2002) and indicates that students perceive using prescription stimulants once in a while (for example, during finals week) is safe. Prior research has reported that perceived risk of prescription stimulants is negatively correlated with misuse (Judson & Langdon, 2009), i.e. students who reported being more aware of the risks, were less likely to report misusing. Future intervention and preventative strategies need to educate students on the risks associated with prescription stimulant misuse.

Consistent with previous research (McCabe, Teter & Boyd, 2004; Austic, 2015), participants reported higher rates of misuse while in college than in high school, middle/ junior high school and elementary school. Specifically, approximately 3% of participants reported misusing in middle/ junior high school and nearly 10% misusing in high school. This finding is consistent with previous studies that have reported prevalence rates among adolescents that range from 1.7% (Herman-Stahl, Krebs, Kroutil, & Heller, 2006) to 8.3% (Whiteside et al., 2015). Studies that were conducted among middle school and high schools students reported 2.3% to 4.5% lifetime prevalence for prescription stimulant misuse (Boyd, McCabe, Cranford, & Young, 2006; McCabe, Teter, & Boyd, 2004). In a separate study conducted among high school seniors, 7.4% reported misusing Adderall in 2013 and 6.8% reported misusing the drug in 2014 (Johnston, OMalley, Miech, Bachman, & Schulenberg, 2015).

Furthermore, a recent study based on data from 240,160 adolescents and young adults (ages 12-20) reported the peak ages to start misusing prescription stimulants are between the ages of 16 and 19 (Austic, 2015). Thus, current findings in conjunction with previous research suggests that students are misusing prescription stimulants prior to college, and it is important that preventative measures are taken aimed at middle and high school aged children. Future studies should explore whether motives for misuse are different for younger students compared to college students.

Current results also revealed that reported misuse of prescription stimulant medication increased with year in college. More specifically, 10.0% of Freshman, 14.9% of Sophomores, 22.4% of Juniors, and 25.0% of Seniors reported misusing. This finding is consistent with previous studies (DeSantis et al., 2008; McCabe et al., 2006), and it has been suggested this may be due to upperclassmen having been in college longer, therefore had more time and opportunities to misuse. An alternative explanation is that upperclassman have more peer pressure and/or academic pressure which contribute to their increased rates of misuse.

Correlational analyses explored the relationships between self-reported prescription stimulant misuse and aspects of EF. Analyses revealed that self-reported prescription stimulant misuse was correlated with Self-Restraint, Self-Motivation, Self-Management of Time, Self-Organization/ Problem Solving, and Self-Regulation of Emotions. Although these observed relationships are not causal in nature, it is reasonable to consider each as a potential risk factor for prescription stimulant misuse among undergraduate students, and to use this information to inform future investigations upon which prevention and intervention strategies may be based.

Limitations and Future Directions

Several limitations of the present study should be discussed. First, the current study employed a convenience sample, which may limit the generalizability of the findings. Second, the sample was disproportionately White and female, which also limits the generalizability of the findings. Future research should attempt to acquire a more proportionate number of students from various universities. Third, the study was voluntary, thus students who participated may not be representative of the entire population, as they may have had a special interest in the topics of this survey. Fourth, this study relied on self-reported data, and although we have no indication that underreporting occurred, due to the sensitive nature of the questions, the possibility of response bias and social desirability bias cannot be ruled out. Fifth, as the study was correlational in design no causal inferences regarding the relationship between the variables of interest can be made.

Future studies regarding the relationship between prescription stimulant misuse, EF and academic outcomes are needed. Ideally, such studies would be longitudinal and may benefit from the use of academic outcomes collected directly from the universities' registrar's office so as to not rely so heavily on self-reported outcomes. Future studies should consider including questions that ask about the dosage that students are misusing. Future research should also consider including students enrolled in private universities as well as community colleges. It is also important that future studies consider investigating prescription stimulant misuse and its relationship with EF among high school and middle or junior high school students.

Conclusions

In conclusion, this study was the first to investigate the relationship between prescription stimulant misuse, EF and academic outcomes among college students. A substantial percentage, 18.8%, of college students in this study reported misusing prescription stimulants and males and females did not differ in rates of reported misuse. The three most frequently reported reasons for prescription stimulant misuse were academically related. Additionally, substantial proportions of participants reported knowing students who use prescription stimulants for academic reasons. As hypothesized individuals identified as having clinically significant levels of EF deficits were significantly more likely to report misusing prescription stimulants. Participants with EF deficits reported significantly lower GPAs than individuals with normal EF, and prescription stimulant misuse was not found to moderate this relationship. The present study has many important implications for prevention and intervention policies on college campuses, specifically in identifying those at risk for misusing prescription stimulants.

TABLES

Table 1.1: Participant Demographics

Category	N	Percent
Gender		
Female	226	73.4%
Male	82	26.6%
Race/ Ethnicity		
White	228	74.0%
Black or African American	11	3.6%
Asian	24	7.8%
American Indian or Alaska Native	1	0.3%
Native Hawaiian or Other Pacific Island	3	1.0%
Biracial	1	0.3%
Chican@/Latin@	1	0.3%
Hispanic	12	3.9%
Hispanic/Latino	1	0.3%
Hispanic/White	2	0.6%
Human	1	0.3%
Latina/o	7	2.3%
Mexican	1	0.3%
Mexican-American	1	0.3%
Mixed	2	0.6%
More than 1 Race	1	0.3%
Multiracial	1	0.3%
Non-white	8	2.6%
Peruvian	1	0.3%
Class year		
Freshman	60	19.5%
Sophomore	74	24.0%
Junior	98	31.8%
Senior	76	24.7%
Member of a sorority or fraternity		
Yes	57	18.5%
No	251	81.5%
ADHD diagnosis		
Yes	39	12.7%
No	269	87.3%
High school		
Public	263	85.4%
Private	38	12.3%
Other	7	2.3%
Intend to purse graduate school		
Yes	247	80.2%
No	61	19.8%

Table 1.2: Participant Demographics- Psychological Conditions

Category	N	Percent
Psychological conditions		
Anxiety	28	9.1%
Anxiety, Bipolar disorder	1	.3%
Anxiety, Depression	48	15.6%
Anxiety, Depression, Bipolar disorder	1	.3%
Anxiety, Depression, Bipolar disorder, Eating disorder	2	.6%
Anxiety, Depression, Bipolar disorder, Eating disorder, Specific learning disability	1	.3%
Anxiety, Depression, Eating disorder	9	2.9%
Anxiety, Depression, Eating disorder, Specific learning disability	1	.3%
Anxiety, Depression, Specific learning disability	3	1.0%
Anxiety, Eating disorder	3	1.0%
Anxiety, Specific learning disability	2	.6%
Depression	16	5.2%
Depression, Eating disorder	3	1.0%
Depression, Eating disorder, Specific learning disability	1	.3%
Eating disorder	4	1.3%
None of the above	183	59.4%
Specific learning disability	2	.6%

Table 1.3. Participant Demographics- College Major(s)

Category	N	Percent
Business Administration	10	3.2
Business Administration, Communication and Media	1	.3
Business Administration, Engineering, Languages and Literature	1	.3
Business Administration, Humanities and Social Sciences	3	1.0
Business Administration, Languages and Literature	1	.3
Business Administration, Mathematics and Computer Science	1	.3
Business Administration, Natural and Physical Science	1	.3
Communication and Media	8	2.6
Communication and Media, Environmental Studies	1	.3
Communication and Media, Humanities and Social Sciences	1	.3
Communication and Media, Mathematics and Computer Science	1	.3
Communication and Media, Natural and Physical Science	1	.3
Communication and Media, Visual and Performing Arts and Design	1	.3
Education	10	3.2
Education, Humanities and Social Sciences	4	1.3
Education, Political and Global Studies	1	.3
Engineering	15	4.9
Engineering, Environmental Studies	1	.3
Engineering, Healthcare and Clinical Sciences	1	.3
Engineering, Languages and Literature	2	.6
Engineering, Mathematics and Computer Science	4	1.3
Engineering, Natural and Physical Science, Undecided/	1	.3

Engineering, Natural and Physical Science, Undecided/ Undeclared	1	.3
Environmental Studies	11	3.6
Environmental Studies, Healthcare and Clinical Sciences	1	.3
Environmental Studies, Natural and Physical Science	4	1.3
Environmental Studies, Natural and Physical Science, Visual and Performing Arts and Design	1	.3
Environmental Studies, Political and Global Studies	1	.3
Healthcare and Clinical Sciences	82	26.6
Healthcare and Clinical Sciences, Humanities and Social Sciences	5	1.6
Healthcare and Clinical Sciences, Natural and Physical Science	3	1.0
Healthcare and Clinical Sciences, Undecided/ Undeclared	1	.3
Humanities and Social Sciences	77	25.0
Humanities and Social Sciences, Natural and Physical Science	3	1.0
Humanities and Social Sciences, Political and Global Studies	3	1.0
Languages and Literature	1	.3
Languages and Literature, Natural and Physical Science	3	1.0
Languages and Literature, Political and Global Studies	3	1.0
Mathematics and Computer Science	6	1.9
Natural and Physical Science	19	6.2
Natural and Physical Science, Undecided/ Undeclared	1	.3
Political and Global Studies	7	2.3
Undecided/ Undeclared	5	1.6

Table 1.4. Participant Demographics- Age and Academics

	Mean	Standard Deviation	Minimum	Maximum
Age	20.77	3.585	18	57
GPA	3.292	.482	1.50	4.00
How many class sessions are in your schedule each week?	9.80	4.193	1	21
How many hours per week on average do you spend studying?	14.10	10.489	0	60
How many classes do you typically skip per week (fill in number of classes)?	.469	1.049	.0	9.0
Number of hours typically spent exercising per week	4.73	4.223	0	23

Table 1.5. Participant Demographics- University Regions

Region	**N**	**Percent**
Northwest	18	5.8
Southeast	13	4.2
Southwest	56	18.2
Central Midwest	59	19.2
Northeast	162	52.6

Table 2.1. Prescription Stimulant Misuse: Academic outcomes

	Have you ever misused a prescription stimulant medication?			
	No		Yes	
	Mean	Standard Deviation	Mean	Standard Deviation
GPA	3.294	.496	3.281	.423
How many class sessions are in your schedule each week?	9.97	4.216	9.09	4.049
How many hours per week on average do you spend studying?	14.54	10.815	12.19	8.779
Standardized Class Sessions Skipped	4.709	10.299	5.933	13.249
How many classes do you typically skip per week (fill in number of classes)?	.406	.9304	.741	1.4334

Table 2.2. Prescription Stimulant Misuse: Class Year

		Have you ever misused a prescription stimulant medication?			
		No		Yes	
		Count	Row N %	Count	Row N %
Class Year	Freshman	54	90.0%	6	10.0%
	Sophomore	63	85.1%	11	14.9%
	Junior	76	77.6%	22	22.4%
	Senior	57	75.0%	19	25.0%

Table 2.3. Prescription Stimulant Misuse: Gender

			Have you ever misused a prescription stimulant medication?		Total
			No	Yes	
Gender	Female	Count	186	40	226
		% within Gender	82.3%	17.7%	100.0%
		% within Misused stimulant medication	74.4%	69.0%	73.4%
		% of Total	60.4%	13.0%	73.4%
	Male	Count	64	18	82
		% within Gender	78.0%	22.0%	100.0%
		% within Misused prescription stimulant medication	25.6%	31.0%	26.6%
		% of Total	20.8%	5.8%	26.6%
Total		Count	250	58	308
		% within Gender	81.2%	18.8%	100.0%
		% within Misused a prescription stimulant medication	100.0%	100.0%	100.0%
		% of Total	81.2%	18.8%	100.0%

Table 3. Executive Functioning Clinical Significance

EF Clinical Significance	Percent	Cumulative Percent
EF is not abnormal	64.6%	64.6%
Marginal clinical significance	6.8%	71.4%
Borderline or Somewhat Deficient	9.1%	80.5%
Mildly Deficient	6.5%	87.0%
Moderately Deficient	8.8%	95.8%
Markedly Deficient or Severe	4.2%	100.0%
Total	100.0%	

Table 4. SSQ Responses Pertaining to the Nature of and Motivations for Self-Reported Misuse of Prescription Stimulants

Item	Never	Rarely	Occasionally	Frequently	Always	Total endorse
1. I have used prescription stimulants for non-medical purposes.	77.6%	9.7%	8.8%	2.9%	1.0%	22.4%
2. I have used prescription stimulants at parties.	86.4%	7.5%	3.9%	1.6%	0.6%	13.6%
3. I have used prescription stimulants with alcohol.	84.4%	7.8%	5.5%	1.9%	0.3%	15.6%
4. I have snorted prescription stimulants.	89.3%	5.2%	4.2%	1.0%	0.3%	10.7%
5. I have injected prescription stimulants.	98.1%	1.0%	0.6%	0.0%	0.3%	1.9%

6. I have smoked prescription stimulants.	93.8%	2.9%	1.0%	1.9%	0.3%	7.2%
7. I have taken prescription stimulants to focus better in class.[b]	77.9%	5.8%	6.5%	4.9%	4.9%	22.1%[b]
8. I have taken prescription stimulants to perform better on tests.[c]	79.5%	6.8%	5.2%	3.9%	4.5%	20.5%[c]
9. I have taken prescription stimulants to help me socialize better.	88.6%	3.9%	4.2%	1.9%	1.3%	11.4%
10. I have taken prescription stimulants to help me lose weight.	92.5%	4.2%	2.3%	0.6%	0.3%	7.5%
11. I have taken prescription stimulants to perform better in my schoolwork.[a]	75.0%	8.8%	7.5%	3.6%	5.2%	25.0%[a]

12. I have taken prescription stimulants to feel more energetic.	82.5%	7.1%	6.5%	2.3%	1.6%	17.5%
13. I have taken prescription stimulants to feel better about myself.	90.3%	2.6%	3.6%	1.9%	1.6%	9.7%
14. I have taken prescription stimulants to “get high”.	87.3%	6.5%	3.6%	2.6%	0.0%	12.7%
15. I have been offered prescription stimulants by other students.	59.1%	20.1%	14.0%	5.2%	1.6%	40.9%
16. I have tried someone else’s prescription stimulant medication.	80.2%	9.1%	6.5%	2.9%	1.3%	19.8%
17. I have purchased prescription stimulants from other students.	88.0%	3.9%	5.5%	1.9%	0.6%	12%

18. I have sold prescription stimulant medication to other students.	93.2%	2.9%	2.3%	1.0%	0.6%	6.8%
19. I have given prescription stimulant medication to other students.	88.6%	5.8%	2.9%	1.3%	1.3%	11.4%
20. I have been pressured into letting someone else have my prescription stimulant medication.	93.5%	3.6%	1.6%	0.6%	0.6%	6.5%

[a] Denotes most frequently endorsed reason
[b] Second most frequently endorsed reason
[c] Third most frequently endorsed reason

Table 5. SSQ Responses Pertaining to the Expressed Attitudes and Perceptions of Students Regarding Prescription Stimulants

Item	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
21. Prescription stimulants are easy to get on this campus.	9.1%	14.3%	32.5%	30.8%	13.3%
22. Prescription stimulants are as easy to get as alcohol.	14.9%	30.8%	26.9%	21.1%	6.2%
23. Prescription stimulants are as easy to get as marijuana.	12.3%	23.7%	27.3%	26.3%	10.4%
24. Using prescription stimulants occasionally is harmless.	28.9%	25.6%	20.8%	21.8%	2.9%
25. Using prescription stimulants daily is harmless.	51.0%	29.2%	12.7%	3.9%	3.2%
26. Prescription stimulant use on campus is a problem.	11.4%	19.5%	37.7%	24.7%	6.8%
27. Prescription stimulants are safer than marijuana.	44.5%	31.2%	20.1%	3.2%	1.0%
28. Prescription stimulants are safer than alcohol.	31.5%	28.2%	30.8%	7.5%	1.9%

29. I feel I am knowledgeable about prescription stimulants.	14.6%	22.4%	25.6%	22.4%	14.9%
30. I feel I am knowledgeable about the side effects of prescription stimulants.	18.8%	23.1%	19.5%	24.7%	14.0%

Table 6. SSQ Responses Pertaining to Perceived Misuse of Prescription Stimulants Among Peers

Item	No	Yes
31. I know students who use prescription stimulants at parties.	46.1%	53.9%
32. I know students who use prescription stimulants with alcohol.	50.6%	49.4%
33. I know students who use prescription stimulants with other drugs.	52.3%	47.7%
34. I know students who use prescription stimulants while studying.	28.6%	71.4%
35. I know students who use prescription stimulants during finals week.	29.5%	70.5%
36. I know students who use prescription stimulants during tests.	37.3%	62.7%
37. I know students who snort prescription stimulants.	65.6%	34.4%
38. I know students who inject prescription stimulants.	91.9%	8.1%
39. I know students who smoke prescription stimulants.	81.2%	18.8%
40. I hide my prescription stimulant medication so that no one will take it.	79.9%	20.1%

Table 7. SSQ Addendum Responses pertaining to Frequency and Onset

Item	Never	Rarely	Occasionally	Frequently	Always	Total endorse
I misused prescription stimulants in elementary school.	99.0 %	0.6%	0.3%	0.0%	0.0%	1.0%
I misused prescription stimulants in middle/ junior high school.	97.1 %	1.9%	0.0%	1.0%	0.0%	2.9%
I misused prescription stimulants in high school.	91.6 %	6.2%	1.6%	0.3%	0.3%	8.4%
I have misused prescription stimulants prior to attending college.	90.6 %	6.5%	1.9%	0.6%	0.3%	9.4%

I have misused prescription stimulants in college.	79.5 %	9.7%	7.5%	2.6%	0.6%	20.5%

Table 8. Contingency table: Executive functioning and prescription stimulant misuse

		Have you ever misused a prescription stimulant medication?		
		No	Yes	Total
EF Clinical Significance	EF is not abnormal	54.9%	9.7%	64.6%
	Marginal clinical significance	5.2%	1.6%	6.8%
	Borderline or Somewhat deficient	7.8%	1.3%	9.1%
	Mildly deficient	4.9%	1.6%	6.5%
	Moderately Deficient	6.8%	1.9%	8.8%
	Markedly deficient or severe	1.6%	2.6%	4.2%
Total		81.2%	18.8%	100.0%

Table 9. Summary of Multiple Regression Analysis: Onset and Frequency of Misuse, GPA

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
Intercept	3.648	.225		16.223	.000
How frequently do you misuse prescription stimulant medication?	-.051	.055	-.110	-.932	.352
I have misused prescription stimulants prior to attending college.	.071	.124	.072	.572	.568
I misused prescription stimulants in elementary school.	-.105	.273	-.030	-.384	.701
I misused prescription stimulants in middle/ junior high school.	-.207	.117	-.140	-1.768	.078
I misused prescription stimulants in high school.	-.043	.136	-.039	-.314	.753
I have misused prescription stimulants in college.	.008	.072	.013	.108	.914

Table 10. Correlations of BDEFs and Self-Reported Misuse of Prescription Stimulants

	BDEFs 1	BDEFs 2	BDEFs 3	BDEFs 4	BDEFs 5	BDEFs Total	SSQ 1
BDEFs 1	1	.682**	.656**	.801**	.543**	.877**	.280**
BDEFs 2	.682**	1	.645**	.668**	.568**	.864**	.321**
BDEFs 3	.656**	.645**	1	.745**	.717**	.866**	.513**
BDEFs 4	.801**	.668**	.745**	1	.608**	.877**	.400**
BDEFs 5	.543**	.568**	.717**	.608**	1	.778**	.335**
BDEFs Total	.877**	.864**	.866**	.877**	.778**	1	.421**
SSQ 1	.280**	.321**	.513**	.400**	.335**	.421**	1

**. Correlation is significant at the 0.01 level (2-tailed).
BDEFs1= Section 1 Score: Self-Management of Time; BDEFs 2= Section 2 Score: Self-Organization/ Problem Solving; BDEFs 3= Section 3 Score: Self-Restraint; BDEFs 4= Section 4 Score: Self-Motivation; BDEFs 5= Section 5 Score: Self-Regulation of Emotions; BDEFs Total= Total EF Summary Score; SSQ 1 = Self-Reported Misuse of Prescription Stimulants; SSQ 2 = Perception of Prevalence of Prescription Stimulant Misuse Among Peers; SSQ3 = Knowledge of Atypical Stimulant Misuse Among Peers; SSQ 4 = Perception of Safety of Prescription Stimulant Medication

Table 11. Correlations of BDEFs and Perception of Prevalence of Prescription Stimulant Misuse Among Peers

	BDEFs 1	BDEFs 2	BDEFs 3	BDEF 4	BDEFs 5	BDEFs Total
SSQ 2	-.019	.111	.152**	.097	.201**	.116*

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Table 12. Correlations of BDEFs and Knowledge of Atypical Stimulant Misuse Among Peers

	BDEFs 1	BDEFs 2	BDEFs 3	BDEFs 4	BDEFs 5	BDEFs Total
SSQ 3	.168**	.195**	.333**	.249**	.240**	.268**

**. Correlation is significant at the 0.01 level (2-tailed).

Table 13. Correlations of BDEFs and Perception of Safety of Prescription Stimulant Medication

	BDEFs 1	BDEFs 2	BDEFs 3	BDEFs 4	BDEFs 5	BDEFs Total
SSQ 4	.201**	.202**	.300**	.257**	.187**	.264**

**. Correlation is significant at the 0.01 level (2-tailed).

Table 14. Correlations of BDEFs and SSQ Total Score

	BDEFs 1	BDEFs 2	BDEFs 3	BDEFs 4	BDEFs 5	BDEFs Total
SSQ Total	.240**	.320**	.435**	.350**	.308**	.379**

**. Correlation is significant at the 0.01 level (2-tailed).

APPENDICES

Appendix A

Informed Consent

The University of Rhode Island
Interdisciplinary Neuroscience Graduate Program
Prescription stimulant misuse: the relationship between executive functioning and academic outcomes

PLEASE PRINT AND KEEP THIS FORM FOR YOURSELF

Dear Participant:

You have been asked to take part in a research project described below. The researcher will explain the project to you in detail. If you have any questions, please feel free to contact the student investigator, Bailey Munro, at (401)-580-5959 or bailey_munro@uri.edu, or the faculty sponsor, Dr. Lisa Weyandt, at (401)-874-2194 or lisaweyandt@uri.edu.

The purpose of this study is to examine the misuse of prescription stimulant medications and its relation to executive functioning and academic outcomes. Responses to survey items are completely anonymous: there will be no identifying information linking you to your responses or to any particular organization. The survey will take about 15 minutes to complete. Data will be encrypted and stored through the website GoogleForms, and only the principal investigator, Dr. Lisa Weyandt, and student investigator, Bailey Munro, will have access to the data through the use of a password.

YOU MUST BE AT LEAST 18 YEARS OLD to participate in this research project. If you are not, please discontinue the survey at this time.

If you decide to participate in this study, it will involve completing some questionnaires pertaining to your perceptions about prescription stimulant medication, your executive functioning, and your academic functioning.

The possible risks of the study are minimal, although you may feel some embarrassment answering questions of a personal nature. Please respond honestly, and remember that your responses are anonymous.

Although there are no direct benefits of the study, your answers will help to increase knowledge about the complexities of non-prescription stimulant use on college campuses.

Your participation in this study is anonymous. This means that your answers to all questions are private. No one else can know that you participated in this study, and no

one can find out what your answers were to any items. Scientific reports will be based on aggregated group data, and will not identify you or any individual in this project.

The decision to participate in this research project is up to you. You do not have to participate, and you can decline to answer the questionnaires. If you decide to take part in the study, you may quit at any time. Whatever you decide will in no way penalize you or your status as a student. Participation in this study is not expected to be harmful or injurious to you.

If you have any additional questions or concerns about this study, you may contact the student investigator, Bailey Munro, at (401)-580-5959 or bailey_munro@my.uri.edu, or her faculty sponsor, Dr. Lisa Weyandt, at (401)-874-2194, or the University of Rhode Island's Vice Provost for Graduate Studies, Research and Outreach, 70 Lower College Road, Suite 2, URI, Kingston, RI; (401)-874-4328.

By clicking this box, you are indicating that:
You are at least 18 years old.
You have read the consent form and your questions have been answered to your satisfaction. Your completion of the surveys implies your consent to participate in this study.

If these questions are upsetting and you want to talk please use the phone numbers below:

The University of Rhode Island Counseling Center
www.uri.edu/coun
(401) 874-2288
Roosevelt Hall, 2nd floor

Florida Atlantic University Counseling and Psychological Services
http://www.fau.edu/counseling/
(561) 297-3540
Student Services Building (SSB #8), Room 229

University of California, Santa Barbara Counseling Center
http://caps.sa.ucsb.edu
(805) 893-4411
Building 599

University of California, Irvine Counseling Center
http://www.counseling.uci.edu
(949) 824-6457
203 Student Services 1
5500 Campanile Dr.

Central Washington University Counseling Center
http://www.cwu.edu/medical-counseling/
(509) 963-1391
400 E. University Way

The University of Michigan Counseling and Psychological Services
http://www.umich.edu/~caps/

(734) 764-8312
Michigan Union, Room 3100
530 S. State Street

Appendix B

Demographic Questionnaire

1. Current age (in years): _____

2. Sex:
Male
Female
Other: _____

3. Race/Ethnicity (please circle one):
White
Black or African American
Asian
American Indian or Alaska Native
Native Hawaiian or Other Pacific Island
Other: _____

4a. What university do you currently attend?
University of Rhode Island
Central Washington University
University of Michigan
Florida Atlantic University
University of California, Irvine
University of California, Santa Barbara

4b. Class year (please circle one):
Freshman Sophomore Junior Senior Other

5. Cumulative Grade Point Average (fill in a number between 0.0 and 4.0):
_____

6. How many class session are in your schedule each week? (For example: A class that meets Monday, Wednesday and Friday has 3 class session each week): _____

7. How many hours per week on average do you spend studying? _____

8. How many classes do you typically skip per week? _____

9. What is your college major(s) (choose interest area)?
Business Administration
Communication and Media
Education
Engineering
Environmental Studies
Healthcare and Clinical Sciences
Humanities and Social Sciences
Languages and Literature

Mathematics and Computer Science
Natural and Physical Science
Political and Global Studies
Visual and Performing Arts and Design
Undecided/ Undeclared

10. Are you currently a member of sorority or fraternity?

Yes No

11. Have you ever been diagnosed with Attention-Deficit-Hyperactivity Disorder (ADHD)?

Yes No

11a. If you answered "yes" to Question 11, with what subtype/presentation of ADHD are you diagnosed?

Hyperactive/Impulsive Type
Inattentive Type
Combined Type
Do not know
Never diagnosed with ADHD

11b. If you answered "yes" to Question 11, at what age were you first diagnosed?

_____

12. Are you currently taking stimulant medications including methylphenidate (Ritalin, Concerta, Metadate) and amphetamine (Adderall, Dexedrine, Desoxyn) that have been prescribed to you by a doctor?

Yes No

13. Please endorse any of the following psychological conditions that you have previously been or are currently diagnosed with:

Anxiety
Depression
Bi-polar disorder
Eating disorder
Specific learning disability

14. Are you currently registered with the Disabilities Support Services office at your university?

Yes No

15. What type of high school did you attend?

Public
Private

Other: _____

16. Do you intend to pursue graduate school (medical, dental, law, masters-degree, PhD) upon completion of your bachelors degree?

Yes No

17. Number of hours typically spent exercising per week: _____

Appendix C

Stimulant Survey Questionnaire (SSQ)

Please answer the following questions about your college experience truthfully.
Stimulants refer to prescription medications including methylphenidate (Ritalin, Concerta, Metadate) and amphetamine (Adderall, Dexedrine, Desoxyn).
Please circle the number that best describes your agreement with each statement.

These questions are rated on a Likert scale:	Never	Rarely	Occasionally	Frequently	Always
1. I have used prescription stimulants for non-medical purposes.	1	2	3	4	5
2. I have used prescription stimulants at parties.	1	2	3	4	5
3. I have used prescription stimulants with alcohol.	1	2	3	4	5
4. I have snorted prescription stimulants.	1	2	3	4	5
5. I have injected prescription stimulants.	1	2	3	4	5
6. I have smoked prescription stimulants.	1	2	3	4	5
7. I have taken prescription stimulants to focus better in class.	1	2	3	4	5
8. I have taken prescription stimulants to perform better on tests.	1	2	3	4	5
9. I have taken prescription stimulants to help me socialize better.	1	2	3	4	5
10. I have taken prescription stimulants to help me lose weight.	1	2	3	4	5
11. I have taken prescription stimulants to perform better in my school work.	1	2	3	4	5
12. I have taken prescription stimulants to feel more energetic.	1	2	3	4	5
13. I have taken prescription stimulants to feel better about myself.	1	2	3	4	5
14. I have taken prescription stimulants to "get high".	1	2	3	4	5
15. I have been offered prescription stimulants by other students.	1	2	3	4	5
16. I have tried someone else's prescription stimulant medication.	1	2	3	4	5
17. I have purchased prescription stimulants from other students.	1	2	3	4	5
18. I have sold prescription stimulant medication to other students.	1	2	3	4	5
19. I have given prescription stimulant medication to other students.	1	2	3	4	5
20. I have been pressured into letting someone else have my prescription stimulant medication.	1	2	3	4	5

Please answer the following questions about your college experience truthfully.
Stimulants refer to prescription medications including methylphenidate (Ritalin, Concerta, Metadate) and amphetamine (Adderall, Dexedrine, Desoxyn).
Please circle the number that best describes your agreement with each statement.

These questions are rated on a Likert scale:	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
21. Prescription stimulants are easy to get on this campus.	1	2	3	4	5
22. Prescription stimulants are as easy to get as alcohol.	1	2	3	4	5
23. Prescription stimulants are as easy to get as marijuana.	1	2	3	4	5
24. Using prescription stimulants occasionally is harmless.	1	2	3	4	5
25. Using prescription stimulants daily is harmless.	1	2	3	4	5
26. Prescription stimulant use on campus is a problem.	1	2	3	4	5
27. Prescription stimulants are safer than marijuana.	1	2	3	4	5
28. Prescription stimulants are safer than alcohol.	1	2	3	4	5
29. I feel I am knowledgeable about prescription stimulants.	1	2	3	4	5
30. I feel I am knowledgeable about the side effects of prescription stimulants.	1	2	3	4	5

Please Circle Yes or No to the following questions:

31. I know students who use prescription stimulants at parties.	YES	NO
32. I know students who use prescription stimulants with alcohol.	YES	NO
33. I know students who use prescription stimulants with other drugs.	YES	NO
34. I know students who use prescription stimulants while studying.	YES	NO
35. I know students who use prescription stimulants during finals week.	YES	NO

36. I know students who use prescription stimulants during tests.	YES	NO
37. I know students who snort prescription stimulants.	YES	NO
38. I know students who inject prescription stimulants.	YES	NO
39. I know students who smoke prescription stimulants.	YES	NO
40. I hide my prescription stimulant medication so that no one will take it.	YES	NO

Appendix D

SSQ Addendum Questions

1. Are you currently prescribed a stimulant medication to treat ADHD? Yes No

If Yes, what medication _____

2. Have you ever been prescribed a stimulant medication? Yes No

If Yes, when _____ (elementary, middle/junior high school, high school, college)

3. Have you ever misused a prescription stimulant medication? Yes No

If yes, when was the first time _____(elementary, middle/junior high school, high school, college)

4. Where do you typically obtain stimulant medications?

Doctor Friends who share Friends who sell I steal them Family the Internet

5. How frequently do you misuse prescription stimulant medication?

Never Once a year Twice a year Once a month Once a week More than once a week

	Never	**Rarely**	**Occasionally**	**Frequently**	**Always**
6. I have misused prescription stimulants prior to attending college.	1	2	3	4	5
7. I misused prescription stimulants in elementary school.	1	2	3	4	5
8. I misused prescription stimulants in middle/ junior high school.	1	2	3	4	5
9. I misused prescription stimulants in high school.	1	2	3	4	5
10. I have misused prescription stimulants in college.	1	2	3	4	5

Appendix E

Additional Information on the SSQ

Factor 1: Self-reported prescription stimulant use
Factor 2: Perception of prevalence of prescription use among peers
Factor 3: Knowledge of atypical stimulant use among peers
Factor 4: Perception of safety of stimulants

Cronbach's alpha coefficient of .849 for all 40 items of the SSQ. The internal consistency of the four factors was as follows: Factor 1 Cronbach's alpha coefficient = .923; Factor 2 Cronbach's alpha coefficient = .434; Factor 3 Cronbach's alpha coefficient = .613; and Factor 4 Cronbach's alpha coefficient = .608.

Factor Structure for the Stimulant Survey Questionnaire

	Factor			
Item	**1**	**2**	**3**	**4**
I have used prescription stimulants for non-medical purposes.	**.768**			
I have used prescription stimulants at parties.	**.737**			
I have used prescription stimulants with alcohol.	**.736**		**-.302**	
I have snorted prescription stimulants.	**.673**			
I have injected prescription stimulants.			**-.632**	
I have smoked prescription stimulants.			**-.616**	
I have taken prescription stimulants to focus better in class.	**.834**			
I have taken prescription stimulants to perform better on tests.	**.854**			
I have taken prescription stimulants to help me socialize better.	**.520**		**-.395**	
I have taken prescription stimulants to help me lose weight.	**.528**			
I have taken prescription stimulants to perform better in school work.	**.861**			
I have taken prescription stimulants to feel energetic.	**.825**			
I have taken prescription stimulants to feel better about myself	**.567**			
I have taken prescription stimulants to "get high."	**.501**		**-.477**	
I have been offered prescription stimulants by other students.	**.428**	**-.419**		
I have tried someone else's prescription stimulants.	**.758**			
I have purchased prescription stimulants from other students.	**.746**			
I have sold prescription stimulants to other students.	**.556**			
I have given prescription stimulants to other students.	**.581**			
I have been pressured into letting someone else have my prescription stimulant medication.				
Prescription stimulants are easy to get on this campus.		**-.622**		
Prescription stimulants are as easy to get as alcohol.		**-.533**		
Prescription stimulants are as easy to get as marijuana.		**-.569**		
Using prescription stimulants occasionally is harmless.	**.405**			**.551**
Using prescription stimulants daily is harmless.				**.341**
Prescription stimulant use on campus is a problem.		**-.362**		
Prescription stimulants are safer than marijuana.				**.770**
Prescription stimulants are safer than alcohol.				**.721**
I feel I am knowledgeable about prescription stimulants.	**.405**			**-.457**
I feel I am knowledgeable about the side effects of prescription stimulants.	**.341**			**-.507**
I know students who use prescription stimulants at parties.		**.754**		
I know students who use prescription stimulants with alcohol.		**.723**		
I know students who use prescription stimulants with other drugs.		**.690**		
I know students who use prescription stimulants while studying.		**.777**		
I know students who use prescription stimulants during finals week.		**.780**		
I know students who use prescription stimulants during tests.		**.763**		
I know students who snort prescription stimulants.		**.517**		
I know students who inject prescription stimulants.				
I know students who smoke prescription stimulants.			**.685**	
I hide my prescription stimulant medication so that no one will take it.		**.356**	**.600**	

Appendix F

2015-2016 Common Data Set

Reported Demographic Information

University of Rhode Island	
Gender	
Total Undergraduate Students	13,641
Male Student Percentage	46%
Female Student Percentage	54%
Ethnicity	
Hispanic/Latino	9.45%
Black or African American	5.21%
White or Caucasian	69.75%
American Indian or Alaska Native	0.23%
Asian	3.22%
Native Hawaiian or other Pacific Islander	0.03%
Two or more races	2.77%
Unknown	7.29%
Florida Atlantic University	
Gender	
Total Undergraduate Students	25,209
Male Student Percentage	44%
Female Student Percentage	56%
Ethnicity	
Hispanic/Latino	25.2%

Black or African American	19.16%
White or Caucasian	44.62%
American Indian or Alaska Native	0.19%
Asian	4.2%
Native Hawaiian or other Pacific Islander	0.12%
Two or more races	3.19%
Unknown	1.46%
University of Michigan	
Gender	
Total Undergraduate Students	28,312
Male Student Percentage	51%
Female Student Percentage	49%
Ethnicity	
Hispanic/Latino	4.59%
Black or African American	4.29%
White or Caucasian	61.35%
American Indian or Alaska Native	0.19%
Asian	12.7%
Native Hawaiian or other Pacific Islander	0.04%
Two or more races	3.42%
Unknown	6.5%
Central Washington University	
Gender	

Total Undergraduate Students	10,982
Male Student Percentage	49%
Female Student Percentage	51%
Ethnicity	
Hispanic/Latino	13.75%
Black or African American	3.66%
White or Caucasian	58.94%
American Indian or Alaska Native	0.72%
Asian	4.05%
Native Hawaiian or other Pacific Islander	0.64%
Two or more races	6.66%
Unknown	8.54%
University of California Irvine	
Gender	
Total Undergraduate Students	25,256
Male Student Percentage	46%
Female Student Percentage	54%
Ethnicity	
Hispanic/Latino	24.87%
Black or African American	1.65%
White or Caucasian	12.28%
American Indian or Alaska Native	0.04%
Asian	37.23%
Native Hawaiian or other Pacific Islander	0.1%

Two or more races	3.79%
Unknown	4.32%
University of California Santa Barbara	
Gender	
Total Undergraduate Students	20,607
Male Student Percentage	47%
Female Student Percentage	53%
Ethnicity	
Hispanic/Latino	25.92%
Black or African American	2.2%
White or Caucasian	35.36%
American Indian or Alaska Native	0.14%
Asian	19.48%
Native Hawaiian or other Pacific Islander	0.13%
Two or more races	8.4%
Unknown	1.31%

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