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Academic and Psychological Factors in Non-Medical Prescription Stimulant Use in Graduate Students

Genvieve Verdi
University of Rhode Island, genevieve_verdi@my.uri.edu

ACADEMIC AND PSYCHOLOGICAL FACTORS IN NON-MEDICAL PRESCRIPTION STIMULANT USE IN GRADUATE STUDENTS

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GENEVIEVE VERDI

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GENEVIEVE ROSE VERDI

APPROVED:

Dissertation Committee:

Major Professor Lisa Weyandt

Susan Rattan

Mark Wood

Leslie Mahler

Nasser H. Zawia

DEAN OF THE GRADUATE SCHOOL

UNIVERSITY OF RHODE ISLAND

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Abstract

The current study investigated the prevalence of the non-medical use of prescription stimulant medication (active use in the absence of a valid prescription) by graduate students. The project sought to determine whether the rate of non-medical use in this population would be commensurate with usage rates observed in the undergraduate, law, and medical student populations. The study also explored the relationship between perceived knowledge and safety of stimulant medications and non-medical use. Additionally, the study explored the relationship between non-medical use of prescription stimulants with academic self-efficacy, psychological factors (anxiety, depression and stress), and internal restlessness. The present study recruited 807 graduate students from universities located in five geographic regions of the United States. Participants completed measures concerning demographic information, stimulant use, internal restlessness, academic self-efficacy, and psychological distress. Past-year rates of self-reported non-medical use were determined to be 5.9%, with overall lifetime prevalence of 17.5%. Motivations for use reported by participants were both academic and social in nature. Self-reported non-medical use of prescription stimulant medications was observed to be significantly correlated with self-reported levels of anxiety, depression, and stress, with various aspects of internal restlessness, and with perceived safety of the medications. Internal restlessness and the perception of safety of stimulant medications were observed to partially predict the non-medical use of prescription stimulants. Effective prevention and education efforts are needed to help address the non-medical use of prescription stimulants by graduate students on university campuses.

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PREFACE

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Non-Medical Prescription Stimulant Use in Graduate Students: Relationship with Academic Self-Efficacy and Psychological Variables

Genevieve Verdi and Lisa Weyandt

School Psychology, University of Rhode Island, Kingston, RI, USA

Corresponding Author: Genevieve Verdi, M.Ed

166 Valley St., 6M302

Providence, RI 02909

Phone: +1-973-224-4487

Email: genevieve_verdi@my.uri.edu

Introduction

Attention-deficit/hyperactivity disorder (ADHD) is characterized by deficits in sustained attention, hyperactive behavior, and impulsive behavior, is estimated to affect 3% to 7% of the school age population and 2% to 4% of the adult population (APA, 2000; Barkley, 2006). Although specific data on the proportion of university students with ADHD is not available, recent research has indicated that ADHD symptomatology has been observed in between 2% and 10% of university students (Garnier-Dykstra, Gillian, Pinchevsky, Caldeira, Vincent & Arria, 2010; Heiligstein, Conyers, Berns & Smith, 1998; McKee, 2008; Weyandt, Linterman & Rice, 1995). Approximately 50% of students receiving disability support services on university campuses receive such services for ADHD (Wolf, Simkowitz & Carlson, 2009). Although once conceptualized as a disorder of childhood (DuPaul, Guevermont, & Barkley (1991), several recent studies have suggested a significant proportion of individuals who are diagnosed with ADHD in childhood continue to display symptoms of the disorder into adulthood (Barkley, Fischer, Smallish, & Fletcher, 2002; Biederman, Mick & Faraone, 2000; Torgersen, Gjervan & Rasmussen, 2006). Furthermore, increasing numbers of students with ADHD are pursuing a university education (Wolf 2001; Wolf, Simkowitz, & Carlson, 2009), although the exact rates of ADHD among college students is unknown due to privacy protection for students with disabilities under the Americans with Disabilities Act (1991). Preliminary studies suggest that a significant percentage of college students (estimates range from 2% to 9%) report elevated ADHD symptomatology, which has been associated with increased risk for impaired academic, social, and psychological functioning (DuPaul, Weyandt, O'Dell, & Varejao, 2009;

Overbey, Snell, & Callis, 2011; Norvilitis, Ingersoll, Zhang, & Jia, 2008; Weyandt, & DuPaul, 2006; Weyandt et al., 2003; Weyandt et al., 2009). In one recent investigation based on data collected from a large, nationally representative sample of first year college students, 5% of participants reported having ADHD (Pryor, Hurtado, DeAngelo, Blake, & Tran, 2010).

Treatment of ADHD in university students and other young adults is similar to treatment of children with ADHD with respect to the use of stimulant medication (e.g., Adderall, Ritalin, Vyvanse, Concerta). Stimulant medications are considered the "first-line" of therapy for young adults, and the number of adolescents and college students treated with prescription stimulants for ADHD has steadily increased in the past decade (Advokat, 2010; Kolar, Keller, Golfinopoulos, Cumyn, Syer, & Hechtman, 2008; Wilens, Spencer, and Biederman, 1998). Although a significant body of research attests to the effectiveness of prescription stimulants in the treatment of individuals with ADHD (Biederman, Seidman, Petty, Fried, Doyle, Cohen, Kenealy, & Faraone, 2008; DuPaul, Weyandt, Rossi, Vilardo, O'Dell, Carson, Verdi, & Swentosky, 2012; Faraone, Faraone, & Glatt, 2010; Kolar et al., 2008; Wigal; 2009), the non-medical use of prescription stimulant medications among university students with and without ADHD has been cited as problematic in recent years.

As psychostimulant medications have become increasingly available on college campuses, the use of stimulant medications without a prescription has been reported among undergraduate college students (DeSantis, Noar & Webb, 2010; DuPont, Coleman, Bucher, & Wilford, 2008; Dussault & Weyandt, 2013; Hall, Irwin, Bowman, Frankenberger & Jewett, 2005; Janusis & Weyandt, 2010; Judson & Langdon, 2009; Low

& Gendaszek, 2002; McCabe, Knight, Teter & Wechsler, 2005; Rabiner et al., 2009; Sharp & Rosen, 2007; Weyandt et al., 2009; White, Becker-Blease & Bishop, 2006). For the purposes of this investigation, the term "non-medical use" will be used to describe use of prescription stimulants by individuals other than those for whom the medication was prescribed. Non-medical use of prescription stimulants has likewise been observed among professional students and young adults (McNiel, Muzzin, DeWald, McCann, Schneiderman et al., 2011; Novak, Kroutil, Williams & Van Brunt, 2007; Prudhomme, Becker-Blease & Grace-Bishop, 2006). A number of psychological variables have been associated with the non-medical use of prescription stimulants, including depression (Huang, Dawson, Stinson, Hasin, Ruan, Saha, et al., 2006; Poulin, 2007; Teter, Falone, Cranford, Boyd & McCabe, 2010), anxiety (Dussault & Weyandt, 2013; Weyandt et al., 2009), stress (Dussault & Weyandt, 2013; Peterkin, Crone, Sheridan & Wise, 2011), and internal (e.g. mental) restlessness (Dussault & Weyandt, 2013, Weyandt et al., 2009).

Although many studies have examined the non-medical use of stimulant medications among undergraduate university students, few studies have explored use among graduate students, a population which reports elevated levels of stress and psychological distress (Aktekin, Karaman, Senol, Erdem, Erengin et al., 2001; Dammeyer & Nunez, 1999; Dyrbye, Thomas & Shanafelt, 2006; Eisenberg, Gollust, Golberstein & Hefner, 2010; Helmers, Danoff, Steinert, Leyton & Young, 1997; McKinzie, Altamura, Burgoon & Bishop, 2006; Myers, Sweeney, Popick, Wesley, Bordfeld et al., 2012; Nelson, Dell'Oliver, Koch, & Buckler, 2001). Many undergraduate students report using stimulants during academic activities such as studying, test-taking and writing papers (DeSantis, Noar & Webb, 2010; DuPont et al., 2008; Rabiner et al.,

2009; Sharp & Rosen, 2007; Weyandt et al., 2009), suggesting that graduate students may also be at increased risk for non-medical use of stimulant medication related to perceived academic demands. Among undergraduates, academic performance has been observed to correlate negatively with the non-medical use of stimulants (Advokat, Guidry & Martino, 2008; Noar & Webb, 2009; McCabe et al., 2005; Weyandt et al., 2009). Academic functioning can be more difficult to assess among graduate students, who are often held to high minimum grade point averages in order to remain in their program (Silvera, Laeng & Dahl, 2003). The construct of academic self-efficacy, however, has been associated with overall academic functioning among students (Chemers, Hu & Garcia, 2001; Hackett, Betz, Casas, & Rocha-Singh, 1992; Pajares, 1996; Majer, 2009; Multon, Brown, & Lent, 1991; Poyrazli & Kavanough, 2006), raising the question of whether graduate students who report lower academic self-efficacy may use stimulants at a higher rate in order to cope with academic demands. Previous investigations have likewise observed academic self-efficacy to correlate with symptoms of impaired psychological functioning among university students, including depression (Lavasani, Khezriazar, Amani, & Malahmadi, 2011) anxiety (Ghaderi, 2010; Lavasani, Khezriazar, Amani, & Malahmadi, 2011; Muris, 2002), and stress (Chemers, Hu, & Garcia, 2001; Lavasani, Khezriazar, Amani, & Malahmadi, 2011).

The present study investigated the prevalence of non-medical prescription stimulant use by graduate students in an attempt to determine whether the rate of non-medical use in this population would be commensurate with usage rates observed in the undergraduate, law, and medical student populations. The study also attempted to discern the relationship between perceived knowledge and safety of stimulant medications and

non-medical use, i.e. to determine whether students who reported using stimulants perceived greater self-knowledge about these medications and their safety. The study also attempted to explore the relationship between non-medical use of prescription stimulants and academic self-efficacy to explore whether students who felt less capable of achieving their academic goals were more likely to use stimulants without a prescription. Last, the study attempted to identify psychological factors including anxiety, depression and stress which predicted self-reported non-medical use of stimulants among graduate students. The overarching goal of the present study was to clarify the nature of non-medical stimulant use among graduate students to help identify sub-populations of graduate students who may be at increased risk for use, as well as to inform prevention and intervention strategies designed to address non-medical use of prescription stimulant medication among graduate students.

University Students with ADHD: Academic, Social, and Psychological Functioning

In terms of academic functioning, college students with ADHD and those with significant ADHD symptomatology have been found to demonstrate impaired functioning when compared with their non-diagnosed peers. A 2010 study of undergraduate students diagnosed with ADHD (Advokat, Lane, & Luo, 2010) found that students with ADHD reported lower grade point averages than peers and reported more frequent withdrawal from courses in which they were enrolled. These findings supported results of previous investigation (Blase, Gilbert, Anastopoulos, Costello, Hoyle, Swartzwelder, & Rabiner, 2009; Heiligenstein, Guenther, Levy, Savino, & Fulwiler, 1999), which found that undergraduate students diagnosed with ADHD reported lower mean grade point averages that non-diagnosed peers. Participants in the latter study were

also more likely to report being placed on academic probation and to report greater overall academic problems. Both inattention and hyperactivity have been observed to uniquely contribute to GPA deficits among undergraduate students with ADHD (Schwanz, Palm, & Brallier, 2007).

A recent investigation into the specific types of academic challenges faced by undergraduates with ADHD (Lewandowski, Lovett, Codding & Gordon, 2008) indicated that university students with ADHD reported significantly more difficulties with having to re-read material repeatedly for comprehension, taking longer than peers to complete assignments, failing to finish timed tests, failing to perform well on standardized tests, and feeling as though they needed to work harder than peers to get good grades. Short-term academic deficits have also been noted among university students with ADHD. A 2013 investigation of various aspects of functioning among undergraduate students with ADHD found the students to report significantly lower grades than peer control group members on weekly reports of test, quiz, and writing assignment grades (Weyandt, DuPaul, Verdi, Rossi, Swentosky, O'Dell et al., 2013). These short-term academic challenges may ultimately threaten the long-term academic outcomes of college students with ADHD. Regarding the ability of undergraduate students with ADHD to complete their degree, a 2002 study found that young adults with ADHD were significantly less likely to graduate from college than a comparison group from the community (Murphy, Barkley, & Bush). Negative outcomes such as lower GPA and a reduced likelihood to graduate from their university within a set time period are not exclusive to university students in the United States, and a recent study in the U.K. observed similar outcomes among university undergraduates with ADHD (Pope, 2010).

The social functioning of college students with ADHD has also been explored in several recent studies. Findings are limited, but suggest that college students with ADHD are more likely to report difficulty in interpersonal relations, less well-developed social skills, lower levels of social adjustment, and diminished levels of self-esteem. Specifically, students with ADHD have reported poorer quality of life in a number of distinct domains, including parent-child relations, political behavior, personal growth, and social desirability (Grenwald-Mayes, 2002). Shaw-Zirt, Popali-Lehane, Chaplin, & Bergman (2005) examined the social adjustment of university students with ADHD and noted significant impairments in Academic Adjustment, Social Adjustment, Personal-Emotional Adjustment, Attachment and Goal Affiliation, and Total Adjustment of students with ADHD when compared with their non-afflicted peers. The same study found the students with ADHD to report significantly lower levels of perceived social skills and self-esteem as compared with peers.

The social functioning of university students with ADHD also differs from that of peers when school-based and romantic social interactions are considered. Weyandt et al. (2013) observed university students with ADHD to report significantly impaired social adjustment related to their role as students, although no significant impairments were reported pertaining to social adjustment in social and leisure activities or relationships with family. Impaired functioning in social functioning in the context of an intimate relationship has also been observed among university students with ADHD, with diagnosed students reporting significantly lower levels of romantic satisfaction that peers (Overbey, Snell, & Callis, 2011).

The existing literature also suggests that the psychological functioning of college students with ADHD differs from that of peers without the disorder. For example, Heiligenstein and Keeling (1995) found that undergraduate and graduate college students with ADHD were more likely than peers to exhibit symptoms of depression disorders, anxiety disorders, substance use disorders, and eating disorders. Regarding substance use, college students with ADHD have been found to be at greater risk than their peers for using alcohol and illicit substances, including tobacco, marijuana, and other illicit drugs (Blasé et al., 2009; Heiligenstein & Keeling, 1995; Murphy, Barkley & Bush, 2002; Upadhyaya et al. 2005).

Indeed, research has supported the notion that college students with ADHD experience elevated levels of psychological distress as compared those without the disorder. Specific differences include university students with ADHD reporting more depressive symptoms (Blase et al., 2009; Norvilitis, Ingersoll, Zhang, & Jia, 2008), lower emotional stability (Blase et al., 2009), greater levels of aggression (Kern, Rasmussen, Byrd, & Wittschen, 1999), greater internal restlessness, and greater overall psychological distress (Blase et al., 2009; Weyandt et al., 2003, Weyandt et al., 2009) as compared with peers. A more recent investigation by Weyandt et al. (2013) into the functioning of university students with ADHD found that these students reported significantly elevated levels of internalizing and externalizing symptomatology as compared with peer controls, including obsessive-compulsive symptomatology, depression, anxiety, hostility, and global psychological functioning.

It is important to note that conclusions based on the extant literature concerning university students with ADHD literature are limited due to significant methodological

problems observed in many investigations (DuPaul, Weyandt, O'Dell & Varejao, 2009). Some studies have included students based solely on self-report of diagnostic status, without confirming the presence of clinical symptoms through an independent evaluation. Further, few studies appear to have comprehensively evaluated psychopathological symptoms among control participants. Lastly, although many studies investigating ADHD in college students have identified the impact that the disorder can have on student functioning in a number of distinct areas, few have systematically examined multiple areas of functioning in a single sample of students. It is also important to note that the body of research concerning the academic, social, and psychological functioning of university students with ADHD focuses heavily on undergraduate students, and largely excludes graduate students. It seems likely that, given the expressed deficits in academic functioning of undergraduates with ADHD, fewer students with ADHD pursue graduate education than do non-diagnosed peers. Nevertheless, given the proportion of adults in the general population estimated to have ADHD and the identification of efficacious treatments to reduced ADHD symptomatology, it is reasonable to assume that a sub-population of graduate students with ADHD does exist. Further investigation into this sub-population is warranted in order to determine whether or not these students may be experiencing similar challenges to those observed among undergraduates with ADHD.

ADHD and Prescription Stimulant Medication

Treatment of ADHD symptomatology in university students and other young adults is similar to treatment of children with ADHD, with respect to the use of prescription stimulant medication. Although a variety of alternative treatments have been explored in managing ADHD symptomatology in children and adults, pharmacological

treatment has been identified as most effective treatment protocol in managing the disorder in both children and adults. Specifically, psychostimulant medication has been found to be the most effective treatment intervention for ADHD, and is the most widely used medication by individuals with ADHD. The number of adolescents and college students treated with prescription stimulants for ADHD has steadily increased in the past decade (Advokat, Lane & Luo, 2010; Kolar, Keller, Golfinopoulos, Cumyn, Syer, & Hechtman, 2008; Wilens, Spencer, and Biederman, 1998). Four stimulant medications are FDA-approved for treatment of the disorder: methylphenidate, dextroamphetamine, pemoline, and Adderall (Weyandt, 2006). Stimulant medication is thought to help alleviate symptoms of ADHD by increasing arousal of the central nervous system through increasing dopamine levels, thus "regulating" the dysfunctional frontro-striatal pathway (Weyandt, 2006). Stimulants increase the availability of dopamine in the brain by limiting reuptake of dopamine, facilitating neurotransmitter release, and in some cases, blocking reuptake of both norepinephrine and dopamine (DuPaul, Weyandt & Booster, 2009; Weyandt, 2006).

A robust body of research studies supports the utility of stimulant medications to treat ADHD in both children and adults. A 2009 study using fMRI technology found a single dose of methylphenidate to stimulate neural function in the fronto-striatal circuit of children with ADHD (Rubia, Halari, Cubillo, Brammer & Taylor). Methylphenidate has also been observed to effectively suppress activity of the neural network associated with task irrelevant mental processes and off-task cognitions in children with ADHD (Peterson et al., 2009). Stimulant medication has likewise been associated with decreased

dopaminergic activity in the caudate, as well as associated inattentive behaviors (Volkow, Wang & Newcorn, 2007) among children.

The literature documents benefits that stimulant medication extends to adults with ADHD as well, as a substantial body of controlled studies has found stimulants to reduce ADHD symptoms in adults with ADHD (Connor, 2006). Qualitative investigations have also suggested that stimulants may reduce symptoms and associated impairment in a number of areas of functioning, among university students with ADHD (Heiligenstein, Johnston, & Nielsen, 1996).

Because prescription stimulant medication has been cited as a particularly effective treatment for managing ADHD symptoms in children, adolescents and adults (Adler et al., 2009; Baverstock & Finlay, 2003; Prince, Wilens, Spencer, & Biederman, 2006; Wilens, Biederman & Spencer, 1998), stimulant medications are widely prescribed to manage ADHD symptoms in university students. Previous investigations have suggested that the medications reduce impulsivity and hyperactivity, increase attentional abilities, and reduce impaired psychological and social functioning among college students with ADHD (Advokat, Lane & Luo, 2010; DuPaul et al., 2011; DuPaul et al, 2009; Heiligenstein et al. 1996; Weyandt & DuPaul, 2006).

Although prescription stimulants are relatively safe when taken as prescribed, they are not without risks and side effects and are classified by the U.S. Food and Drug Administration (FDA) as Class II medications because they can be abused or lead to dependence (United States Food and Drug Administration, 2011). Still, data also exists to support the use of caution when considering stimulant medication to treat ADHD symptoms in both children and adults. Prescription stimulant medications have been

observed to cause a number of undesirable mental health side effects for individuals who take them, including increased anxiety and the onset of novel psychotic symptoms such as mania and auditory hallucinations (Curran, Byrappa, & McBride, 2004; Surles, May, & Garry, 2002; Murray, 1998; U.S. Food & Drug Administration, 2007). The emergence of such symptoms may be particularly problematic in young adults because symptoms of organic psychotic disorders such as schizophrenia frequently emerge in late adolescence or early adulthood (APA, 2000), making accurate differential diagnosis challenging for practitioners.

Psychostimulant medications have also been found to increase systolic blood pressure, diastolic blood pressure, and heart rate, all of which are cardiovascular risk factors (Hammerness, Surman, & Chilton, 2011; Stiefel & Besag, 2010). The FDA suggests that stimulant products should not be used in patients with serious heart problems, or for whom an increase in blood pressure or heart rate would be problematic, and that patients treated with stimulant medications should be periodically monitored for changes in heart rate and blood pressure (United States Food and Drug Administration, 2011). Emergency room visits involving prescription stimulant medications have become increasingly common in recent years. A report issued by the U.S. Substance Abuse and Mental Health Services Administration (SAMHSA, 2013) indicated that, although the number of emergency department visits involving stimulant medications did not increase significantly for children between 2005 and 2010, visits for adults increased from 13,379 in 2005 to 31,244 in 2010. Regarding non-medical use of stimulants, the number of emergency department visits increased from 5,212 to 15,585 (SAMHSA, 2013). The report indicated that other pharmaceutical drugs were also implicated in 45% of visits

involving stimulant medications, illicit drugs were implicated in 21% of visits involving stimulant medications, and alcohol was implicated in 19% of visits involving prescription stimulants.

Despite the documentation of cardiovascular side effects, however, a recently published twenty-year retrospective, population-based, cohort study found no association between use of psychostimulant medications and risk of serious cardiovascular events among young and middle aged adults (Habel et al., 2011). Early studies cite lower levels of efficacy for stimulants in treating ADHD, as in a 1993 meta-analysis that found stimulant medication to be largely ineffective for 25 to 40 percent of children with ADHD (Swanson et al., 1993). These early results stand in stark contrast to the body of contemporary research cited here, perhaps because of improvements in medication formulas or increased knowledge and understanding of ideal stimulant type, dosage levels, etc. by physicians. Higher rates of aversive side effects of ADHD medications have also been found when individuals have been diagnosed with a co-morbid disorder or disability in addition to ADHD. For example, lack of symptom improvement has been observed in samples of children who have both ADHD and a co-morbid anxiety disorder (Pliszka, 1999) or cognitive impairment (Handen, Feldman, Gosling, Breaux & McAuliffe, 1991). Additionally, qualitative and survey research supports the assertion that some university students with ADHD are ambivalent about their stimulant medication protocol, citing undesirable side effects and limited treatment benefits (Advokat et al., 2010; Loe & Cuttino, 2008). Nevertheless, having been empirically validated as a relatively safe and effective treatment for ADHD symptoms in children and adults, stimulant medications are often the first, and sometimes the only, intervention

used to ameliorate the impaired behavioral and cognitive and functioning associated with the pathology of ADHD in young adults.

Prevalence and Nature of the Non-Medical Use of Prescription Stimulants

Recent research has raised concerns that students with ADHD may give or sell their prescribed stimulants to their peers, or have reported their medication stolen by classmates (Rabiner et al., 2009; Weyandt et al., 2009). Regardless of the method by which students are obtaining the medication, stimulant medication has been reported to be accessible on university campuses (McCabe et al., 2005; Rabiner et al., 2009; Sharp & Rosen, 2007; Weyandt et al., 2009), and non-medical use of stimulants is a growing concern for educators and practitioners.

Recent investigations have identified widespread prescription stimulant use among undergraduate students (DeSantis et al., 2010; DuPont et al., 2008; Hall et al., 2005; Judson & Langdon, 2009; Low & Gendaszek, 2002; McCabe et al., 2005; Rabiner et al., 2009; Sharp & Rosen, 2007; Weyandt et al., 2009; White et al., 2006). Rates of reported past-year non-medical use vary across studies, and range from less than 5% to nearly 20% of students (DuPont et al., 2008; Judson & Langdon, 2009). A number of risk factors associated with increased use of prescription stimulants have been identified: students who are male, Caucasian, involved in Greek life, have a lower GPA, report greater "academic strain," and/or live in the Northeastern United States more likely to report non-medical stimulant use (Advokat, Guidry & Martino, 2008; DuPaul et al., 2009; Dussault & Weyandt, 2013; Ford & Schroeder, 2009; McCabe et al., 2005; White et al., 2006). Psychological variables have also been observed to associate with prescription stimulant use, and variables associated with non-medical use, including

overall psychological distress, depression, anxiety, sensation-seeking, and internal restlessness (Dussault & Weyandt, 2013; Peterkin et al., 2011; Rabiner et al., 2009; Teter, Falone, Cranford, Boyd & McCabe, 2010; Weyandt et al., 2009).

Indeed, non-medical stimulant use is not exclusive to adolescents and college students, and has also been observed among professional students and other young adults. Young adults appear to use stimulants regardless of educational trajectory, and non-medical use among non-students has been reported by 4.3% of adults aged 18-25 (Novak et al., 2007). Although a growing body of research has focused on non-medical stimulant use among undergraduates, the literature has yet to specifically examine use among graduate students, a population at risk for non-medical use because of increased stress levels and heightened academic demands. A study including both undergraduate and graduate students (Prudhomme et al., 2006) found that 11% of students over the age of 24 (graduate students comprised 74% of this age group) endorsed non-medical use, along with 16.9% of the overall sample. McNiel et al. (2011) found that 12.4% of dental and dental hygiene students reported non-medical use of prescription stimulants. Medical school students (10.1%; Frick, Frick, Coffman & Dey, 2011) and students enrolled in an accelerated doctor of pharmacy program (11.6%; Tuttle, Scheurich & Ranseen, 2010) report similar rates of non-medical use. Researchers examining stimulant use among medical students posited that non-medical use among post-graduate students may relate to observed associations between stimulant use and perfectionism, application to competitive programs, and desire for academic success (Low & Gendaszek, 2002; McCabe et al., 2005; Teter et al., 2005).

Psychological Functioning Among Graduate Students

The lack of research exploring non-medical prescription stimulant use in the graduate population is surprising given the observed association between use and several aspects of psychological functioning, including depression (Rabiner et al., 2009b; Teter et al., 2010; Weyandt et al., 2009) anxiety (Dussault & Weyandt, 2013; Weyandt et al., 2009), and stress (Janusis & Weyandt, 2010). Investigations have identified high rates of perceived stress among students, associated with poor sleep hygiene, inadequate social support, poor emotion regulation, lack of exercise and underdeveloped coping mechanisms (McKinzie et al., 2006; Myers et al., 2012; Nelson et al., 2001). Graduate students from a variety of programs report elevated levels of stress stemming from: academic coursework, research projects, clinical training, performance anxiety, institutional demands, lack of experience, time constraints, sleep deprivation, limited free time, competitive peer environment, interpersonal relationships and financial strain (Badali & Habra, 2003; Levey, 2001; Nelson et al., 2001).

A 2009 study by the American Psychological Association's Advisory Committee on Colleague Assistance of psychology graduate students found that 70% of participants reported having experienced significant stress during the previous year (ACCA, 2009, in El-Ghoroury, 2011). Stress levels among graduate students may vary according to the nature, pace and duration of the graduate program; students in an accelerated 3-year doctoral program reported significantly more stress than a comparison group from a 4-year program (Frick et al., 2011). Ultimately, stress may manifest in internalizing disorders, and anxiety and depression have been observed to be highly prevalent among

graduate, law, and medical students (Aktekin et al., 2001; Dammeyer & Nunez, 1999; Dyrbye et al., 2006; Eisenberg et al., 2010; Helmers et al., 1997).

Academic Self-Efficacy Among University Students

A student's perceived level of capability to meet task demands may also influence their academic and psychological functioning, and academic self-efficacy has been associated with both academic functioning and psychological adjustment in undergraduate and graduate students (Chemers, Hu, & Garcia, 2001; Hackett, Betz, Casas, & Rocha-Singh, 1992; Multon, Brown, & Lent, 1991; Pajares, 1996; Majer, 2009; Zajacova, Lynch & Espenshade, 2005). Self-efficacy, a concept introduced by Bandura (1986), references one's self-evaluation of competence to successfully reach one or more desired outcomes. Academic self efficacy refers to a student's self-perceptions concerning their abilities to achieve specific academic goals. A 1991 meta-analysis of research on the correlation between self-efficacy and academic success (Multon, Brown, & Lent) found that self-efficacy was positively, significantly, and reliably correlated with academic success and academic performance in university students. A 2001 study observed that academic self-efficacy was directly correlated not only with levels of academic achievement, but also with psycho-social adjustment among undergraduate students, and academic self-efficacy was observed to mediate effects for academic expectations, academic performance, stress, health, overall satisfaction, and commitment to remain enrolled in school (Chemers, Hu, & Garcia). Zajacova, Lynch, & Espenshade (2005) investigated the relationship between the academic self-efficacy, stress levels, and academic success of undergraduate students, ultimately finding that academic self-

efficacy was more predictive of academic success (as measured by overall grade point average and number of accumulated credits) than stress.

These findings have been replicated in mixed-gender and ethnically diverse samples as well. Majer (2009) explored academic-self efficacy in an ethnically diverse sample of community college students, finding that baseline rates of self-efficacy were predictive of academic success (as measures by overall grade point average) one year into the academic program. Hackett, Betz, Casas, & Rocha-Singh (1992) investigated the relationships between academic self-efficacy, vocational interests, outcome expectations, academic ability, perceived stress, support, coping, and academic achievement, finding that self-efficacy for academic milestones was the strongest predictor of college academic achievement for a sample of undergraduate students enrolled in engineering programs.

While the majority of investigations concerning academic self-efficacy focus on undergraduate university students, a 1998 study (Santiago & Einarson) was conducted focusing specifically on the academic self-efficacy of graduate students. Investigators used data from the Graduate Experience Project to examine possible predictors of academic self-confidence, academic self-efficacy, and outcome expectations of science graduate students. Santiago and Einarson hoped to determine whether gender or ethnic differences among graduate students may be associated with differences in academic self-confidence and self-efficacy. Further, investigators hoped to discover whether student background characteristics would predict academic self-confidence or academic self-efficacy, with the ultimate goal of better identifying subsets of students at risk for attrition in order to inform preventative programmatic supports. Results suggested that neither gender nor ethnicity were predictive of academic self-efficacy at the time students

entered the program. Results provided some insight into factors that appeared to predict academic self efficacy among graduate students, however, including: student perceptions of academic preparedness, status-related disadvantages, and expectations about faculty/student interactions.

A more recent investigation (You & Chen, 2012) considered the relationship between academic self-efficacy, academic stress, optimism and suicidal ideation in a population of Chinese doctoral students. Results suggested that students with lower levels of academic self-efficacy reported higher levels of academic stress and greater likelihood of suicidal ideation. Academic self-efficacy was also found to predict student optimism, and both factors acted as mediators between academic stress and suicidal ideation. In another recent study examining the relationship between academic self-efficacy and psychological functioning among graduate students, Ghaderi (2010) examined the relationship between self-efficacy and anxiety in a sample of masters-level and doctoral-level students. Previous investigations have found self-efficacy to correlate with symptoms of impaired psychological functioning among children and adults, including depression (Bandura, Pastorelli, Barbaranelli, & Caprara, 1999; Lavasani, Khezriazar, Amani, & Malahmadi, 2011) anxiety (Lavasani, Khezriazar, Amani, & Malahmadi, 2011; Muris, 2002), and stress (Chemers, Hu, & Garcia, 2001; Lavasani, Khezriazar, Amani, & Malahmadi, 2011). Lavasani and colleagues (2011) specifically explored the relationship between academic self-efficacy, academic goals, and levels of depression, anxiety and stress among undergraduate students, finding that academic self-efficacy was predictive of stress, anxiety and depression, irrespective of academic field of study.

Ghaderi (2010) collected data from 80 male graduate students and 80 female graduate students at an Indian university. Because the study also considered possible effects for country of origin, as well as gender, half of the students were of Indian descent, and half were of Iranian descent. All students were enrolled on a full-time basis in masters or doctoral-level programs, and students from a variety of academic departments were sought to participate. While no gender effect emerged, results indicated that Indian students endorsed greater anxiety than their Iranian counterparts, that masters-level students endorsed higher levels of anxiety than doctoral-level students. Notably, results also indicated that students with lower expressed academic self efficacy reported significantly higher levels of anxiety.

Psychological and Academic Functioning and Risk for Non-Medical Stimulant Use

A number of psychological and academic variables have been observed to associate with the non-medical use of prescription stimulants. Relevant psychological variables include depression (Huang, Dawson, Stinson, Hasin, Ruan, Saha, et al., 2006; Poulin, 2007; Teter, Falone, Cranford, Boyd & McCabe, 2010), anxiety (Dussault & Weyandt, 2013; Weyandt et al., 2009), stress (Dussault & Weyandt, 2013; Peterkin, Crone, Sheridan & Wise, 2011), and internal restlessness (Dussault & Weyandt, 2013, Weyandt et al., 2009). In perhaps the largest, most well-designed study considering the non-medical use of prescription stimulants, Huang et al. (2006) analyzed data derived from a large (N = 43,093), representative sample of adults in the United States that was related to the non-medical use of a variety of prescription medications. Greater non-medical use of prescription stimulants (specifically, amphetamines) was reported by 4.7% of participants, and higher rates of abuse and dependence of these medications were

reported than any other category of medication (2%). Results indicated that individuals with previously diagnosed Axis I and Axis II disorders were more likely to report the non-medical use of prescription drugs, and non-medical use of amphetamines was significantly associated with depressive symptoms. The non-medical use of prescription stimulants has also been found to associate with elevated levels of reported depression among adolescents (Poulin, 2007). The non-medical use rates of methylphenidate and amphetamine use were 6.6% and 8.7%, and use was associated with positive screening results for ADHD symptomatology and depression symptomatology, among participants. Poulin suggested that that the non-medical use of prescription stimulants may indicate the presence of undiagnosed pathology in adolescent students who use the medications. Teter et al. (2010) investigated the relationship between depressed mood and the non-medical use of prescription stimulants among undergraduate university students and found that frequent users of non-medical use of prescription stimulant medications and users who endorsed non-oral routes of administration indicated significantly higher levels of depressive symptomatology. Indeed, students who reported frequent non-medical use of prescription stimulants were twice as likely as peers to report significantly depressed mood over the previous month.

Weyandt et al. (2009) investigated the relationship between the non-medical use of prescription stimulants by university students and various aspects of psychological functioning. Results indicated that non-medical use of prescription stimulants was correlated with overall psychological distress, as measured by total score on the Brief Symptom Inventory. Non-medical use of prescription stimulants was also correlated with self-reported symptoms relating to Somatization, Obsessive-Compulsive, Interpersonal

Sensitivity, Depression, Anxiety, Hostility, Phobic Anxiety, Paranoid Ideation, and Psychoticism (Weyandt et al., 2009). The relationship between the non-medical use of prescription stimulant medications and self-reported anxiety among undergraduate university students has also been demonstrated in more recent research. In 2013, Dussault & Weyandt investigated the relationship between the non-medical use of prescription stimulant medications and self-reported levels of depression, anxiety and stress. While associations between reported level of depression and non-medical stimulant use were not observed, the non-medical use of prescription stimulants was positively associated with self-reported levels of anxiety, as well as stress. Self-reported internal restlessness has also been positively associated with the nonmedical use of prescription stimulants among undergraduate university students (Dussault & Weyandt, 2013; Weyandt et al., 2009). Specifically, Dussault & Weyandt observed increased levels of self-reported internal restlessness and internal impulsivity to correlate with self-report of non-medical prescription stimulant use, while Weyandt et al. noted a significant positive correlation between self-reported non-medical use and self-reported internal distractibility, internal impulsivity, and internal disorganization.

Many undergraduate students report engaging in the non-medical use of stimulants during academic activities, such as studying, test-taking and writing papers (DeSantis, Noar & Webb, 2010; DuPont et al., 2008; Rabiner et al., 2009; Sharp & Rosen, 2007; Weyandt et al., 2009), suggesting that university students reporting concerns associated with academic functioning may also be at increased risk for non-medical use of stimulant medication related to academic demands. In Peterkin et al.'s (2011) investigation of non-medical stimulant use among university undergraduates, the

most common reason participants provided to justify their use was "to improve study skills," with 89% of students who reported non-medical use endorsing that motivation. When motivations for non-medical use of prescription stimulants were classified as either academic or non-academic in nature, a significant majority of participants (87%) endorsed academic motivations. DeSantis, Noar & Webb's (2010) investigation of non-medical stimulant use among fraternity members also indicated that most users reported academic factors as a motivator for use, with 74% of participants indicating that they used the medications to stay awake while studying, 59% indicating that they used the medications to improve concentration while studying, and 30% indicating that they use the medications to help them memorize course material.

Statement of Purpose

Although a substantial number of studies have been conducted examining stimulant use among undergraduates, the literature has yet to specifically assess non-medical use among a diverse cross-section of graduate students, a population which has previously reported elevated levels of stress, anxiety and depression, factors which have been associated with non-medical use among undergraduates. To date, no studies have explored the relationship between academic self-efficacy, psychological variables, and internal restlessness with non-medical use of these medications among graduate students. The purpose of the present study is to examine the prevalence and nature of non-medical prescription use among graduate students, and to explore the relationship between such use with academic and psychological variables. It is suggested that results of such an investigation could potentially be used to identify sub-populations of graduate students who may be at risk for non-medical use of stimulant medication, and to inform prevention and intervention strategies designed to address non-medical use among graduate students. For the purposes of the current investigation, the term "non-medical use" was used to describe use of prescription stimulants by individuals other than those for whom the medication was prescribed.

Research Hypotheses

- It was hypothesized that non-medical use of stimulants would be reported by graduate students at rates similar to those reported by professional and medical students (8% or greater reporting non-medical use over the past 12 months), as reported on the *Self-Reported Prescription Stimulant Use* and *Perception of Prevalence of Prescription Stimulant Use Among Peers* subscales of the *Stimulant Survey Questionnaire* (SSQ; Weyandt et al., 2009).
- Further, it was hypothesized that graduate students who reported non-medical use of stimulants would report greater perceived self-knowledge regarding stimulants, and regard stimulant use as being safer than graduate students who do not use stimulants, as measured by the *Perception of Safety of Stimulants* subscale of the SSQ (Weyandt et al., 2009).
- It was also hypothesized that graduate students who reported non-medical use of stimulants would endorse lower academic self-efficacy ratings than peers who did not report non-medical use of stimulants, as measured by the *Academic Self-Efficacy Scale* (ASES; Santiago & Einarson, 1998).
- Additionally, it was hypothesized that graduate students who report non-medical use of stimulants would endorse higher ratings of depression, anxiety and stress than peers who did not report non-medical use of stimulants, as measured by the *Depression, Anxiety Stress Scales-21* (Lovibond & Lovibond, 1995).
- Finally, it was hypothesized that graduate students who report non-medical use of stimulants would endorse higher ratings of internal restlessness than

peers who did not report non-medical stimulant use, as measured by total and subscale scores on the *Internal Restlessness Scale* (Weyandt et al., 2003).

Method

Participants

Participants were 807 male and female graduate students from a variety of masters-level, specialist-level and doctoral-level graduate programs in the United States. Participants were recruited from five public universities located in regions of the United States: Northeast, Southeast, Central-Midwest, Northwest, and Southwest. Universities from various regions of the nation were included in an effort to obtain a diverse, geographically representative sample of participants. Each university identified for inclusion was previously the site of at least one investigation of non-medical prescription stimulant use among students at the undergraduate level (University of Rhode Island, Weyandt et al., 2009; University of Michigan, Teter et al., 2010; University of Central Florida, Ford & Schroeder, 2009; San Diego State University, Shillington, Reed, Lange, Clapp & Henry, 2006; and the University of Washington, Dussault & Weyandt, 2013).

A total of 854 students completed the survey measures online. Of this total, 33 students (3.7% of total respondents) reported currently taking stimulant medication as prescribed by a health care provider, and were excluded from the sample. An additional 14 students provided consent but did not complete sufficient items for analysis, and were eliminated from the sample. A power analysis performed prior to data collected suggested that with expected effect size being small (f = .1), a series of two-group univariate ANOVAs would require a minimum of 788 participants. A power analysis was also conducted based on multiple regression with alpha level set at .05, and power set at .80. With expected effect size being small (f2 = .02), a minimum of 688 participants was suggested. As such, the final sample size of the present study (N = 807) was

calculated to have adequate power for detection of expected effect sizes in the variables of interest given the anticipated analyses. The sample was also determined to have met recommended requirements of ratio of cases to independent variables (Tabachnick & Fidell, 2007).

The five universities were not equally represented within the sample, with the largest proportion of participants coming from the university located in the Northeast (37%). Twenty-four percent of participants were enrolled at a university in the Midwest, 17.8% at a university in the Southeast, 14.1% at a university in the Southwest, and 4.5% at a university in the Northwest. A small number of participants, comprising 1.8% of the total sample, reported that they were enrolled at a university other than the five universities targeted by the researcher. Because no comparisons were made between universities, the disproportionate representation of universities/geographic regions did not affect analyses. A majority of participants were female (72.1%), with 26% of participants identifying as being male and 1.9% indicating that they preferred not to disclose their gender. A majority of participants (65.8%) reported being between 22 and 29 years of age. A majority of participants (76.6%) identified their ethnicity as being White/European American; while 8.6% of participants self-identified as Latino/Hispanic American, 6.3% as Asian/Asian American, 2.2% as Multiethnic, 1.9% as Black/African American, and .4% as Native American/American Indian. Additional demographic information pertaining to gender, age, and ethnicity at each university is provided in Table 1.

Participants reported being enrolled in master's-level (43.5%), specialist-level (1.9%), and doctoral-level (53.9%) degree programs. Students reported various fields of

study, including: Computer Science/Information Technology, Education, Engineering, Fine Arts & Design, Health Industry, Public Services, Humanities, Medical and Health Professions, Mental Health Professions, Biomedical Sciences, Environmental Sciences, Natural/Physical Sciences, and Social Sciences. Graduate students from Social Sciences programs were most heavily represented within the sample, comprising 26.8% of the total sample. Additional demographic information pertaining to academic enrollment of participants is provided in Table 2.

Demographic information was also collected from participants pertaining to mental and physical health. Participants endorsed a variety of previous diagnoses related to impaired psychological functioning, including Attention-Deficit Hyperactivity Disorder, Anxiety, Depression, Bi-Polar Depression, Eating Disorder, and Specific Learning Disability. Because participation was anonymous, previous diagnoses could not be verified. A small number of participants reported currently having a major physical disability. Students who endorsed a physical or mental disability were asked to indicate whether they had registered with the disability support services on their campus; 1.9% of participants reported having done so. Additional demographic information pertaining to the reported history of physical and mental disabilities among study participants is provided in Table 3.

Measures

Demographic Information Form

Demographic information was obtained via a short self-report questionnaire developed by the investigator (Appendix E). The form requested basic demographic information, including participant age, gender, ethnicity, university, and degree program.

Students were also asked to indicate whether or not they have been diagnosed with ADHD, and whether they possessed a current medical prescription for stimulant medication. Graduate students who report having ADHD were not excluded from participation; however, those endorsing a current prescription for stimulant medication were excluded.

Stimulant Survey Questionnaire (SSQ)

Forty items comprise the SSQ (Weyandt et al., 2009), which was designed to assess the medical and non-medical use of prescription stimulant medications among college students. The SSQ also examines attitudes toward and knowledge about prescription stimulant use among other students). The majority of the survey (30 items) is formatted as a series of statements to which participants endorse responses on a 5-point Likert scale. For 20 of those items, the possible values endorsed range from 1 ("*never"*) to 5 ("*always"*), and for the remaining ten items, a value of 1 signifies that the respondent "*strongly disagree[s]"* with the statement, and a value of 5 indicates that the respondent "*strongly agree[s]."* The final ten items are presented in a dichotomous forced-choice format. The SSQ generates a total score, and items have been observed to load on four factors: (1) *Self-reported prescription stimulant use*, (2) *Perception of prevalence of prescription stimulant use among peers*, (3) *Knowledge of atypical stimulant use among peers*, and (4) *Perception of safety of stimulants* (Weyandt et al., 2009).

Preliminary analysis found the SSQ to have adequate internal consistency (α = .85; Weyandt et al., 2009). A principal-axis factor analysis indicated that the four factors accounted for 51.11% of the total variance. Internal consistency varied across the factors: self-reported prescription stimulant use (α = .92), perception of prevalence of prescription

stimulant use among peers (α = .43), knowledge of atypical stimulant use among peers (α = .61), and perception of safety of stimulants (α = .61; Weyandt et al., 2009). Internal consistency of the measure and factors has been observed to be adequate in subsequent investigations (Dussault & Weyandt, 2013; Janusis & Weyandt, 2010), with rates of internal consistency on one factor (the perception of safety of stimulants) comparatively low (α = .62), but stable across studies. In the present study, internal consistency varied somewhat across factors but was adequate: self-reported prescription stimulant use (α = .87), perception of prevalence of prescription stimulant use among peers (α = .89), knowledge of atypical stimulant use among peers (α = .63), and perception of safety of stimulants (α = .69). An excerpted copy of the SSQ (Appendix F) is included. For the present study, the total and subscale scores of the SSQ each served as dependent variables for analyses.

The Internal Restlessness Scale (IRS)

The IRS (Weyandt et al., 2003) is a self-report instrument that attempts to measure mental restlessness among college students. Twenty-four statements related to internal restlessness comprise the scale, for which respondents must endorse a Likert-style response. Responses indicate for what proportion of the time each statement is true for participants, and options range from a value of 1 ("*none of the time"*) to 7 ("*all of the time"*). The IRS also generates a total score, and items have been observed to load on four factors: *Internal distractibility, internal impulsivity, internal restlessness,* and *internal disorganization* (Weyandt et al., 2003).

Previous studies utilizing the IRS have demonstrated adequate test– retest reliability, construct validity, and concurrent validity of the IRS based on correlations

with self-report instruments frequently used to assess ADHD in young adults (Weyandt et al., 2003; Weyandt, Hays, & Schepman, 2005). More recent studies with undergraduate students have raised concerns about the construct validity of the scale given the relatively low internal consistency observed in two of the proposed factors (*internal impulsivity* (α = .66); *internal disorganization* (α = .51)), but overall internal consistency for web administration of the IRS is commensurate with that observed in traditional administration (Dussault & Weyandt, 2013). An excerpted copy of the IRS (Appendix G) is included. Internal consistency for the present sample was as follows: *internal distractibility (*α = .89); *internal restlessness (*α = .79); *internal impulsivity* (α = .88); *internal disorganization* (α = .77). For the present study, the total and subscale scores of the IRS each served as dependent variables for analyses.

The Depression Anxiety Stress Scale -21 (DASS-21)

The DASS-21 (Lovibond & Lovibond, 1995) is a self-report measure designed to assess levels of anxiety, depression and perceived stress among adults. The scale asks respondents to use a Likert-style reply format to indicate how often a series of statements have applied to them during the preceding seven days. Response options on the 4-point scale include values from 0 ("*did not apply to me at all"*) to 3 ("*applied to me very much/most of the time"*; Lovibond & Lovibond, 1995).

Previous research has found internal consistency to be quite high on each of the three subscales: depression (α = .91; α = .97), anxiety (α = .81; α = .92), stress (α = .88; α = .92; Antony, Bieling, Cox, Enns, & Swinson, 1998; Lovibond & Lovibond, 1995). The present study demonstrated adequate internal consistency on each of the three subscales as well: depression (α = .89), anxiety (α = .76), stress (α = .88; α = .87). The DASS-21

has also demonstrated high rates of concurrent validity when examined against lengthier, well-established measures including the Beck Depression and Anxiety Inventories (Antony et al., 1998). A recent investigation of the psychometric properties of the DASS-21 scales when administered online noted that while the combination of all items may not be an appropriate measure of overall psychological distress, the three subscales demonstrated adequate internal consistency reliability, unidimensionality and freedom from differential item functioning for sex, age and mode of administration when considered independently (Shea, Tennant & Pallant, 2009). An excerpted copy of the DASS-21 (Appendix H) is included. For the present study, the Depression, Anxiety, and Stress subscale scores of the DASS-21 each served as dependent variables for analyses.

Academic Self-Efficacy Scale

The Academic Self-Efficacy Scale (ASES; Santiago & Einarson, 1998) is a 10-item, self-report measure designed to assess graduate students' perception of their ability to meet a variety of academic demands. The scale asks respondents to use a Likert-style reply format to indicate how confident they are in their abilities to complete a number of tasks, endorsing a belief that that are "*very*," "*somewhat*," or "*not at all confident"* in their abilities to complete activities including: completing their degree in a timely manner, handle course work, and conduct research. Total possible scores range from 0, indicating a very low degree of self-efficacy, to 20, indicating a very high degree of self-efficacy. Previous investigations have noted a high degree of internal consistency across items (r = .80; Santiago & Einarson, 1998), and internal consistency calculated on the present sample was adequate (α = .79). An excerpted copy of the ASES (Appendix I) is

included. For the present study, the total score of the ASES served as a dependent variable for analyses.

Procedure

Following approval of the study by the Institutional Review Board at the University of Rhode Island, program directors and department chairs on each of the five campuses were contacted via email. Contacts were provided with a synopsis of the study as well as a request for facilitation of the solicitation of participation from graduate students [Appendix A]. In the absence of a reply following the initial email contact, two reminder emails were sent at ten-day intervals. Students from all master's-level, specialist-level and doctoral-level graduate programs were eligible to participate, in an effort to obtain a diverse and representative sample of participants [Appendix B]. A link was included in the email which enabled students to access the informed consent forms, all associated survey measures, and debriefing materials. Interested department chairs and program administrators were asked to distribute the email containing the link to students who may be eligible and willing to participate. Participants were instructed to enter a secure and encrypted screen hosted via the website for commercial research platform *SurveyMonkey* and prompted to read the informed consent document. After confirming that they had read the document, participants were encouraged to print the informed consent form for future reference. Participants who provided consent were presented with electronic versions of five measures: a demographic survey designed by the researcher, the *Stimulant Survey Questionnaire* (Weyandt et al., 2009), the *Internal Restlessness Scale* (Weyandt et al., 2003), the *Academic Self-Efficacy Scale* (Santiago & Einarson, 1998), and the *Depression Anxiety Stress Scale -21* (Lovibond & Lovibond,

1995). After completing all measures, participants were provided with a virtual debriefing of the study, including specific information about mental health support services available on campus and information about how to contact the researchers directly if desired (debriefing materials included in Appendix C). Data were collected in several waves between November 2012 and March 2013.

Graduate students who logged on to the study's website were required to document having viewed the informed consent form (Appendix D) before they were permitted to complete the measures. Students who did not provide consent were excluded from the study. Unfortunately, data could not be compiled from the research platform on how many potential participates accessed the link but failed to consent. The informed consent form contained contact information for the primary investigator, and indicated that if participants desired further information before choosing to participate in the study, contact could be established via email or telephone. This form detailed the requirements and responsibilities of participating in the study, including a basic description of the research project (timeline, potential for harm, confidentiality, etc.). Participants were made aware that they had the opportunity to discontinue participation in the assessment at any time without penalty. Participants were encouraged to print a copy of the form for future reference in the case of undesired effects associated with participation or a desire to access a copy of the final report.

Results

The independent variable of interest in this study was reported non-medical use of prescription stimulants, as assessed via SSQ Factor 1: Self-Reported Use. Dependent variables included: perception of stimulant safety (as assessed via the Perception of Safety of Stimulants factor of the SSQ, Weyandt et al.,2009); reported internal restlessness (as assessed via total score and the Internal Distractibility, Internal Impulsivity, Internal Restlessness, and Internal Disorganization factor scores of the IRS, Weyandt et al., 2003); reported levels of anxiety, depression and stress (as assessed via the Anxiety, Depression, and Stress factor scores of the DASS-21, Lovibond & Lovibond, 1995); and academic self-efficacy (as assessed via the total score of the ASES, Santiago & Einarson, 1998).

Exploratory descriptive analyses were conducted on a number of demographic characteristics, including categorical variables pertaining to both academic (e.g. program focus, terminal degree) and non-academic characteristics (e.g. gender, age, ethnicity). Prior to statistical analysis, all responses to the Demographic Questionnaire, the DASS-21, the SSQ, the IRS, and the ASES were numerically coded and entered into SPSS 21.0. Data accuracy was checked using preliminary descriptive analyses (e.g. frequency distributions) and spot-checks. Preliminary assumption testing was conducted in accordance with the guidelines advanced by Tabachnick & Fidell (2007). Means, standard deviations, and internal consistencies of the SSQ, DASS-21, IRS, and ASES were calculated, and are included in Table 4. Correlational analyses were performed to assess the relationships between the four measures, and are included in Tables 5-7.

Descriptive Statistics

The demographics of the sample were compared with university enrollment data for each of the five universities gathered via the Common Data Set Initiative (The College Board, Peterson's, and U.S. News & World Report: www.commondata.org). While the sample was consistent with the universities' overall graduate student populations in terms of ethnicity, participants in the present sample were disproportionately female. Female participants comprised 72.1% of the total sample, whereas female students comprised 56% of full-time graduate students enrolled at the five universities during the 2011-2012 academic year. A majority of participants (65.8%) reported being between 22 and 29 years of age and White/European American (76.6%). Participants reported being enrolled in master's-level (43.5%), specialist-level (1.9%), and doctoral-level (53.9%) degree programs. Participants endorsed a variety of previous diagnoses related to impaired psychological functioning, including Attention-Deficit Hyperactivity Disorder (9.3%), Anxiety (20.1%), Depression (21.9%), Bi-Polar Depression (2.2%), Eating Disorder (3.0%), and Specific Learning Disability (3.7%). These prevalence rates are similar to lifetime prevalence rates observed by Kessler, Berglund, Demler, Jin, & Walters (2005), who found that, over the course of the lifetime, 8.1% of individuals will be diagnosed with Attention-Deficit Hyperactivity Disorder, 28.8% will be diagnosed with an Anxiety Disorder, and 3.9% with Bi-Polar Depression. A small number of participants (1.9%) reported currently having a major physical disability. Additional descriptive statistics pertaining to the demographics of the sample can be found in Tables 1, 2, and 3.

Preliminary Data Analysis

Hypotheses were tested using a series of univariate Analyses of Variance (ANOVA) and standard multiple regression analyses. Preliminary assumption testing was conducted in accordance with the guidelines advanced by Tabachnick & Fidell (2007) with regard to: unequal sample sizes, missing data, normality, linearity, outliers, homogeneity of variance, homogeneity of regression, ratio of cases to independent variables, normality, linearity, homoscedasticity, outliers, multi-collinearity, and singularity. Assumptions related to unequal sample sizes were of primary concern, given the fact the group failing to endorse previous non-medical use of prescription stimulants was far larger than the group reporting non-medical use of stimulants. In order to determine whether the disparate sample sizes would result in violations regarding homogeneity of variance or equality of means assumptions, Levene, Brown-Forsythe, and Welch statistics were calculated prior to analyses. Despite the significant disparity in sample sizes, results indicated that assumptions for homogeneity of variances and equality of means were met, and no further transformations or parametric modifications were required. Missing data ranged between .3% and 1.8%, well below the 5% level listed as indicative of concern suggested by Tabachnick & Fidell (2007). Violations of assumptions regarding outliers were noted, and data was adjusted per the re-coding technique (e.g. coded as one unit higher than the highest non-outlier value) suggested by Tabachnick & Fiddell (2007). The sample size (N = 807) was significantly greater than that required to meet the ratio of cases-to-independent variables assumption (N = 130). Skewness and kurtosis fell within suggested limits (Tabachnick & Fidell, 2007). Preliminary correlational analyses indicated that none of the measures were highly

correlated ($r \geq .90$), and Tolerance and VIF(variance inflation factor) statistics generated by the SPSS program also indicated that the sample was robust to assumptions of multicollinearity and singularity.

Graduate Students and the Non-Medical Use of Prescription Stimulant Medication

To investigate Hypothesis 1, that non-medical use of stimulants would be reported among graduate students at rates similar to those reported by professional and medical students (8% or greater reporting non-medical use over the past 12 months), descriptive statistics calculations were performed on specific items of the demographic questionnaire, the *Self-Reported Prescription Stimulant Use* subscale of the SSQ, and the *Perception of Prevalence of Prescription Stimulant Use Among Peers* subscale of the SSQ.

A notable proportion of participants (17.5% of the total sample) reported having previously used prescription stimulants for non-medical purposes. Overall, 5.9% of participants reported non-medical use of prescription stimulant use within the past year. Items from the Stimulant Survey Questionnaire provide some insight into the nature of and motivations for the non-medical use of prescription stimulants reported by students. Many of the most frequently reported motivations for use related to academic activities. Among students who endorsed past non-medical use of stimulant medication, the most frequently reported motivation for use was "to perform better in my schoolwork," which was endorsed by 16.2% of participants. 10.7% of participants reported having used stimulants "to focus better in class," with nearly as many (10.0%) endorsing having used the medication "to perform better on tests."

Not all reported use was related to academic activities, however. The second most frequently-reported motivation for use was "to feel more energetic," which was endorsed by 12.3% of participants. Substantial proportions of students reported having used prescription stimulants "with alcohol" (10.7%), "at parties" (8.9%), "to help [them] socialize better" (7.4%), and "to get high" (7.8%).

Participant data gathered from SSQ responses also provided insight into student behaviors and beliefs regarding stimulant use and peers. More than a quarter of students (27.9%) reported being offered prescription stimulant medication by other students, and 4.5% reported having purchased the medications from peers. Participants indicated a belief that peers were engaging in the non-medical use of stimulants to accomplish academic tasks. Academic activities were the most frequently cited perceived motivation for the non-medical use of stimulants by peers. Over a third of participants (36%) reported knowing other students who use the medications "during tests," with even higher numbers for the use of medications by peers "while studying" (43.8%) and "during finals week" (44.0%). Perceived social use among peers was also reported, with about 1 in 5 participants indicating that they knew students who use prescription stimulants "at parties" (20.4%), "with alcohol" (22.1%), and "with other drugs" (18.9%).

Prescription stimulant medications appear quite accessible on campus, and perceived as relatively safe among students, as nearly 1 in 4 participants (24.9%) indicated that they "agree" or "strongly agree" that "using prescription stimulants occasionally is harmless," and 15.2% of participants indicated a belief that the medications are "easy to get on this campus." Still, not all students are comfortable with the level of prescription stimulant use among peers: 23.3% of students agreed with the

statement that "prescription stimulant use on this campus is a problem." About a third of students indicated that they feel "knowledgeable about prescription stimulants" (30.5%) and about "the side effects of prescription stimulants" (32.7%). Additional information pertaining to the prevalence nature of self-reported stimulant use among participants, participant attitudes toward the non-medical use of stimulant medication, and perceptions of peer use of stimulants are included in Tables 8, 9, and 10, respectively.

For the purposes of further analysis, participants were assigned to groups based on endorsement of non-medical prescription stimulant use on the demographic questionnaire. A series of univariate ANOVAs was conducted on the two groups of participants: those who endorsed having used prescriptions stimulants without a prescription previously and those who did not. A series of ANOVAs was determined to be a more appropriate analytic method than a single MANOVA in recognition of the fact that several of the dependent variables were conceptually independent (Huberty & Morris, 1989). Means, standard deviations, effect sizes and F statistics for all ANOVAs are included in Table 11.

To investigate Hypothesis 2, that graduate students who endorse greater non-medical prescription stimulant use would report greater perceived self-knowledge regarding stimulants and regard stimulant use as being safer than graduate students who do not use stimulants, a one-way ANOVA was conducted, with the dependent variable being the *Perception of Safety of Stimulants* subscale of the SSQ. In support of Hypothesis 2, ANOVA results revealed a small but significant group effect for perception of safety, as students who reported a history of non-medical prescription stimulant use endorsed prescription stimulants as being safer than peers who did not report previous

non-medical use. Results were significant at a statistical significance level of .01: F (1, 799) = 15.197, $p < .001$, $\eta^2 = .019$.

Academic Self-Efficacy and the Non-Medical Use of Prescription Stimulant Medication

To investigate Hypothesis 3, that graduate students who endorse non-medical prescription stimulant use would report lower academic self-efficacy ratings compared to those who do not, a univariate ANOVA was conducted with the total score generated by the ASES as a dependent variable. ANOVA results initially revealed a small but significant group effect for academic self-efficacy. Although the results were significant at the .05 level, they did not reach the level of statistical significance required at the .01 level: F (1, 799) = 3.926, $p < .048$, $\eta^2 = .005$. In contrast to Hypothesis 3, this finding suggests that students who endorsed previous non-medical use of prescription stimulants did not report lower levels of overall academic self-efficacy than peers who did not report previous non-medical use.

Depression, Anxiety, and Stress and the Non-Medical Use of Prescription Stimulant Medication

Hypothesis 4, that graduate students who endorse non-medical prescription stimulant use would report higher ratings of depression, anxiety and stress, was tested via a series of univariate ANOVAs, with the dependent variables of interest being the *Depression, Anxiety, and Stress* subscales of the DASS-21.

Regarding self-reported depressive symptomatology, ANOVA results failed to reveal a significant group effect for self-reported depression, as measured by the Depression subscale of the DASS-21. Results were not significant at the .05 or .01 level:

F (1, 799) = 3.221, p = .073, η^2 = .004. This finding suggests that, in contrast to the hypothesis, students who endorsed previous non-medical use of prescription stimulants did not report higher levels of depressive symptomatology than peers who did not report previous non-medical use.

Regarding self-reported anxiety symptomatology, ANOVA results revealed a small but significant group effect for self-reported anxiety, as measured by the Anxiety subscale of the DASS-21. Results were significant at the .01 level: F (1, 799) = 12.44, p < .001, η^2 = .015, suggesting that, students who endorsed previous non-medical use of prescription stimulants reported higher levels of anxiety symptomatology than peers who did not report previous non-medical use.

Regarding self-reported levels of stress, ANOVA results revealed a small but significant group effect for self-reported stress level, as measured by the Stress subscale of the DASS-21. Results were significant at the .01 level: F (1,799) = 17.75, p < .001, η^2 = .022, suggesting that students who endorsed previous non-medical use of prescription stimulants reported experiencing higher levels of stress than peers who did not report previous non-medical use.

Internal Restlessness and the Non-Medical Use of Prescription Stimulant Medication

To investigate Hypothesis 5, that graduate students who endorse non-medical prescription stimulant use would report higher ratings of internal restlessness compared to those who do not, a series of univariate ANOVAs were conducted with the dependent variables of interest being the total score and factor scores (*internal distractibility, internal impulsivity, internal restlessness,* and *internal disorganization)* of the IRS.

Regarding self-reported levels of mental restlessness, ANOVA results, consistent with Hypothesis 5, revealed a small but significant group effect for overall restlessness, as measured by the total score of the IRS. Results were significant at the .01 level: F (1,799) = 27.73, $p < .001$, $\eta^2 = .034$, suggesting that students who endorsed previous non-medical use of prescription stimulants reported experiencing higher levels of mental restlessness than peers who did not report previous non-medical use.

Regarding self-reported levels of internal distractibility, ANOVA results revealed a medium significant group effect, as measured by the Internal Distractibility subscale score of the IRS. Results were significant at the .01 level: F (1,799) = 17.96, $p < .001$, $\eta^2 = .022$, suggesting that students who endorsed previous non-medical use of prescription stimulants reported experiencing higher levels of internal distractibility than peers who did not report previous non-medical use.

Regarding self-reported levels of internal impulsivity, ANOVA results revealed a small but significant group effect, as measured by the Internal Impulsivity subscale score of the IRS. Results were significant at the .01 level: F (1,799) = 11.02, $p = .001$, $\eta^2 = .013$, suggesting that students who endorsed previous non-medical use of prescription stimulants reported experiencing higher levels of internal impulsivity than peers who did not report previous non-medical use.

Regarding self-reported levels of internal restlessness, ANOVA results revealed a small to moderate significant group effect, as measured by the Internal Restlessness subscale score of the IRS. Results were significant at the .01 level: F (1,799) = 59.30, $p < .001$, $\eta^2 = .069$, suggesting that students who endorsed previous non-medical use of

prescription stimulants reported experiencing higher levels of internal restlessness than peers who did not report previous non-medical use.

Regarding self-reported levels of internal disorganization, ANOVA results revealed a small but significant group effect, as measured by the Internal Disorganization subscale score of the IRS. Results were significant at the .01 level: F (1,799) = 7.67, p = .006, η^2 = .010, suggesting that students who endorsed previous non-medical use of prescription stimulants reported experiencing higher levels of internal disorganization than peers who did not report previous non-medical use.

Ancillary Analyses: Predictors of the Non-Medical Use of Prescription Stimulants

Preliminary Pearson product-moment correlations were calculated to explore the relationships between total and subscale scores of the SSQ with the ASES, IRS, and DASS-21 (see Tables 5-7). Pearson product-moment correlations revealed that self-reported stimulant use, as measured by Factor 1 subscale score on the SSQ, was significantly correlated with a perception of safety of prescription stimulant medications, as measured by Factor 4 subscale score on the SSQ (r = .209, p < .01). Pearson product-moment correlations also revealed that self-reported stimulant use was significantly correlated with total (r = .220, p < .01) and subscale scores of the IRS (Internal Distractibility: r = .163, p < .01; Internal Restlessness: r = .258, p < .01; Internal Impulsivity: r = .126, p < .01; Internal Disorganization: r = .193, p < .01). Further correlations revealed that, while self-reported stimulant use was not significantly correlated with academic self-efficacy, it was significantly correlated with DASS-21 subscale scores for Depression (r = .108, p < .01), Anxiety (r = .083, p < .01), and Stress (r = .116, p < .01).

To explore which of the assessed variables most strongly predicted ratings the *Self-Reported Stimulant Use* subscale of the SSQ, a post-hoc standard multiple regression analysis was conducted using the *Perception of Safety of Stimulants* generated by the SSQ, the academic self-efficacy ratings generated by the ASES, the total and subscale values of internal restlessness generated by the IRS, and the depression, anxiety and stress scores generated by the DASS-21 and as predictor variables. The full model explained a small amount of variance in the criterion variable (adjusted $R^2 = .11$), $F(10,796) = 12.007$, $p < .001$. Four significant predictor variables were revealed: the ASES total score, $t(796) = 2.659$, $p = .008$; the SSQ Factor 4 subscale score, $t(796) = 5.436$, $p < .001$; the IRS Internal Restlessness subscale score $t(796) = 5.765$, $p < .001$; and the IRS Internal Disorganization subscale score $t(796) = 2.612$, $p = .009$. Higher rates of non-medical stimulant use were positively associated with internal restlessness, internal distractibility, academic self-efficacy, and a greater perception of safety regarding the non-medical use of prescription stimulant medication. Additional statistics pertaining to the regression model are presented in Table 12.

Finally, additional post-hoc analyses were conducted to explore possible variations in self-reported stimulant use across reported ethnicity, gender, and terminal degree of the graduate program in which students were enrolled. A series of one-way ANOVA's were conducted, with ethnicity, gender, and terminal degree serving as independent variables, and the *Self-Reported Stimulant Use* subscale of the SSQ as dependent variable. Results revealed significant but small group effects for self-reported ethnic group membership: $F(1, 799) = 4.238$, $p < .001$, $\eta^2 = .037$; as well as for terminal

degree indicated: F (1, 799) = 10.835, $p < .001$, $\eta^2 = .038$. No significant group effect for gender was observed: F (1, 799) = 2.754, $p = .064$.

Discussion

While a number of investigations have been conducted in recent years examining the prevalence and nature of non-medical prescription stimulant use among university students, the present study is the first to exclusively explore non-medical prescription stimulant use among a general sample of graduate students. Past-year rates of self-reported non-medical use were determined to be lower than hypothesized across the full sample. Nevertheless, previous usage rates were quite high overall, with 17.5% of participants reporting previous non-medical prescription stimulant use. Motivations for use reported by participants were both academic and social in nature, although a greater emphasis was observed on academically-motivated use, as compared to previously reported motivations among undergraduate students. Self-reported non-medical use of prescription stimulant medications was observed to correlate with self-reported levels of anxiety, depression, and stress, various aspects of internal restlessness, and perceived safety of the medications. Contrary to expectations, academic self-efficacy was not significantly associated with non-medical stimulant use. A regression model suggested that, while the above psychological variables may be positively correlated with non-medical stimulant use, only internal disorganization, internal restlessness and the perception of safety of stimulant medications effectively predicted the non-medical use of prescription stimulants.

The first hypothesis of the investigation proposed that non-medical use of stimulants would be reported among graduate students at rates similar to those reported by professional and medical students (8% or greater reporting non-medical use over the past 12 months). In fact, past-year usage rates for participants were somewhat lower than

hypothesized: while a notable proportion of participants (reported having previously used prescription stimulants for non-medical purposes, many fewer students (5.9% of participants) reported non-medical use of prescription stimulant use within the past year. Various factors could have contributed to a lower rate of past-year use being observed in the present sample. The current sample was disproportionately female, and previous investigations of non-medical stimulant use among undergraduates have suggested that usage rates are higher among male students (e.g. Low et al., 2002; Teter et al., 2005). Additionally, the present study included students from a wide variety of programs, while two of the three previous studies on non-medical stimulant use that included graduate-level students surveyed students from programs that may give them increased knowledge of or access to prescription stimulant medications: medical school students and students enrolled in an accelerated doctor of pharmacy program (Frick, Frick, Coffman & Dey, 2011; Tuttle, Scheurich & Ranseen, 2010).

The most frequently cited motivations for self-reported use of stimulant medications related to academic activities: general academic performance, focus in class, and test performance were all noted by students as reasons they had used the medications previously. Again, these findings are consistent with previous research conducted with undergraduate students that identified academic concerns as primary motivators for non-medical stimulant use (DuPont et al., 2008; Dussault & Weyandt, 2013; Judson & Langdon, 2009; Teter et al., 2005; White et al., 2006). Also consistent with previous research with undergraduate students was the finding that students reported previous non-medical use that was recreational in nature, endorsing the use of stimulant medications

while at parties, with alcohol, or to "get high" (Babcock & Byrne, 2000; DuPont et al., 2008; Dussault & Weyandt, 2013; Teter et al., 2005).

Results also provided insight into graduate student behaviors and beliefs regarding stimulant use among peers. More than one in four participants reported having been offered prescription stimulant medication by other students, and a smaller proportion of students reported having purchased the medications from peers. Academic activities were the most frequently cited perceived motivation for the use of stimulants among classmates, and participants reported knowledge of peers using the medications during tests and while studying. Relatively lower rates of perceived use among peers during social activities was reported, with about half as many participants reporting that their classmates were using stimulants non-medically at parties, with alcohol, or with other illicit substances. This discrepancy in reported academic versus non-academic motivations for use is more significant than that observed in previous research with undergraduates, where rates are more similar across the two domains (DuPont et al., 2008; Dussault & Weyandt, 2013; Teter et al., 2005). Because these data relate to perceived use by others rather than self-reported use by the individual, it is unclear how accurate these perceptions may be. It is plausible that academic motivations for non-medical use are more salient motivators for graduate students as compared to undergraduate students. It is also possible, however, that graduate students may be less likely to disclose their non-medical prescription stimulant use to peers, particularly if motivations are less socially acceptable, as with recreational use. Previous investigations with undergraduate students have indicated that perceived social norms surrounding non-

medical use of stimulants is associated with self-reported usage (Judson & Langdon, 2009).

Results of the present study regarding the prevalence and nature of non-medical stimulant use among undergraduates likewise indicated that the medications appear quite accessible on campus, and perceived as relatively safe among students, with nearly one in four participants indicating a belief that "using prescription stimulants occasionally is harmless." About a third of students indicated that they feel "knowledgeable about prescription stimulants" and about "the side effects of prescription stimulants." Again, these results are largely consistent with previous investigations of non-medical use among undergraduate students regarding availability and safety of the medications (Dussault & Weyandt, 2013; Judson & Langdon, 2009; Weyandt et al., 2010)

The second hypothesis, which proposed that graduate students who endorse greater non-medical prescription stimulant use would report greater perceived self-knowledge regarding stimulants and regard stimulant use as being safer than graduate students who do not use stimulants, was supported. Results revealed a small but significant group effect for perception of safety, as students who reported a history of non-medical prescription stimulant use endorsed prescription stimulants as being safer than peers who did not report previous non-medical use. These findings are consistent with previous investigations of non-medical prescription stimulant use among undergraduate students (Dussault & Weyandt, 2013; Judson & Langdon, 2009), as well as with the considerable body of research that associates perceived safety with risk for use of alcohol and other illicit substances among adolescents and adults. This result, in combination with the finding noted previously that many participants endorsed the

medications as relatively safe, or even "harmless," is troubling, and suggests that future prevention and intervention strategies may benefit from the inclusion of a psychoeducational component that targets false perceptions of safety surrounding non-medical prescription stimulant use. The U.S. Department of Education's Higher Education Center for Alcohol and other Drug Abuse and Violence Prevention (2011) has identified five areas of strategic intervention that have been found to be effective in altering alcohol and drug use behaviors in a university setting, which include offering ample access to substance-free social, extracurricular, and public service options, creating a health-promoting normative environment, restricting the marketing and promotion of alcohol and other drugs both on and off campus, limit availability of alcohol and other drugs, and the development and enforcement of campus policies and enforce laws to address high-risk and illegal alcohol and other drug abuse and violence. Future studies should adapt these research-based interventions to include non-medical prescription drug use to investigate generalizability of the intervention.

The third hypothesis, which proposed that graduate students who endorsed non-medical prescription stimulant use would report lower academic self-efficacy ratings compared to those who did not, was not supported. Upon initial analysis, a small but significant group effect was revealed indicating that students who endorsed previous non-medical use of prescription stimulants did not report lower levels of overall academic self-efficacy than peers who did not report previous non-medical use. The relationship between academic self-efficacy and non-medical use of prescription stimulant medications had not been previously researched, although the relationship between reported use and other academic variables has been investigated. Objective measures of

academic performance such as GPA have been considered in previous research with undergraduates, with results indicating that students who are experiencing less academic success report higher rates of non-medical stimulant use (DuPaul et al., 2009; Rabiner et al., 2009; Shillington et al., 2009; Weyandt et al., 2010). While the results of these previous investigations have suggested that academic difficulties are associated with non-medical prescription stimulant use, the nuances of the relationship remained unclear. By including academic-self-efficacy in the present investigation, it was hoped that greater insight regarding directionality would be provided. Researchers have previously questioned whether academic failure (and the associated psychological distress) is a risk factor for stimulant use, or whether the reverse is true- that is, that non-medical stimulant use may be a risk factor for academic failure. The results of the present investigation do not directly address this question, but do provide additional information about the relationship between academic strain and non-medical use of prescription stimulants. Participants in the present study were not asked to report GPA, as typically, relatively high GPAs are required in order to maintain enrollment in a graduate program. Instead, the ASES invited students to indicate how equipped they felt to achieve a number of specific programmatic goals, such as their ability to complete their degree in a timely manner, to handle the course work in their program, to conduct required research, and to handle associated stress. Students who reported the non-medical use of prescription stimulants were no likelier than peers to demonstrate low self-efficacy as measured by the ASES, suggesting that, while actual academic failure may be a risk factor for non-medical stimulant use among university students, subjective academic stress does not appear to be a risk factor, at least among graduate students.

The fourth hypothesis, which proposed that graduate students who endorse non-medical prescription stimulant use would report higher ratings of depression, anxiety and stress, was partially supported. Significant, albeit small effects emerged for Anxiety and Stress subscales, indicating that students who endorsed previous non-medical use of prescription stimulants reported higher levels of anxiety symptomatology and higher levels of perceived stress than peers who did not report previous non-medical use. The hypothesis was not supported regarding self-reported levels of depressive symptomatology. Previous research among undergraduate university students has suggested that psychological factors are significantly associated with non-medical stimulant use, including depression (Rabiner et al., 2009b; Teter et al., 2010; Weyandt et al., 2009) anxiety (Dussault & Weyandt, 2013; Weyandt et al., 2009), and stress (Janusis & Weyandt, 2010). The results of the present study are consistent with the results of Dussault and Weyandt (2013), who also assessed depression, anxiety and stress levels using the DASS-21 and observed associations for anxiety and stress, but not depression. In previous studies that did observe a significant association between self-reported depressive symptomatology and non-medical stimulant use, other measures were used to assess depression (e.g. the Brief Symptom Inventory, Derogatis & Melisaratos, 1993; Center for Epidemiologic Studies Depression Scale, Radloff, 1977). Because results of previous investigations do support an association between depressive symptomatology and non-medical stimulant use, it is unclear whether a lack of observed relationship in the two studies which used the DASS-21 may be a function of the instrument rather than the true absence of symptomatology among participants who report non-medical stimulant use. Future studies examining depressive symptomatology would likely benefit from the

inclusion of a more comprehensive instrument, such as the Brief Symptom Inventory, Beck Depression Inventory, or a structured interview. Nevertheless, in the present study, students who reported non-medical use of prescription stimulants did not report significantly more depressive symptomatology than peers, but did report significantly higher levels of anxiety and stress. These findings are not causal in nature, but suggest that students who are experiencing significant levels of anxiety and stress may be at increased risk for non-medical use of prescription stimulant medication.

The fifth hypothesis, which proposed that graduate students who endorsed non-medical prescription stimulant use would report higher ratings of internal restlessness compared to those who did not, was supported. Results revealed a small but significant group effect for overall mental restlessness, internal distractibility, internal impulsivity, internal restlessness, and internal disorganization. These results are consistent with results from previous investigations examining the non-medical use of prescription stimulants among undergraduate students (Dussault & Weyandt, 2013; Weyandt et al., 2009), suggesting that students who are experiencing significant levels of internal restlessness, distractibility, impulsivity, or disorganization may be at increased risk for non-medical use of prescription stimulant medication. High levels of internal restlessness have previously been observed among adults with ADHD (Biederman et al, 2009; Weyandt et al., 2003), which raises the possibility that students may be engaging in non-medical use of prescription stimulants in an effort to address elevated ADHD symptomatology or to self-medicate undiagnosed ADHD.

Correlational analyses explored the relationships between self-reported non-medical stimulant use, perceived safety of stimulant medication use, academic self

efficacy, internal restlessness, depression, anxiety, and stress. Analyses revealed that self-reported stimulant use was significantly correlated with a perception of safety of prescription stimulant medications, internal distractibility, internal restlessness, internal impulsivity, internal disorganization, depression, anxiety, and stress. It should be noted that most of the correlations were small, and did not all translate to meaningful between-group differences, as detailed previously. Nonetheless, the associations are consistent with previous investigations of non-medical use of prescription stimulant medications among undergraduates, which have associated elevations in non-medical use with elevated levels of: perceived safety of use (Dussault & Weyandt, 2013; Judson & Langdon, 2009), depression (Rabiner et al., 2009b; Teter et al., 2010; Weyandt et al., 2009) anxiety (Dussault & Weyandt, 2013; Weyandt et al., 2009), stress (Janusis & Weyandt, 2010), and internal restlessness (Dussault & Weyandt, 2013; Weyandt et al., 2009). Although these observed relationships are not causal in nature, it is reasonable to consider each as a potential risk factor for non-medical use of prescription stimulant medication among graduate students in addition to their undergraduate counterparts, and to use this knowledge to responsibly inform future investigations upon which prevention and intervention strategies may be based.

Regression analyses were conducted in an effort to identify which of the assessed variables might serve as predictors of non-medical stimulant use. The full model explained only a small amount of variance, and few significant predictor variables were revealed, including perception of safety of stimulant medication, internal restlessness, and academic self-efficacy. These results were somewhat consistent with regression analyses in a previous investigation of non-medical use among undergraduates (Dussault

& Weyandt, 2013), which identified internal restlessness as a valid predictor, but also identified anxiety and stress as predictors, which was not replicated in the current investigation. Consideration of these findings, along with results of the correlational analyses and results of the regression analyses suggest that a relationship exists between the non-medical use of prescription stimulant medications by graduate students and identified psychological factors (e.g. perception of safety, depression, anxiety, stress). Results further indicate, however, that the identified factors cannot effectively predict use. It is likely that currently unidentified factors exist and are contributing to elevations in both psychological distress and non-medical stimulant use among students, and future studies should endeavor to uncover these factors.

Limitations and Future Directions

The present study has a number of limitations that should be considered when interpreting the findings. The most substantial limitations concern the nature of the sample. Although the sample was relatively large, participants were disproportionately white and female. Because the sample was one of convenience, it is important to note that participants may also differ from the population from which the sample was drawn in ways other than demographic characteristics. Because participation was voluntary, students who elected to participate may be more interested in the concepts being explored. Participants in the sample, therefore, may have stronger opinions or more familiarity regarding non-medical stimulant use, or a greater interest in/experience with the psychological variables of interest, such as depression, anxiety, stress, or internal restlessness. Future research should consider collaborating with graduate school

administrators to gain greater access to all enrolled students, and potentially using a stratified sampling technique to increase representativeness.

Another limitation of the present study was the relatively small number of students who reported non-medical use. Although unequal sample sizes may continue to be an issue, future studies may consider targeting a larger number of students to obtain a larger number of students who do report previous use, especially use within the past twelve months. Since psychological symptomatology was among the variables of interest for the present study, co-morbid diagnoses of participants were also a limitation. Although participants were asked to report any previous diagnoses, individuals who had previously been diagnosed with disorders other than ADHD (e.g. anxiety, depression, eating disorders) were not excluded from the sample. Future researchers may consider trying to establish a sample including only students with normative psychological functioning to help control for possible effects of the diagnosed students' existing psychopathology. If students with existing diagnoses of mental illness are included in future studies, more thorough information regarding their mental health history should be gathered to differentiate past and present pathology among participants.

Although adequate (and in most cases, high) internal consistency was established for a majority of measures, relatively low internal consistency was observed on the SSQ Factor 3 ($\alpha = .63$) and SSQ Factor 4 ($\alpha = .69$). Future research including the SSQ, and particularly research examining subscale scores, may wish to undertake a full factor analysis prior to data collection, and consider removing items from the measure for the purposes of the study.

The online nature of the present study may also serve as a limitation. In web-based research, sample bias may cause some groups to be excluded or underrepresented in the sample (Duda & Nobile, 2010; Wyatt, 2000). Because of variation in rates of Internet access and usage, web-based surveys may under represent certain economic, racial, and gender groups, as well as individuals who are not literate, not computer-literate, or not able to utilize computers because of disability (Rhodes, Bowie & Hergenrather, 2003). Given the nature of the present sample, it seems unlikely that the online nature of the study interfered diminished sample representativeness, but future studies with non-student populations should attempt to control for possible bias. Further, informed consent is more difficult to truly obtain online, as it can be difficult to determine whether participants truly understand the risks associated with the study or to validate participant age or demographic information (Duda & Nobile, 2010; Mustanski, 2001; Rhodes et al., 2003). Still, the web-based nature of data collection has notable advantages, particularly when participants are asked to disclose sensitive information. Web-based research has been observed to increase respondent openness and full participation (Rhodes et al., 2003), and it has been suggested that an online format appears to reduce inhibitions and social desirability (Griffiths, 2009). The literature also suggests that emerging adults, specifically, may feel more comfortable disclosing sensitive information in a web-based survey, rather than a method that involves face-to-face interaction (Battles, 2010; Griffiths, 2009; Mustanski, 2001).

Additional suggestions for future research include conducting similar research on a more ethnically diverse population. Future studies may also wish to compare usage rates for prescription stimulants between groups of students that would have greater

access to the medications (e.g. medical or pharmaceutical students) and their peers. Although previous research has indicated a link between academic performance and non-medical stimulant use, no association was observed between academic self-efficacy and stimulant use. Further exploration of the relationship between academics and stimulant use is warranted, especially regarding possible mediating or moderating factors between academic performance and non-medical stimulant use. Although the link between stimulant use and increased risk of cardiac events has been established, greater knowledge is also needed regarding actual outcomes for students. Future research may consider the collection of data on actual risk/medical events related to non-medical use of stimulants on campus, perhaps by collecting data through campus health centers or local hospitals. Finally, given the observed rates of use among young adults who are not pursuing higher education, future research exploring the association between non-medical use of stimulants and psychological factors may benefit from the inclusion of young adults from community populations.

Conclusions

While a number of investigations have been conducted in recent years that have examined the prevalence and nature of non-medical prescription stimulant use among university students, the present study is among the first to explore non-medical prescription stimulant use among graduate students. Past-year rates of self-reported non-medical use were determined to be lower than hypothesized and the hypothesized usage rate was observed at just one of the five universities included in the present study. Motivations for use reported by participants were both academic and social in nature,

although a greater emphasis was observed on academically-motivated use, as compared to previously reported motivations among undergraduate students.

Self-reported non-medical use of prescription stimulant medications was observed to be significantly correlated with self-reported levels of anxiety, depression, and stress, various aspects of internal restlessness, and perceived safety of the medications. Contrary to the study's hypothesis, academic self-efficacy was not significantly associated with non-medical stimulant use. A regression model suggested that, while psychological variables were positively correlated with non-medical stimulant use, only internal restlessness, internal disorganization, and the perception of safety of stimulant medications effectively predicted the non-medical use of prescription stimulants. In conclusion, the findings of the present study support the notion that non-medical use of prescription stimulants is problematic on university campuses, including the graduate student population.

Table 1.

Demographic Characteristics of Participants from Universities Located in the Northeastern, Southeastern, Midwestern, Southwestern, and Northwestern United States Pertaining to Gender, Age and Ethnicity.

	Southwest	Southeast	Midwest	Northeast	Northwest	Total
Gender						
Male	23.70%	20.80%	33.30%	27.00%	8.30%	26.00%
Female	76.30%	77.10%	62.10%	73.00%	83.30%	72.10%
Prefer not to say	--	2.10%	4.50%	--	8%	1.90%
Age						
18-21 years	--	--	--	--	--	--
22-25 years	26.30%	25.00%	39.40%	46.00%		35.70%
26-29 years	26.30%	29.20%	33.30%	30.00%	41.70%	30.10%
30-34 years	21.10%	14.60%	24.40%	15.00%	33.30%	19.00%
35-39 years	7.90%	14.60%	3.00%	2.00%	16.70%	6.30%
40-44 years	5.30%	2.10%	--	3.00%	8.30%	3.00%
45-49 years	2.60%	4.20%	--	1.00%	--	1.50%
50+ years	7.90%	10.40%	--	3.00%	--	4.10%
Ethnicity						
White/European American	65.80%	87.50%	59.10%	89.00%	66.70%	76.60%
Latino/Hispanic American	13.20%	2.10%	18.20%	3.00%	16.70%	8.60%
Asian/Asian American	7.90%	4.20%	9.10%	5.00%	--	6.30%
Black/African American	--	2.10%	6.10%	--	--	1.90%
Multiethnic	2.60%	2.10%	3.00%	2.00%	--	2.20%
American Indian	2.60%	--	--	--	--	0.40%
Other	2.60%		1.50%	1.00%	--	1.10%
Prefer not to say	5.30%	2.10%	3.00%	--	16.70%	3.00%

Table 2

Demographic Characteristics of Participants from Universities Located in the Northeastern, Southeastern, Midwestern, Southwestern, and Northwestern United States Pertaining to Enrollment Status.

	Southwest	Southeast	Midwest	Northeast	Northwest	Total
Degree Program						
Master's Level	86.80%	43.80%	12.10%	54.00%	--	43.50%
Specialist Level	5.30%	2.10%	--	2.00%	--	1.90%
Doctoral Level	7.90%	52.10%	87.90%	43.00%	100.00%	53.90%
Other	--	2.10%	--	1.00%	--	0.70%
Graduate Program						
Computer Science/IT	--	--	--	1.00%	--	0.40%
Education	21.10%	39.60%	1.50%	10.00%	--	14.50%
Engineering	5.30%		7.60%	9.00%	--	6.30%
Fine Arts & Design	13.20%	12.50%	1.30%		--	4.50%
Health Industry and Public Services	5.30%		4.60%	4.00%	--	3.30%
Humanities	18.40%	8.30%	7.60%	4.00%	--	7.40%
Medical and Health Professions	5.30%	--	4.40%	10.00%	--	5.60%
Mental Health Professions	5.30%	--		1.00%	--	1.10%
Sciences (Biomedical)	2.60%	--	37.90%	10.00%	50.00%	13.40%
Sciences (Environmental)	--	--	3.00%	21.00%	--	8.60%
Sciences (Natural/Physical)	2.60%	--	4.40%	1.00%	--	1.90%
Social Sciences	5.30%	39.60%	25.80%	28.00%	50.00%	26.80%
Other	15.80%	--	1.50%	8.00%	--	5.90%
Prefer not to Say	--	--	--	1.00%	--	0.40%

Table 3

Demographic Characteristics of Participants from Universities Located in the Northeastern, Southeastern, Midwestern, Southwestern, and Northwestern United States Pertaining to Diagnostic Status of Mental Health Disorders and Physical Disabilities.

	Southwest	Southeast	Midwest	Northeast	Northwest	Total
	(N = 115)	(N = 144)	(N = 198)	(N = 300)	(N = 36)	(N = 807)
Psychological Diagnoses						
Attention-Deficit Hyperactivity Disorder	5.30%	16.70%	3.10%	11.00%	16.70%	9.30%
Anxiety Disorder	13.20%	25.00%	21.20%	16.00%	33.30%	20.10%
Depression Disorder	15.80%	27.10%	28.80%	19.00%	16.70%	21.90%
Bi-Polar Depression	2.60%	2.10%	3.00%	2.00%	0.00%	2.20%
Eating Disorder	--	6.30%	1.50%	4.00%	0.00%	3.00%
Specific Learning Disability	5.30%	4.20%	3.00%	4.00%	0.00%	3.70%
Physical Diagnoses						
Major Physical Disability	5.30%	--	1.50%	2.00%	--	1.90%
Currently Registered with Disability Support Services	--	--			--	--
Yes	2.60%	--	4.50%	1.00%	--	1.90%

Table 4

Means, Standard Deviations, and Internal Consistencies (as Measured by Cronbach's Alpha Scores) of: SSQ Total Score, SSQ Factor 1, SSQ Factor 2, SSQ Factor 3, SSQ Factor 4, IRS Total Score, IRS Factor 1, IRS Factor 2, IRS Factor 3, IRS Factor 4, DASS-21 Factor 1, DASS-21 Factor 2, DASS-21 Factor 3, and ASES Total Score.

	M	SD	A
SSQ Total	64.71	7.38	.75
SSQ Factor 1[a]	27.80	7.11	.87
SSQ Factor 2 [b]	14.11	2.39	.89
SSQ Factor 3[c]	8.41	1.24	.63
SSQ Factor 4[d]	8.87	2.61	.69
IRS Total	74.3	19.69	.94
IRS Factor 1[e]	26.36	7.91	.89
IRS Factor 2[f]	7.39	2.86	.79
IRS Factor 3[g]	17.04	5.42	.88
IRS Factor 4[h]	9.11	3.02	.77
DASS-21 Factor 1[i]	10.77	4.07	.89
DASS-21 Factor 2[j]	9.52	2.83	.76
DASS-21 Factor 3[k]	12.80	4.11	.87
ASES Total	25.03	3.31	.79

[a] SSQ Factor 1 = Self-Reported Use of Prescription Stimulants; [b] SSQ Factor 2 = Perception of Prevalence of Prescription Stimulant Use Among Peers; [c] SSQ Factor 3 = Knowledge of Atypical Stimulant Use Among Peers; [d] SSQ Factor 4 = Perception of Safety of Prescription Stimulant Medication; [e] IRS Factor 1 = Internal Distractibility; [f] IRS Factor 2 = Internal Restlessness; [g] IRS Factor 3 = Internal Impulsivity; [h] IRS Factor 4 = Internal Disorganization; [I] DASS-21 Factor 1 = Depression; [j] DASS-21 Factor 2 = Anxiety; [k]DASS-21 Factor 3 = Stress.

Table 5

Intercorrelations Between Total and Factor Scores of the IRS and SSQ.

	SSQ Total	SSQ 1[a]	SSQ 2[b]	SSQ 3[c]	SSQ 4[d]	IRS Total	IRS 1[e]	IRS 2[f]	IRS 3[g]
SSQ Factor 1[a]	.866**								
SSQ Factor 2[b]	.003	-.205**							
SSQ Factor 3[c]	.106**	.001	.723**						
SSQ Factor 4[d]	.450**	.209**	-.088*	-.069*					
IRS Total	.184**	.220**	-.130**	.008	.106**				
IRS 1[e]	.127**	.163**	-.138**	-.034	.093**	.934**			
IRS 2[f]	.218**	.258**	-.128**	-.021	.058	.730**	.590**		
IRS 3[g]	-.356**	.126**	.145**	-.034	.077*	.834*	.730**	.482**	
IRS 4[h]	.197**	.193**	-.105**	.009	.176**	.622**	.496**	.386**	.395**

[a] SSQ Factor 1 = Self-Reported Use of Prescription Stimulants; [b] SSQ Factor 2 = Perception of Prevalence of Prescription Stimulant Use Among Peers; [c] SSQ Factor 3 = Knowledge of Atypical Stimulant Use Among Peers; [d] SSQ Factor 4 = Perception of Safety of Prescription Stimulant Medication; [e] IRS Factor 1 = Internal Distractibility; [f] IRS Factor 2 = Internal Restlessness; [g] IRS Factor 3 = Internal Impulsivity; [h] IRS Factor 4 = Internal Disorganization.

** Correlation is significant at the .01 level (two-tailed)

* Correlation is significant at the .05 level (two-tailed)

Table 6

Intercorrelations Between SSQ Total and Factor Scores and Factor Scores of the DASS-21.

	SSQ Total	SSQ 1[a]	SSQ 2[b]	SSQ 3[c]	SSQ 4[d]	DASS 1[e]	DASS 2[f]
DASS-21[e] Factor 1	.123**	.108**	.055	.129**	.116**		
DASS-21 Factor 2[f]	.063	.083**	-.019	.025	.104**	.515**	
DASS-21 Factor 3[g]	.118**	.116**	.051	.110**	.106**	.631**	.638**

[a] SSQ Factor 1 = Self-Reported Use of Prescription Stimulants; [b] SSQ Factor 2 = Perception of Prevalence of Prescription Stimulant Use Among Peers; [c] SSQ Factor 3 = Knowledge of Atypical Stimulant Use Among Peers; [d] SSQ Factor 4 = Perception of Safety of Prescription Stimulant Medication; [e] DASS-21 Factor 1 = Depression; [f] DASS-21 Factor 2 = Anxiety; [g] DASS-21 Factor 3 = Stress.

** Correlation is significant at the .01 level (two-tailed)

* Correlation is significant at the .05 level (two-tailed)

Table 7

Intercorrelations Between SSQ Total and Factor Scores and ASES Total Score.

	SSQ Total	SSQ 1[a]	SSQ 2[b]	SSQ 3[c]	SSQ 4[d]
ASES	-0.39	-.034	.002	-.009	-.092**

[a] SSQ Factor 1 = Self-Reported Use of Prescription Stimulants; [b] SSQ Factor 2 = Perception of Prevalence of Prescription Stimulant Use Among Peers; [c] SSQ Factor 3 = Knowledge of Atypical Stimulant Use Among Peers; [d] SSQ Factor 4 = Perception of Safety of Prescription Stimulant Medication.

** Correlation is significant at the .01 level (two-tailed)

* Correlation is significant at the .05 level (two-tailed)

Table 8

Stimulant Survey Questionnaire Responses Pertaining to the Nature of and Motivations for Self-Reported Use of Prescription Stimulants Among Graduate Students.

	Never	Rarely	Occasionally	Frequently	Always	Total Use
I have used prescription stimulants for non-medical purposes.	82.2%	11.2%	5.9%	0.4%	--	17.5%
I have used prescription stimulants at parties.	90.7%	6.3%	2.2%	0.4%	--	8.9%
I have used prescription stimulants with alcohol.	89.2%	7.4%	3.3%	--	--	10.7%
I have snorted prescription stimulants.	96.3%	2.6%	0.7%	0.4%	--	3.7%
I have injected prescription stimulants.	100.0 %	--	--	--	--	--
I have smoked prescription stimulants.	97.8%	1.1%	0.4%	0.4%	--	1.9%
I have taken prescription stimulants to focus better in class.	88.5%	5.2%	3.3%	1.1%	1.1%	10.7%
I have taken prescription stimulants to perform better on tests.	89.9%	5.9%	2.6%	0.4%	1.1%	10.0%
I have taken prescription stimulants to help me socialize better.	92.5%	4.5%	2.2%	--	0.7%	7.4%
I have taken prescription stimulants to help me lose weight.	97.0%	1.5%	0.4%	0.4%	0.7%	3.0%
I have taken prescription stimulants to perform better in my schoolwork	83.8%	8.3%	4.5%	1.9%	1.5%	16.2%
I have taken prescription stimulants to feel more energetic.	87.7%	5.2%	4.5%	1.9%	0.7%	12.3%
I have taken prescription stimulants to feel better about myself.	95.1%	1.1%	1.9%	1.5%	0.4%	4.9%

I have taken prescription stimulants to “get high”.	92.1%	4.1%	3.0%	0.7%	--	7.8%
I have been offered prescription stimulants by other students.	71.7%	20.4%	5.6%	1.5%	0.4%	27.9%
I have tried someone else’s prescription stimulant medication.	82.9%	11.9%	3.3%	0.7%	0.4%	16.3%
I have purchased prescription stimulants from other students.	95.4%	3.0%	1.1%	0.4%	--	4.5%
I have sold prescription stimulant medication to other students.	99.9%	--	--	--	--	--
I have given prescription stimulant medication to other students.	98.1%	1.5%	0.4%	--	--	1.9%
I have been pressured to let others have my prescription stimulant medication.	98.9%	1.1%	--	--	--	1.1%

Table 9

Stimulant Survey Questionnaire Responses Pertaining to the Expressed Attitudes and Perceptions of Graduate Students Regarding the Non-Medical Use of Prescription Stimulants.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Prescription stimulants are easy to get on this campus.	3.8%	9.9%	71.1%	12.9%	2.3%
Prescription stimulants are as easy to get as alcohol.	16.9%	29.1%	49.1%	4.2%	0.8%
Prescription stimulants are as easy to get as marijuana.	6.1%	16.7%	56.8%	17.8%	2.7%
Using prescription stimulants occasionally is harmless.	18.6%	31.2%	25.3%	23.0%	1.9%
Using prescription stimulants daily is harmless.	45.4%	32.3%	19.3%	2.6%	0.4%
Prescription stimulant use on campus is a problem.	3.0%	9.7%	64.0%	18.4%	4.9%
Prescription stimulants are safer than marijuana.	26.2%	43.1%	28.5%	1.9%	0.4%
Prescription stimulants are safer than alcohol.	14.9%	38.1%	39.2%	7.1%	0.7%
I feel I am knowledgeable about prescription stimulants.	11.5%	33.1%	24.9%	23.4%	7.1%
I feel I am knowledgeable about the side effects of prescription stimulants.	13.0%	32.3%	21.9%	26.0%	6.7%

Table 10

Stimulant Survey Questionnaire Responses Pertaining to Perceived Non-Medical Use of Prescription Stimulants Among Peers.

	Yes	No
I know students who use prescription stimulants at parties.	20.4%	79.6%
I know students who use prescription stimulants with alcohol.	22.1%	77.9%
I know students who use prescription stimulants with other drugs.	18.9%	80.1%
I know students who use prescription stimulants while studying.	43.8%	56.2%
I know students who use prescription stimulants during finals week.	44.0%	55.9%
I know students who use prescription stimulants during tests.	36.0%	64.0%
I know students who snort prescription stimulants.	7.6%	92.4%
I know students who inject prescription stimulants.	0.4%	99.6%
I know students who smoke prescription stimulants.	1.5%	98.5%
I hide my prescription stimulant medication so that no one will take it.	3.1%	96.8%

Table 11

Differences in the Perception of Safety of Stimulant Use, Reported Self-Efficacy, Depression, Anxiety, Stress, and Internal Restlessness Among Students Who Do and Do Not Report the Non-Medical Use of Prescription Stimulant Medication.

	Students Endorsing Non-Medical Use			**Students Not Endorsing Non-Medical Use**			**Effect Size**	**ANOVA *F* test results**
Variable	**N**	**Mean**	**SD**	**N**	**Mean**	**SD**	**η^2**	
Lifetime Use								
SSQ Factor 4: Perception of Safety	129	10.21	1.69	672	9.40	2.217	η^2 = .0186	F(1,799) = 15.197, p < .001**
ASES Total Score	129	24.47	3.08	672	25.09	3.36	η^2 = 0.005	F(1,799) = 3.926, p = .048*
DASS-21: Depression Total Score	129	11.33	3.47	672	10.63	4.16	η^2 = 0.004	F(1,799) = 3.221, p = .073
DASS-21: Anxiety Total Score	129	10.34	3.29	672	9.38	2.77	η^2 =.015	F(1,799) = 12.44, p < .001**
DASS-21: Stress Total Score	129	14.16	4.20	672	12.52	4.02	η^2 = .022	F(1,799) = 17.75, p < .001**
IRS: Total Score	129	82.63	20.28	672	72.75	19.35	η^2 = .034	F(1,799) = 27.73, p < .001**
IRS: Internal Distractibility Score	129	28.91	7.47	672	25.71	7.92	η^2 = 0.022	F(1,799) = 17.96, p < .001**
IRS: Internal Impulsivity Score	129	18.44	5.52	672	16.71	5.38	η^2 = 0.013	F(1,799) = 11.02, p = .001**
IRS: Internal Restlessness Score	129	9.09	3.80	672	7.04	2.52	η^2 = 0.069	F(1,799) = 59.30, p <.001**
IRS: Internal Disorganization Score	129	9.79	3.33	672	8.99	2.96	η^2 = 0.010	F(1,799) = 7.67, p = .006**

***Significant at the p < .01 level*
**Significant at the p < .05 level*

Table 12

Summary of Standard Multiple Regression Analyses for Academic Self-Efficacy, Perception of Safety of Prescription Stimulant Medication, Internal Distractibility, Internal Restlessness, Internal Impulsivity, Internal Disorganization, Depression, Anxiety and Stress Predicting SSQ Factor One: Self-Reported Prescription Use.

Predictor	*B*	*SE B*	*β*	*p*- value	R^2	Adjusted R^2
Step 1					.119	.109
Academic Self Efficacy [a]	.224	.084	.105	.008**		
Perception of Safety of Prescription Stimulant Medication [b]	.604	.111	.184	< .001**		
Internal Distractibility [c]	-.045	.050	-.050	.371		
Internal Restlessness [d]	.605	.105	.245	<.001**		
Internal Impulsivity [e]	.027	.075	.021	.721		
Internal Disorganization [f]	.262	.100	.112	.009**		
Depression [g]	.072	.085	.041	.393		
Anxiety [h]	-.122	.111	-.050	.271		
Stress [i]	.068	.095	.039	.473		

[a] ASES Total Score; [b] SSQ Factor 4; [c] IRS Factor 1; [d] IRS Factor 2; ; [e] IRS Factor 3; [f] IRS Factor 4; [g] DASS-21 Factor 1; [h] DASS-21 Factor 2; [I] DASS-21 Factor 3.

** Correlation is significant at the .01 level

* Correlation is significant at the .05 level

Appendix A:

Content of Contact Email to University Faculty

Dear Dr. [Insert Faculty Member Last Name]:

I would like to extend the opportunity to invite your graduate students to take part in an anonymous research projects studying prescription stimulant misuse, psychological and academic functioning among graduate students. Results of this study will inform my dissertation project, which explores the relationship between misuse of prescription stimulants and several unique aspects of psychological and academic functioning. We will be collecting data from graduate students at five universities, including [Insert name of University here]. We are surveying students from a wide variety of graduate programs in an effort to get the perspective of as many students as possible, and the information that students in the [Insert name of specific graduate program here] program have to offer is very important to us.

I would be grateful if you would be willing to email this link to your graduate students and/or post this link on a class website, inviting students to participate.

This study is approved by the University of Rhode Island's Institutional Review board, voluntary, and results will not be linked to any identifiable information. Respondents will be asked to answer questions about stimulant use, mood, and academic functioning. The survey is online, so they must access the survey on a computer that has internet access. The survey will take about 15 minutes to complete.

Please post this link below:

https://www.surveymonkey.com/s/Y53Z8JH

Thank you for your help! If you have any questions, please feel free to contact me (genevieve_verdi@my.uri.edu or 401-270-8299), or my supervising faculty member, Dr. Lisa Weyandt (401-874-2087 or lisaweyandt@uri.edu).

Best,

Genevieve Verdi, M.Ed

Appendix B:

Statement on Diversity in Research

Per the requirements identified by the Office of Research Compliance and the Institutional Review Board, this research Project will endeavor to include participants from both genders and a variety of cultural backgrounds in order to ensure that findings will equally benefit all individuals within the target population- in this case, graduate students. As stated in the dissertation proposal, graduate students from all graduate programs on the five identified campuses will be targeted for participation in order to obtain a representative sample, and no graduate student enrolled in a program on a full-time basis at any of the target universities will be excluded.

The focus of this investigation is non-prescription stimulant use among graduate students, and although only a handful of studies have explored this phenomenon, investigations of stimulant use among undergraduate students have been conducted at each of the five targeted universities, which provides some insight into specific sub-populations that may be at increased risk for non-medical prescription stimulant use, and this may benefit particularly from the information generated by this investigation. Overall, findings indicate that in terms of gender and ethnicity, students who are White and male are at increased risk to use prescription stimulants. At a multi-site study including participants from the University of Rhode Island, the University of Central Florida, and the University of Washington, male students (26%) were found to be at increased risk to use prescription stimulants non-medically as compared to female students (17.3%; Dussault & Weyandt, 2013). In a previous study at the University of Rhode Island, no effects were found for ethnicity or gender with regard to non-medical

stimulant use among undergraduates (Weyandt et al., 2009). At the University of Michigan, a number of investigations have explored prescriptions non-medical stimulant use among undergraduates, finding no gender effect for use, with one study observing that White students report greater non-medical use than peers from other ethnic backgrounds (McCabe & Teter, 2007; Sepulveda et al., 2011; Teter et al., 2010). At the University Central Florida, small gender effects were found for non-medical prescription stimulant use, with male students reporting higher rates of use (Ford & Schroeder, 2009). At San Diego State University, male students were more likely to report non-medical prescription stimulant use within the past year (14.4%) than female students (9.1%), and a greater proportion of White students (14.5%) than Non-white students (6.1%) reported past-year use (Shillington et al., 2006).

An effort will be made to include participants who self-identify as White and male because they are at increased risk to use prescription stimulants without a prescription. An effort will also be made, however, to recruit a sample of students at each of the five targeted universities that is representative of the gender and ethnicity demographics of the graduate student population, and to include members of diverse ethnic backgrounds as well as females as participants. At the University of Rhode Island, 2010 data states that the graduate student population is: 58% female, 65% White, 3% Latino, 3% Black/African American, and 4% Asian/Pacific Islander, with the remainder of students not reporting racial or ethnic identity. At the University of Central Florida, 2010 data states that the graduate student population is: 59% female, 62% White, 8% Latino, 10% Black/African American, and 4% Asian/Pacific Islander, with the remainder of students not reporting racial or ethnic identity. At the University of Washington, 2010

data states that the graduate student population is: 53% female, 60% White, 5% Latino, 3% Black/African American, 12% Asian/Pacific Islander, and 1% Native American, with the remainder of students not reporting racial or ethnic identity. At the University of Michigan, 2010 data states that the graduate student population is: 46% female, 2% multi-racial, 52% White, 4% Latino, 4% Black/African American, and 10% Asian/Pacific Islander, with the remainder of students not reporting racial or ethnic identity. At San Diego State University, 2010 data states that the graduate student population is: 61% female, 2% multi-racial, 44% White, 16% Latino, 3% Black/African American, and 9% Asian/Pacific Islander, with the remainder of students not reporting racial or ethnic identity. All of the demographic data above is based on Fall 2010 enrollment data, and is provided by the Institute of Education Sciences, National Center for Education Statistics of the U.S. Department of Education (http://nces.ed.gov/ipeds/datacenter/Data.aspx).

Appendix C:

Debriefing Statement

The study that you just participated in was examining misuse of prescription stimulant medications among graduate students, and the relationship between psychological variables, internal restlessness, academic self-efficacy, and stimulant misuse among college students. This research, entitled, "An Examination of Non-Medical Use of Prescription Stimulant Medication Use and Psychological Functioning in Graduate Students" is being conducted in order to fulfill requirements for a doctorate of philosophy degree in psychology.

The prevalence of non-medical use of stimulant medications among college students has been well documented in research. This research seeks to assess prevalence rates among a sub-population of the college community (graduate students), and to further examine risk factors associated with stimulant use. Results of this investigation may help to identify sub-populations of graduate students who are at risk for non-medical use of stimulant medication, and to inform prevention and intervention strategies designed to address non-medical prescription stimulant use.

If you have any questions or concerns about this study, please contact Genevieve Verdi at 401-270-8299. Thank you for your time and participation.

Appendix D:

Informed Consent Form

The University of Rhode Island
Department of School Psychology
An Examination of Prescription Stimulant Misuse and Psychological Functioning in Graduate Students

PLEASE PRINT AND KEEP THIS FORM FOR YOURSELF

Dear Participant:

You have been invited to take part in a research project described below. If you have any questions, please feel free to contact the student investigator, Genevieve Verdi Tubbs, at (401)-270-8299 or <genevieve_verdi@my.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 aspects of mental well-being (such as emotional state, anxiety, mental restlessness, etc.) and attitudes toward academic responsibilities and obligations. Responses to survey items are completely anonymous: there will be no identifying information linking you to your responses or to any particular organization. Data will be encrypted and stored through the website SurveyMonkey, and only the primary student investigator 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 overall well-being, 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, Genevieve Verdi, at (401)-270-8299, her faculty sponsor, Dr. Lisa Weyandt, at (401)-874-2194, or the University of Rhode Island's Vice President for Research, 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

The University of Central Florida Counseling Center
www.counseling.sdes.ucf.edu/
(407) 823-2811
Bldg. 27
4000 Central Florida Blvd.

San Diego State University Counseling and Psychological Services
http://www.sa.sdsu.edu/cps/index.html
(619) 594-5220
Calpulli Center, Room 4401
5500 Campanile Dr.

The University of Washington Counseling Center
https://depts.washington.edu/counsels/
(206) 543-1240
401 Schmitz Hall

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 E:

Demographic Information Form

Instructions: Please answer the following questions as completely and accurately as possible.

1. Current Age:
   18-21 years
   22-25 years
   26-29 years
   30-34 years
   35-39 years
   40-44 years
   45-49 years
   50+ years

2. Gender: Male Female Prefer Not to Say

3. Ethnicity (Please circle one): White/European American Pacific Island
   Latino/Hispanic American Asian/Asian American
   Black/African American Multiethnic
   American Indian or Alaska Native
   Other _____

4. University that you attend:
   San Diego State University
   University of Central Florida
   University of Michigan
   University of Rhode Island
   University of Washington
   Other _____

5. Degree Program in which you are enrolled (please choose one):
   Master's Level
   Specialist Level
   Doctoral Level
   Other (Please Specify degree) _____

6. Please select the category that *best* describes the type of Graduate Program in which you are enrolled:
   Architecture/Environmental Engineering/Built Environments/Urban Planning/Town Planning
   Business/Business Administration/Hospitality
   Computer Science/Information Technology
   Education
   Engineering
   Fine Arts & Design (e.g. Visual Arts, Performing Arts, Music, Theatre, Dance, etc.)
   Health Industry and Public Services (e.g. Health and Human Services/Health and Public Affairs/Public Health/Public Policy, etc.)
   Humanities (e.g. History, Religion, Philosophy, etc.)
   Law
   Medical and Health Professions (e.g. Health Sciences, Dentistry, Medicine, Nursing, Pharmacy, etc.)
   Mental Health Professions (e.g. Counseling, Social Work, etc.)
   Sciences (Biomedical)
   Sciences (Environmental: e.g. Natural Resources, Oceanography, Forestry, etc.)
   Sciences (Natural/Physical)
   Social Sciences (e.g. Psychology, Sociology, Anthropology, Economics, Political Science, etc.)
   Other: _____
   Prefer not to Say

7. Have you ever used prescription stimulant medication that was not prescribed to you?
   Yes No

8. Have you used prescription stimulant medication that was not prescribed to you in the past 12 months?
   Yes No

9. Have you ever been diagnosed with Attention-Deficit-Hyperactivity Disorder?

   Yes No

10. If you answered "yes" to Question 7, with what subtype of ADHD are you diagnosed?
    Hyperactive/Impulsive Type Inattentive Type

    Combined Type Do Not Know

11. If you answered "yes" to Question 7, at what age were you first diagnosed?

    _____

12. Are you currently taking stimulant medication that has been prescribed to you by a doctor, including methylphenidate (e.g. Ritalin, Concerta, Metadate) or amphetamine (Adderall, Dexedrine, Desoxyn, Vyvanse)?
    Yes No

13. If "yes," what is the name of your medication? _____

14. If "yes," have you ever used stimulant medication that was prescribed to you in a way other than the manner it was prescribed (e.g. higher or more frequent dosage, different method of ingestion)?
    Yes No

15. Please endorse any of the following psychological conditions that you have

    previously been or are currently diagnosed with:

    Anxiety Disorder
    Depression Disorder
    Bi-Polar Depression
    Eating Disorder
    Specific Learning Disability

16. Do you currently have a major physical disability?

    Yes No

17. If "yes" to *Question 15* or *Question 16*, are you currently registered with the Disabilities Support Services office at your university?

    Yes No

Appendix F:

Stimulant Survey Questionnaire

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

[*Items 4-30 redacted; contact publisher for access to full measure*]

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

[*Items 35-40 redacted; contact publisher for access to full instrument*]

Appendix G:

The Internal Restlessness Scale

Following is a list of statements that people have used to describe themselves. Please indicate, in general, to what extent each one applies to you. Be sure to answer all of the items.

	None of the time		Some of the time		Most of the time		All of the time
1. I am organized.	1	2	3	4	5	6	7
2. I am told that I interrupt people.	1	2	3	4	5	6	7
3. Thoughts race through my head.	1	2	3	4	5	6	7
4. Mental restlessness prevents me from sleeping.	1	2	3	4	5	6	7
5. I am always thinking; I have difficulty putting thoughts to rest.	1	2	3	4	5	6	7

[*Items 6-24 redacted; contact publisher for access to full instrument]*

Appendix H:

Depression Anxiety Stress Scales – 21

Please read each statement and circle a number 0, 1, 2, or 3 that indicates how much that statement applied to you *over the past week*. There are no right or wrong answers. Do not spend too much time on any statement.

0 = Did not apply to me at all
1 = Applied to me to some degree, or some of the time
2 = Applied to me to a considerable degree, or a good part of time
3 = Applied to me very much, or most of the time

1. I found it hard to wind down.	0	1	2	3
2. I was aware of dryness of my mouth.	0	1	2	3
3. I couldn't seem to experience any positive feeling at all.	0	1	2	3
4. I experienced breathing difficulty (e.g. excessively rapid breathing, breathlessness in the absence of physical exertion.)	0	1	2	3

[*Items 5-21 redacted; contact publisher for access to full instrument*]

Appendix I:

Academic Self-Efficacy Scale

Please rate your confidence in your abilities in the following areas.

0 = Not at all Confident
1 = Somewhat Confident
2 = Very Confident

1. Completing your degree	0	1	2
2. Completing your degree in a timely manner.	0	1	2
3. Completing your degree at your current university	0	1	2
4. Your ability to pay for your graduate training	0	1	2

[*Items 5-10 redacted; contact publisher for access to full instrument*]

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