DISSERTATION

Recreational Use of Prescription Stimulants Among College Students

Submitted by

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WE HEREBY RECOMMEND THAT THE DISSERTATION PREPARED UNDER OUR SUPERVISION BY JEREMY THOMAS SHARP ENTITLED RECREATIONAL USE OF PRESCRIPTION STIMULANTS AMONG COLLEGE STUDENTS BE ACCEPTED AS FULFILLING IN PART REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY.

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ABSTRACT OF DISSERTATION

RECREATIONAL USE OF PRESCRIPTION STIMULANTS AMONG COLLEGE STUDENTS

The current study investigated characteristics of individuals participating in recreational use of prescription stimulant medication, such as methylphenidate and amphetamine salts, in a Western United States university sample. The researcher recruited students from introductory psychology courses to take a Recreational Stimulant Use Survey that included questions on illicit drug use in addition to questions concerning recreational prescription stimulant use. Results indicated that the overall prevalence rate for lifetime recreational prescription stimulant use was 13.0%. The author found no significant differences in lifetime prevalence rates comparing non-Hispanic White individuals to minority students. In addition, the author found that the majority of individuals used prescription stimulant medication to increase concentration while studying. Finally, the author identified a significant relationship between motive for use of prescription stimulant medication and method of ingestion, indicating that those using medication for studying may be more likely to swallow the medication rather than ingest it intranasally.

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CHAPTER I

Introduction

Attention Deficit Hyperactivity Disorder (ADHD) is a serious psychological disorder resulting from "executive control" processing deficits in the pre-frontal lobe of the brain (Barkley, 2005). This disorder affects between 3-5% of children, and is increasingly diagnosed in adults as well (Barkley, 2005; Robison et al., 2005). Research has shown that the frontline treatment for ADHD is stimulant medication such as Ritalin (methylphenidate) and Adderall (*d*-amphetamine and *l*-amphetamine), which act on various neurotransmitters to improve functioning in those with the disorder (MTA cooperative group, 1999a). Interestingly, the biochemical properties of these medications are quite similar to those of illicit stimulants such as cocaine and methamphetamine, a fact that makes it possible for individuals to misuse and even abuse stimulant medication (Feussner, 2002; Kollins, 2003; Sannerud & Feussner, 2000). The Drug Enforcement Administration (DEA) has recognized this abuse potential and classified these medications as Schedule II substances. This classification acknowledges their medical utility while also noting their potential for abuse and dependence (DEA, 2002).

This potential for non-medical use is reflected in the existence of an illicit market for prescription stimulant medication, much like that which exists for Oxycontin and other prescription medications that are taken recreationally. Prior research has documented several aspects of this market relating to prevalence and population

characteristics of users (Arria & Wish, 2005; Babcock & Byrne, 2000; Hall, Irwin, Bowman, Frankenberger, & Jewett, 2005; Low & Gendaszek, 2002; Marsh, Key, & Payne, 2000; McCabe, Knight, Teter, & Wechsler, 2005; McCabe, Teter, and Boyd, 2004; Sharp & Rosén, 2005; Sharp & Smith, 2002; Teter, McCabe, Cranford, Boyd, & Guthrie, 2005; Williams, Goodale, Shay-Fiddler, Gloster, & Chang, 2004). Characteristics of this illicit market, however, have yet to be defined in terms of motives for ingestion, quantities purchased at a time, and sources of purchase. The purpose of the current study is twofold: 1) to further examine characteristics of recreational prescription stimulant users, notably the relationship between method of ingestion and motives for use, quantity of prescription stimulants recreationally used on each occasion of use, quantity of prescription stimulants purchased for recreational use at a time, and the role of recreational stimulant use in weight loss, and 2) to investigate the sources of diversion of recreational prescription stimulant medication.

Physiological similarities to abused drugs

Biochemical properties of a drug play an important role in determining their potential for recreational use and abuse. For example, cocaine and methamphetamine can be absorbed into the brain very rapidly, providing an immediate "rush" or "high" to the user (DuPont & Bensinger, 2005). Depending on quantity taken and method of ingestion, this "high" can vary in its intensity. For example, oral administration of these drugs provides little to no feeling of euphoria due to the slow absorption through the digestive tract. However, intranasal (snorting) or pulmonary (smoking) ingestion can result in a much more immediate and noticeable feeling of euphoria; this feeling is the rush or high that some recreational drug users seek (DuPont & Bensinger, 2005). Subjective feelings

from these illicit stimulants include increased sense of euphoria and alertness (Feussner, 2002). More negative sensations include feeling jittery, rapid heartbeat, sweating, and trembling (Feussner, 2002).

Stimulant medications such as methylphenidate and amphetamine salts share many of these biochemical properties with illicit stimulants such as cocaine and methamphetamine (Feussner, 2002; Kollins, 2003; Sannerud & Feussner, 2000). Studies with animals and humans have documented both the physiological and subjective similarities between these groups of drugs. Rate of absorption and the amount of time a substance remains active in the brain are important factors in determining the intensity of a drug's effects. Methylphenidate has been shown to be equivalent to cocaine when both uptake time and dopamine binding levels are compared (Kollins, 2003). Subjectively, the drugs are also comparable. When considering a diagnosis of dependence on a particular substance, diagnosticians examine the amount of tolerance one has acquired for that particular drug. Again, animal studies have suggested that methylphenidate users develop a tolerance much like cocaine users when given intravenous injections of methylphenidate (Feussner, 2002; Sannerud & Feussner, 2000). Some have suggested that methylphenidate is perhaps more alluring than cocaine, as evidenced by higher levels of self-administration and higher rates of death among animals given the chance of unlimited intravenous injection of methylphenidate (Feussner, 2002).

Illicit market for recreational prescription stimulant use

As with cocaine and methamphetamine, an illicit (recreational) market has developed in order that prescription stimulant medication may be traded and sold to individuals without a prescription. Many factors may have contributed to the

development of this illicit market. The first is the amount of similarity between prescription stimulant medication and illicit stimulants, biochemically and subjectively. A second factor, more specific to the development of illicit markets for prescription drugs, is the amount of drug produced each year. The DEA is the regulatory agency responsible for determining how much of a drug may be manufactured and distributed (DEA, 2002). The production quotas for methylphenidate and amphetamine salts have been steadily rising for many years, a necessary circumstance given that the number of prescriptions for ADHD medications have increased yearly as well (Feussner, 2002; Robison, Skaer, Sclar, & Galin, 2002; Safer, Zito, & Fine, 1996; Safer & Malever, 2000). It has been shown, however, that as more medicine is manufactured for legal use, the chances of development of an illicit diversion market increase as well (Haislip, 1993; Morrow, Morrow, & Haislip, 1998; NIH, 1998). This notion is compounded by the lack of concrete data regarding prescription ceilings or limits (NIH, 1998). In other words, researchers have yet to discover the maximum amount of a certain drug that can be legally prescribed without facilitating the development of a significant illicit market. Unfortunately, research has shown that recreational prescription stimulant use often "depends on direct transactions between legitimate medical patients...and their classmates, family members, and friends" (DuPont & Bensinger, 2005).

The increase in stimulant prescriptions written each year is well-documented (Feussner, 2002; Robison et al., 2002; Safer & Malever, 2000; Safer, Zito, & Fine, 1996). At the heart of this growth is the increased recognition of ADHD symptoms and support for pharmacological treatments. For example, the number of physician visits to address ADHD symptoms or treatment rose 90% from 1989-1996 (Zito, Safer, dosReis, Magder,

Gardner, & Zarin, 1999). Stimulant prescriptions have increasingly been the result of these physician visits. Approximately 55% of those visiting a physician for ADHD symptoms received stimulant prescriptions in 1989, but this figure rose to 75% by 1996 and 76% in 2002 (Hoagwood, Kelleher, Feil, & Comer, 2000; Robison, Sclar, & Skaer, 2005). As of 1999, stimulant medication alone was the most common treatment offered by physicians for ADHD symptoms (Robison et al., 2004). The increase in physician visits resulting in prescriptions for stimulant medication can be largely attributed to a rise in the number of females and adults receiving ADHD diagnoses and stimulant treatment (Robison et al., 2002; Robison et al., 2005; Safer et al., 1996).

Ethnicity plays a role in prescription practices as well. Previous research has found that non-White individuals accounted for less than three percent of physician visits for ADHD among those age 20 or older (Robison et al., 2005). There is also a large disparity in prescribing trends for non-Hispanic White and African-American high school students, with non-Hispanic Whites being prescribed stimulants more than five times as often as African-Americans (Safer & Malever, 2000). Additionally, school districts with greater ethnic minority populations had significantly lower rates of methylphenidate prescriptions than non-minority districts, and physicians saw fewer ethnic minorities for ADHD symptoms than Whites (Zito et al., 2000).

Public and scholarly approval of stimulant medication has also gradually improved over the past 20 years. After a large number of lawsuits in the 1980's related to methylphenidate use, research has shown that stimulant medication is the most effective treatment for ADHD (MTA Cooperative group, 1999a). Stimulant medication is also quite compatible with the policies of most Health Management Organizations (HMO's),

in that HMO's are more likely to reimburse a patient for a doctor's visit in which he or she receives a prescription for stimulant medication than when they do not (Zito et al., 2000).

Population-specific non-medical stimulant use

Previous research, though varied in its results, has demonstrated that prevalence of recreational prescription stimulant use is increasing in several populations (Arria & Wish, 2005; Babcock & Byrne, 2000; Hall, Irwin, Bowman, Frankenberger, & Jewett, 2005; Low & Gendaszek, 2002; Marsh, Key, & Payne, 2000; McCabe, Knight, Teter, & Wechsler, 2005; McCabe, Teter, and Boyd, 2004; Sharp & Rosén, 2005; Sharp & Smith, 2002; Teter, McCabe, Cranford, Boyd, & Guthrie, 2005; Williams, Goodale, Shay-Fiddler, Gloster, & Chang, 2004). Though these prevalence rates are not at the levels of use of other "diverted" prescription drugs or illicit drugs such as marijuana, they are comparable to those of cocaine and methamphetamine, sometime exceeding levels of use of these drugs.

Recreational prescription stimulant use in the college population is important to consider for several reasons. College students often show higher levels of heavy drinking and illicit drug use than non-college populations (Jackson, Sher, & Park, 2005). Recreational prescription stimulant use is no different; the Monitoring the Future study, a national survey aimed at assessing substance use in middle and high school age adolescents, indicated that individuals in college report higher levels of recreational prescription stimulant use than non-college peers (Johnston, et al. 2003). Given that older adolescents and young adults are being diagnosed with ADHD more frequently than in the past, more of these individuals are being prescribed stimulant medication (Robison et al., 2005). This rise in prescriptions in the college population presumably

makes it much easier to obtain or distribute prescription stimulant medication recreationally, much like other drugs of abuse that have illicit markets. Research has produced varying results in regards to actual prevalence of recreational prescription stimulant use in a college population, with numbers ranging from 0% (in small religious institutions) to 35% of students reporting recreational use of prescription stimulants (Arria & Wish, 2005; Babcock & Byrne, 2000; Hall, et al., 2005; Low & Gendaszek, 2002; McCabe, et al., 2005; Sharp & Rosén, 2005; Teter, et al., 2005). Most previous studies, however, have shown that recreational prescription stimulant use is occurring more often than cocaine or methamphetamine use, and almost as often as marijuana use.

As mentioned earlier, recreational prescription stimulant use has been shown to occur more among those individuals who are using other illicit substances. In adolescent and college student populations, recreational prescription stimulant use has been correlated with alcohol use, illicit drug use (marijuana, cocaine, and methamphetamine), and non-medical use of other prescription medications such as benzodiazepines and opiate pain relievers (Hall et al., 2005; Low & Gendaszek, 2002; McCabe et al., 2004; McCabe et al, 2005; Poulin, 2001; Teter et al., 2005; Sharp & Rosén, 2005; Williams et al., 2004). In studies with adolescent substance users, methylphenidate was reportedly used in a non-medical context more often than any other prescription medication (Marsh et al., 2000). Not only did methylphenidate use increase six fold over the course of the study, but Marsh et al. (2000) found that it was used more frequently than cocaine, methamphetamine, or psychedelics.

Substance users in college are also more likely to participate in recreational prescription stimulant use than their non-substance using peers. This correlation has been

supported by several studies to date, and it extends to several types of substance use, both licit and illicit (Hall et al., 2005; Low & Gendaszek, 2002; McCabe et al, 2005; Teter et al., 2005; Sharp & Rosén, 2005). For example, college students engaging in recreational prescription stimulant use are more likely than non-recreational users to smoke cigarettes, participate in heavy episodic drinking, display risky behavior, and use illicit drugs (McCabe et al., 2005).

Gender and ethnic differences in recreational prescription stimulant use

Prior research has suggested that recreational prescription stimulant use differs according to gender and ethnic group (Arria & Wish, 2005; Hall et al., 2005; Low & Gendaszek, 2002; McCabe et al, 2005; Sharp & Smith, 2000; Simoni-Wastila, 2000; Teter et al., 2005). The specific differences noted, however, have been varied. For instance, most studies show that males are more likely than females to use stimulants in a non-medical context. Low and Gendaszek (2002) first noted this difference, and their claim was subsequently supported by several research projects (Arria & Wish, 2005; Hall et al., 2005; Teter et al., 2005). On the other hand, a few studies have found no difference between usage levels of women versus men or found that women participate in a higher level of recreational use than non-Hispanic White males (Sharp & Smith, 2002; Simoni-Wastila, 2000).

Recreational prescription stimulant use, much like prescription trends, has also been shown to differ according to ethnicity, but research is again divided on this notion. The majority of research has found that non-Hispanic Whites are more likely to engage in non-medical stimulant use than ethnic minorities (Hall et al., 2005; Low & Gendaszek, 2002; McCabe et al., 2004; McCabe et al., 2005; Teter et al., 2005). Nonetheless, some

research has found no significant differences in prevalence rates of recreational stimulant use according to ethnicity (Sharp & Smith, 2002; Sharp & Rosén, 2005).

Diversion of prescription stimulants in adolescent and college populations

Recreational prescription stimulant use would not be possible without the medication being diverted to form an illicit market, and this diversion is occurring in both high school and college students. Various research has found that anywhere between 16-24% of high school students with legally prescribed stimulants have been approached and asked to divert their medication by selling it or giving it away (Musser et al., 1998; McCabe et al., 2004). Unfortunately, rates of actual compliance with these requests were not addressed in these studies. Poulin (2001) made a distinction between those who sold medication and those who provided it to fellow high school students for free. He found that 14.7% of students with a legal prescription for stimulants gave medication away for free while 7.3% sold it. He also showed that females and non-Hispanic White students were more likely to engage in prescription stimulant diversion than males and ethnic minority students.

The earliest studies on this topic have found that an illicit market for prescription stimulant use has also developed in the college population (Babcock & Byrne, 2000; Hall et al., 2005; McCabe & Boyd, 2005; Sharp & Rosén, 2005). Originally, research focused primarily on the extent to which prescription stimulant medication was being diverted. The issue was examined from both the supply and demand side. The author sought prevalence rates for both number of individuals with legal prescriptions who reported being approached to sell or give away prescription stimulant medication (54%) and individuals who reported knowing someone they could obtain prescription stimulant

medication from (45%) (Babcock & Byrne, 2000; McCabe et al., in press). Sharp and Rosén (2005) found that over 62% of undergraduates surveyed knew someone that could provide them with prescription stimulant medication. They also found that more than 55% rated prescription stimulant medication as either 'highly available' or 'somewhat available.' McCabe and Boyd (2005) examined sources of various prescription drugs among recreational college users, and found that prescription stimulant medication was most often obtained from peer sources. Heavy episodic drinking and other illicit drug use were also more likely to occur among those who procured prescription stimulant medication from peer sources than among those who did not (McCabe & Boyd, 2005). No study has examined the quantities purchased at a time for recreational use or the quantities used in each episode of recreational ingestion. These are important factors to consider in determining how closely recreational prescription stimulant use matches trends of illicit stimulant (i.e., cocaine and methamphetamine) use. In other words, the current study seeks to determine if quantity purchased or quantity used at one time is related to other demographic variables.

Motives for use and method of ingestion

Recreational prescription stimulant use has been established as a growing issue on many college campuses. However, two important factors to consider when investigating recreational prescription stimulant use are the method of ingestion and motive for use. As mentioned before, intranasal and intravenous ingestion of prescription stimulants provide sensations more like those of cocaine and methamphetamine than oral ingestion. The reason for this lies in the delivery of the drug to the body. When crushed and snorted intranasally, injected intravenously, or smoked, a higher concentration of the drug is

delivered to the brain at one time, providing more of a 'rush', or reinforcing effect, to the user (DuPont & Bensinger, 2005; Kollins, 2003). Motives for use, however, may play an important role in the method of ingestion. The main motives for recreational prescription stimulant use appear to fall into one of two categories: 1) to enhance academic performance (i.e., increase alertness/concentration, help with studying) and 2) to facilitate partying/socializing (i.e., increase mental clarity while drinking alcohol, stay up later) (Hall et al., 2005; Low & Gendaszek, 2002; Sharp & Rosén, 2005; Teter et al., 2005). No study to date has investigated the potential relationship between method of ingestion and motive for use.

For example, there is reason to believe that individuals interested in increasing academic performance are more likely to ingest prescription stimulants orally. By doing so, they experience a slower onset and longer duration of mild stimulant effects, conducive to 'all-nighters' and increased concentration. Conversely, individuals seeking a "party" rush from prescription stimulant medication may be more likely to ingest prescription stimulants intranasally. Given the well-supported notion that recreational prescription stimulant use is correlated with other illicit drug use (Hall et al., 2005; Low & Gendaszek, 2002; Marsh et al., 2000; McCabe et al., 2004; Sharp & Rosén, 2005; Teter et al., 2005), it is quite possible that these experienced drug users are ingesting prescription stimulants in order to experience euphoric subjective effects; intranasal ingestion is the method of ingestion most likely to produce these effects. Though a formal correlation was not conducted, one study's prevalence rates of recreational stimulant use for partying (12%) was similar to the prevalence rates of those who ingested prescription stimulants intranasally (11.5%) (Hall et al., 2005). These

prevalence rates, however, could represent entirely different user populations. Sharp and Rosén (2005) found that a similar percentage of individuals ingested prescription stimulants intranasally as well (9.5%) but did not examine the relationship between method of ingestion and motive for use. Further investigation of this relationship is a major focus of the current study.

Recreational prescription stimulant use and weight loss

Two studies have found that weight loss is also a motive for ingesting recreational prescription stimulants (Johnston & O'Malley, 1986; Low & Gendaszek, 2002). A prior study showed that 40% of high school students engaging in recreational prescription stimulant use reported doing so for weight loss purposes (Johnston & O'Malley, 1986). On the other hand, a separate study stated that "a small percentage" (actual number unspecified) of college-age female respondents indicated that they used prescription stimulants recreationally to aid in weight loss or appetite control (Low & Gendaszek, 2002). Given the large discrepancy between these two data, further investigation and clarification of this particular motive is certainly warranted.

Current study

The present study investigated several facets of recreational prescription stimulant use on a large western United States college campus. Based on the literature, several research questions were posed. First, the researchers sought to identify sources of diversion of prescription stimulant medication. Possible sources of diversion include family, close friends, boyfriends/girlfriends, peers/acquaintances, and drug dealers. Further, prior studies have documented the different motives for use (Hall et al., 2005; Teter et al., 2005). In the present study, the author attempted to identify a relationship

between motive for use and method of ingestion (i.e., intranasally or orally). Additionally, no research currently exists to document the quantities of recreational stimulants purchased or used at one time. The author investigated whether individuals intending to use the medication for academic enhancement purchase significantly less medication at one time than those intending to use it for partying/socializing. Finally, research exists to support the idea that some individuals ingest recreational prescription stimulants for weight loss (Johnston & O'Malley, 1986; Low & Gendaszek, 2002). These numbers vary greatly; therefore, the author sought to clarify the prevalence rates of those using recreational stimulants to lose weight.

The author asked about plans to attend graduate school in order to determine whether a relationship exists between having such plans and engaging in recreational prescription stimulant use. Research has shown that high school students planning to attend college engage in lower rates of recreational stimulant use (McCabe et al., 2004), and the author sought to determine if this finding also holds true for undergraduates with plans to attend graduate school.

CHAPTER II

Method

Participants

The participants were 476 students enrolled in an introductory psychology course at a large public university in the western United States. A demographic questionnaire assessed the participant characteristics. The demographics questions asked about each participant's age, gender, ethnicity, year in school, and grade point average (GPA). Of all respondents completing the survey, 71% (N = 338) were female and 29% (N = 138) were male, and the mean age of the sample was 18.63 years (SD=1.95). The sample was 83.6% White, and the largest ethnic minority group represented was Latinos (5.0%; N = 24). The sample was 3.4% Asian/Pacific Islander (N = 16), 2.5% Black/African-American (N = 12), and .4% Other (N = 2). The majority of individuals in the sample were freshmen (70.2%; N = 334), followed by sophomores (21.4%; N = 102), juniors (6.9%; N = 33), and seniors (1.1%; N = 5). With regard to GPA, 24.6% reported a GPA of 3.51-4.00 (N = 117); 41.2% reported a GPA of 3.01-3.50 (N = 196); 20.0% reported a GPA of 2.51-3.00 (N = 95); 8.2% reported a GPA of 2.01-2.50 (N = 39); 2.1% reported a GPA of 1.01-2.00 (N = 10); and .4% reported a GPA of 0.00-1.00 (N = 2). These statistics may be viewed in Table 1.

Table 1 – Descriptive Statistics

Sex	*N*	*Percentage of Total Sample*	*Percentage Reporting Lifetime Recreational Stimulant Use*
Male	138	29.0	15.0
Female	338	71.0	13.0
Ethnicity			
White/Non-Hispanic	398	83.6	14.0
Black/African-American	12	2.5	17.0
Asian/Pacific Islander	16	3.4	0.0
Hispanic/Latino	24	5.0	4.0
Other	2	0.4	100.0
Class			
Freshman	334	70.2	11.0
Sophomore	102	21.4	21.0
Junior	33	6.9	12.0
Senior	5	1.1	40.0
Graduate	1	0.2	0.0
GPA			
0.0 – 1.00	2	0.4	100.0
1.01 – 2.00	10	2.1	30.0
2.01 – 2.50	39	8.2	18.0
2.51 – 3.00	95	20.0	13.0
3.01 – 3.50	196	41.2	15.0
3.51 – 4.00	117	24.6	8.0

Measures

The present study utilized a questionnaire that combined elements used in prior research. In addition to the demographic information mentioned above, the survey inquired about several facets of recreational prescription stimulant use, including: participation in recreational use, purchase of recreational prescription stimulant medication, motive for use, method of ingestion, and distribution of prescription stimulant medication. The measure also inquired as to current levels of illicit drug (i.e., marijuana, cocaine, methamphetamine, and heroin) use (See Appendix A).

Procedure

Participants in this research project were solicited using an announcement on the Introduction to Psychology course website. The participants were offered research credit to be applied toward the requirements of their introductory psychology course. Each of the participants was given a notice of informed consent with their questionnaire. This informed consent form detailed all aspects of the study, including the fact that all responses to the questionnaire would be completely anonymous. Additionally, the participants were informed that they could withdraw from the project at any time. The procedure was approved by the University Institutional Review Board (see Appendix B).

Upon "signing up" for participation in the study, individuals were assigned a time and place in which to complete the survey. The surveys were distributed by the research assistant, who read the instructions for completion and remind participants that no identifying information should be recorded on the survey. After completion of the survey, the researcher collected the materials and debriefed the participants (see Appendix C).

CHAPTER III

Results

The data showed that 13.0% of the students responding (61 of 468) had engaged in recreational prescription stimulant use "at some point" in their past. Fifteen percent of males (20 out of 138) reported recreational prescription stimulant use compared to 13.0% of females (43 out of 338). A cross tabulation statistical analysis determined that this difference was not statistically significant ($\chi^2 = .405$, df = 1, p = .524). Lifetime prevalence rates of recreational prescription stimulant use for both non-Hispanic Whites and ethnic minority individuals were generally similar; however, individuals who self-identified as Asian/Pacific Islander (N = 16) or Hispanic/Latino(a) (N = 24) reported less recreational prescription stimulant use (0% and 4% lifetime prevalence rates, respectively) than non-Hispanic White (N = 398; 14% lifetime prevalence rate) or Black/African-American (N = 12; 17% lifetime prevalence rate) individuals. Low cell counts of ethnic minority individuals who engaged in recreational use of prescription stimulant medication dictated that the author collapse ethnicities into two groups (non-Hispanic White and ethnic minority individuals) before conducting valid statistical calculations. After doing so, a cross tabulation procedure found that no significant differences existed between non-Hispanic White lifetime prescription stimulant use and ethnic minority lifetime prescription stimulant use ($\chi^2 = .238$, df = 1, Fisher's exact p = .717).

Only 1.3% of individuals indicated that they are *currently* using recreational prescription stimulant medication. This usage rate was substantially less than that for marijuana (27.9%) and also less than the rates for cocaine (2.7%) and methamphetamine (2.7%). A Pearson Product Moment correlation was used to determine the relationship between current recreational prescription stimulant use and current illicit drug use. The author found that there was a weak positive correlation (r = .165) between current recreational prescription stimulant use and current use of marijuana; a weak positive correlation (r = .218) between current recreational prescription stimulant use and current cocaine use; a weak positive correlation (r = .378) between current recreational prescription stimulant use and current use of other amphetamines; and a moderate positive correlation (r = .401) between current recreational prescription stimulant use and current heroin use. These results may be viewed in Table 2.

Results indicated that diversion of recreational prescription stimulant medication is most often characterized by transactions from those with a prescription to those without a prescription for the medication (81.3%). This compares to individuals who received prescription stimulants from those without a prescription (10.9%) or those who were unsure if the provider had a prescription or not (7.8%). The majority of individuals who reported recreational prescription stimulant use indicated that they obtained the medication from a close friend (64.6%) or peer/acquaintance (20.0%). Few respondents indicated that they obtained the medication from a drug dealer (4.6%) or family member (4.6%). The number of participants reporting distribution of recreational prescription stimulants or exposure to such behavior is noteworthy. Of all respondents, 9.3% indicated that they personally sold or gave away prescription stimulant medication to

Table 2 – Correlation Between Recreational Prescription Stimulant Use and Other Drug Use

Substance	*Correlation (Pearson's r) with Recreational Stimulant Use*
Alcohol	.165*
Marijuana	.218**
Cocaine	.378**
Amphetamine	.401**

Note: ** Indicates the correlation is significant at the .01 level
* Indicates the correlation is significant at the .05 level

someone without a prescription (which is interesting given that the results indicated that only 3.8% of individuals were prescribed ADHD medication at some point in their past and only 1.7% were still taking ADHD medication). Additionally, 62.6% of participants reported knowing someone who had sold or given away prescription stimulant medication, and 68.3% of students knew someone who had taken prescription stimulant medication recreationally. Perceived availability of recreational prescription stimulant medication was also surveyed, with 54.0% of individuals rating the availability as either "very available" or "somewhat available".

Respondents also reported several sources of diversion. Results showed that 24.6% of individuals reporting recreational stimulant use purchased the medication, 1.6% traded other drugs for stimulant medication, and 73.8% of users received stimulant medication for free. Among those who purchased medication, 23.7% purchased one to two pills at a time, 5.3% purchased three to five pills, 1.3% purchased five to ten pills, and 5.3% purchased more than ten pills at one time.

In addition, the author conducted a Chi-Square test of independence to determine if a relationship existed between quantity purchased at one time and participants' motives for use (i.e., to study/concentrate or to party/get high). Results indicated that there was no significant relationship between these two variables ($\chi^2 = 5.617$, df = 4, p = .230).

The author also investigated the descriptive aspects of the methods of ingestion and motives for use cited by recreational prescription stimulant users. Findings indicated that 81.5% of those reporting recreational prescription stimulant use ingested the medication orally (swallowed) while 17.5% of individuals reported ingesting it intranasally (snorted). Many users indicated that they utilized recreational prescription

stimulants to focus and study (67.2%) while others indicated that they ingested prescription stimulants recreationally in order to prolong nights of partying or hanging out with friends (16.5%). Of all individuals reporting recreational prescription stimulant use, 7.5% reported doing so to gain energy for exercising, while 3.0% did so to control their appetite for weight loss purposes. Both individuals who used prescription stimulants for weight loss were female (N = 2). Table 3 shows the cross tabulation of motives for use and methods of ingestion.

A cross tabulation statistical procedure was performed in order to assess the relationship between motive for use and method of ingestion. Again, low cell counts dictated that the author collapse both motive for use and method of ingestion in order to obtain accurate statistical analyses. With regard to motive for use, the author identified three categories: to concentrate/study, to stay up later in a social or "party" situation, and to reduce appetite or gain energy for exercise. Methods of ingestion fell into two categories: orally (swallowed) and intranasally (snorted). The author performed a Chi-Square test of independence to determine the strength of association between the variables. Results indicated that there *is* a relationship between these variables (χ^2 = 6.670, df = 2, p = .036). These results indicate a moderately strong relationship between method of ingestion and motive for use. Individuals using prescription stimulants recreationally to study or concentrate typically ingest the medication orally, whereas those using the prescription medication to party typically ingest it intranasally. The number of individuals who snorted or swallowed prescription stimulants to reduce appetite or gain energy for exercising was equal.

Table 3 – Motives for Use and Methods of Ingestion

Motive for Use	*Method of Ingestion*		
	Intranasal (Snort)	Oral (Swallow)	**Total**
Concentrate/Study	5	38	**43**
Stay up later/Party	4	8	**12**
Energy/Weight loss	3	3	**6**
Total	**12**	**49**	**61**

The author conducted exploratory analyses across several variables to determine if the twelve individuals who ingested recreational prescription stimulants intranasally differed significantly from those who ingested recreational prescription stimulants orally. These variables included: sex, GPA, perceived availability of recreational prescription stimulants, quantities of alcohol used in one sitting, and current use of marijuana, cocaine, and illegal amphetamines. No significant differences were found between the two groups on these variables.

Of the total number of respondents, 64.3% (N = 302) indicated that they had plans to attend graduate school while 33.6% (N = 156) did not. Among those planning to go to graduate school, 12.0% reported lifetime recreational stimulant use. Of the total number of individuals without plans to attend graduate school, 16.0% reported lifetime recreational stimulant use. A Chi-Square test of independence was performed to determine whether those with plans to attend graduate school reported significantly different prevalence rates for recreational prescription stimulant use than those without plans to attend graduate school. No significant differences were found to exist (χ^2 = 1.502, df = 1, p = .220).

CHAPTER IV

Discussion

The author sought to illuminate several aspects of recreational prescription stimulant use with the current study. Areas of particular interest included: sources of diversion of recreational stimulants, a descriptive examination of the motives for use and methods of ingestion as well as the potential relationship between these two variables, descriptive inquiries into the quantity purchased and its relationship to motive for use, a descriptive investigation of weight loss as a specific motive for use of recreational stimulant medication, and the relationship between plans to attend graduate school and recreational stimulant use. Results were also used to corroborate prior research on gender and ethnic differences in recreational stimulant use.

Lifetime prevalence of recreational prescription stimulant use

This study found that 13.0% of respondents reported engaging in recreational prescription stimulant use *at some point* in their past. While research has shown that lifetime prevalence rates range from 0% to 25%, the average lifetime prevalence rate for recreational prescription stimulant use was 6.9% (McCabe et al., 2005). Prior research asserted that factors such as higher admission standards and membership in a fraternity/sorority contribute to higher levels of recreational prescription stimulant use. The admission standards and population characteristics of the university from which the

sample was drawn are consistent with the slightly higher prevalence rate that was found and likely account for the increase over the national average.

Gender and ethnicity in recreational prescription stimulant use

The current study examined gender and ethnic breakdowns within recreational stimulant use. As mentioned before, gender research in this area has produced mixed results; many studies have documented a significantly higher percentage of men engaging in recreational stimulant use (Arria & Wish, 2005; Hall et al., 2005; Low & Gendaszek, 2002; Teter et al., 2005) while others have found no significant differences or found that women participate in recreational stimulant use significantly more than men (Sharp & Smith, 2002; Sharp & Rosén, 2005; Simoni-Wastila, 2000). The current research found no significant difference in the rates of recreational stimulant use between men and women. Factors other than prescribing trends may be contributing to these results. For example, recreational stimulant medication shares biochemical similarities with cocaine and methamphetamine when ingested intranasally. Additionally, males typically engage in higher rates of illicit stimulant use (SAMSHA, 2004). In this study, however, the vast majority of individuals ingesting stimulant medication recreationally did so by swallowing it (oral ingestion). This oral ingestion removes much of the "rush" that comes with snorting the medication. When coupled with the finding that there were no significant differences between males and females in their use of illicit stimulants (i.e., cocaine and methamphetamine), these results are consistent.

Research has also examined the role of ethnicity in recreational stimulant use. As with the findings on gender differences, prior reports have been conflicted with regard to significant differences between ethnic groups in terms of recreational stimulant use. The

majority of studies have found that non-Hispanic White individuals engage in significantly higher rates of recreational stimulant use (Hall et al., 2005; Low & Gendaszek, 2002; McCabe et al., 2004; McCabe et al., 2005; Teter et al., 2005) than ethnic minority individuals, however, other studies have not documented this difference (Sharp & Smith, 2002; Sharp & Rosén, 2005). The current study again sought to provide more evidence regarding ethnic differences in recreational stimulant use. A collapsing of ethnic groups into two main groups (non-Hispanic Whites and ethnic minorities) accounted for low cell counts among ethnic minority prescription stimulant users and provided a more accurate representation of usage characteristics. After collapsing these groups, no significant differences were found to exist between those who self-identified as non-Hispanic White and those identifying as a member of an ethnic minority group. Again, if one looks to general prescription practices as an indicator of recreational stimulant use trends, these results are consistent with the current study's findings that there are no significant differences among ethnic groups at this university in terms of those currently taking ADHD medication with a legal prescription or those who have received a legal prescription in the past.

Diversion characteristics

Diversion of recreational prescription stimulant medication from those with a legal prescription to those without one in a college population has certainly been well documented in prior research (Babcock & Byrne, 2000; Hall et al., 2005; McCabe & Boyd, 2005; McCabe et al., in press; Sharp & Rosén, 2005). This study attempted to further delineate the characteristics of diversion in a college population. Previous findings indicated that between 45-62% of undergraduates knew where they could procure

prescription stimulant medication to be used recreationally. Results in the current study indicated that 62.6% of total respondents knew someone that could provide them with stimulant medication, which provides further evidence for a substantial illicit market. While it is certainly possible that the prescription stimulant medication is being provided by a small cadre of individuals, it is nonetheless noteworthy that almost two-thirds of students know where to obtain the medication. Another finding to take into account is the disparity between those receiving legal prescriptions currently (1.7%) or in the past (3.8%) and those who reported giving away or selling stimulant medication (9.3%). One potential explanation for this finding is the possibility of "double-diversion," where those who first obtain the medication from an individual with a prescription then re-distributed it to others without a prescription. While it is far from conclusive, it is interesting that 10.9% of those reporting recreational stimulant use indicated that they obtained the medication from someone without a legally written prescription. If this were indeed the case, it presents a compelling similarity with the markets for other illicit drugs in which there exists a tiered distribution system.

Another aspect of diversion that has been discussed in the literature is the source of diversion. McCabe and Boyd (2005) reported that prescription stimulant medication most often came from peer sources. The current study corroborated these findings, as the majority of individuals who have used prescription stimulants (64.6%) indicated that they obtained the medication from a close friend and another 20.0% stated that they received the medication from a peer/acquaintance. Only 4.6% of individuals using recreational prescription stimulants indicated that they procured the medication from a drug dealer. Also worthy of considering in this context of acquiring the medication is the current

findings regarding purchasing of the medication. Of all respondents, only 24.6% reported that they purchased the medication, while 73.8% stated that they received it for free. This finding seems to fit well with the idea that the distribution appears to still only be occurring between close friends or peers rather than from a true "drug dealer"; perhaps friends and acquaintances are less willing to charge or attempt to make money from their distribution than a drug dealer. This lack of monetary exchange may also be lessening the stigma associated with using prescription stimulant medication recreationally in that it allows individuals to believe that they are not actually *buying* drugs and thereby are staying more within the confines of the law. Subsequent research could benefit from specifically asking about subjective feelings toward receiving the medication without paying for it and the perceived stigma or legality thereof.

Finally, the author sought to illuminate specific information regarding quantities of recreational prescription stimulants obtained at one time and the potential relationship between quantities purchased and motive for use. The author proposed that those using stimulants more frequently would purchase more than those who are less frequent users. The author also suggested that those using recreational stimulants for partying or getting "high" would purchase more at one time than those using recreational prescription stimulants to study. No prior studies have investigated this aspect of the recreational prescription stimulant market. Results showed that neither of the proposed relationships was supported by data. It is important to note that the vast majority of users did not actually purchase the medication, which resulted in low cell counts for statistical comparison. Future research would do well to also inquire as to the quantities obtained

when individuals receive the medication for free, as this appears to be the main method of obtaining recreational prescription stimulants.

The totality of evidence on diversion suggests that stimulant medication, while not currently at the level of distribution associated with illicit drugs such as marijuana and cocaine, is developing an illicit market that is worthy of attention. Though individuals may be obtaining medication and then re-distributing it, most respondents are not actually paying for it and are not receiving the medication from a designated "drug dealer." These facts indicate that recreational stimulant medication still has some "growing room" before reaching the problematic distribution proportions of illicit drugs.

Motive for use and method of ingestion

A small amount of previous research has documented the prevalence rates of motive for use along with method of ingestion of recreational stimulant medication. For example, one study found that 12% of respondents ingested the medication for partying/socializing and 42% did so in an academic context (i.e., to concentrate, before tests, or during finals week) (Hall et al., 2005). Methods of ingestion reported include oral ingestion (63%) and intranasal ingestion (11.5%). The current study supported these findings, as the majority of respondents reporting recreational prescription stimulant use indicated that they did so primarily for focusing or concentration (67.2%) and 16.5% reported primarily using recreational prescription stimulants for partying/socializing. In terms of method of ingestion, 81.5% of respondents indicated that they ingested the prescription stimulant medication orally (swallowed) while 17.5% ingested it intranasally (snorted).

This study also attempted to quantitatively look at the relationship between motive for use and method of ingestion as no prior research to date has done so. The nominal nature of the two variables made it impossible to assert predictive or directional relationships between the variables, but the author was able to determine that a relationship does indeed exist between the two through the use of a Chi-Square test of independence. It is interesting to note that the percentage of those using the medication for partying/socializing is very similar to those ingesting it intranasally. These findings are comparable to results from a prior study (Hall et al., 2005) in which the respective percentages were also very similar (12% and 11.5%, respectively). Caution must be exercised in making inferential statements, however. While it may be easy to assume that the similarity in percentages of individuals using recreational stimulants for partying overlaps significantly with the percentage of individuals who snorted the medication, future research could certainly benefit from devising a research method in which this relationship could be assessed using predictive tests (which would require a much larger sample of recreational stimulant users). This assertion is also very true in considering the differences between intranasal users of recreational prescription stimulants and oral users. While no significant differences were found between these two groups in the current sample, it is certainly worthwhile to conduct similar analyses in a much larger sample of recreational prescription stimulant users.

The author also inquired as to the prevalence of individuals who ingested recreational stimulant medication with the primary purpose of appetite suppression or to gain energy for exercising. Prior research varied widely in reported prevalence rates, with one study reporting a 40% prevalence rate of individuals ingesting recreational stimulant

for weight loss (Johnston & O'Malley, 1986) and another reporting "a small percentage" (Low & Gendaszek, 2002) of college-age female respondents doing so. This study supported the latter of the two findings, with 3.0% primarily taking recreational stimulant medication for weight loss purposes. Of those who reported recreational stimulant use, 7.5% indicated that they did so primarily to gain energy to exercise. It is noteworthy that all respondents who used stimulants recreationally to control their appetites were female.

Exploratory findings

As outlined earlier, prior research found that individuals with plans to attend college were less likely to ingest recreational stimulants than those without plans to attend college (McCabe et al., 2004). The current study found that this difference did not necessarily translate to college students with or without plans to attend graduate school, as there were no significant differences in prevalence of recreational stimulant use between individuals planning on attending graduate school and those who do not plan on attending graduate school. Subsequent research would benefit from defining "graduate school" more appropriately to include medical school, law school, or veterinary school as well as more traditional Master's or Ph.D. programs in order to alleviate any ambiguity for respondents. It is particularly important to do so given that current findings suggest that most individuals are using recreational stimulants to stay up and concentrate while studying, an activity that is particularly important considering the potential for high-pressure atmospheres and heavy academic burdens of graduate schools mentioned above.

Limitations of the current study

Sampling bias is certainly a consideration when using a population comprised entirely of students in introductory psychology classes. While the classes typically

possess similar population characteristics as the entire university, one must be aware of the drawbacks to such a sampling method. While representations of ethnic minorities in the sample were consistent with those in the university, representation of the sexes was not; females comprise only 51% of the university's population but 71% of the sample.

A relatively small sample size was also a shortcoming of this study and dictated that the author collapse various data categories to account for low cell counts on some variables. For example, the number of ethnic minorities (N = 54) was quite small compared to Whites (N = 390). A larger number of ethnic minorities would help strengthen statistical analyses used to draw conclusions about differences between ethnic groups. A larger sample would also have allowed for stronger statistical analyses when assessing the relationship between motive for use and method of ingestion.

Another potential shortcoming in this study was the definition of "current recreation stimulant use." The author did not clearly operationalize this variable, which may have resulted in varied interpretation by respondents. In future research, clear definition of the time-frame denoted by "current" would be beneficial.

Additionally, students essentially self-selected themselves for the study, which could lead to sampling issues as well (i.e., if more drug users completed the study based solely on the title of the project). Self-reporting measures are also a concern when considering the results of this study. While researchers certainly took several precautions to assure participants that their responses were confidential, the possibility of exaggeration or minimization does still exist. Furthermore, results from this project may allow for generalization to students across the university, but they do not allow for total generalizability among students in other universities or geographic regions. As

mentioned earlier, collecting a larger sample size will certainly strengthen the conclusions and findings of this research. Future research would not only benefit from gathering similar data from other university students but also from college-age individuals who are not actually attending a four-year university.

Implications and Conclusions

Findings from this study indicate that recreational stimulant use continues to be present on a college campus. Lifetime prevalence of recreational prescription stimulant use is noteworthy as it falls on the higher end of prior findings. Current prescription stimulant use, however, is still at fairly low levels when compared to illicit stimulants such as methamphetamine or cocaine. Gender and ethnic differences, though documented in other studies, were not shown to exist in the current research. This may be a reflection of prescription trends in this particular geographic region, however, and should be investigated further. They could also be due to the small number of ethnic minorities who participated in the current study.

Aspects of recreational stimulant use that are worthy of further attention also include the diversion characteristics such as source of diversion, whether money is changing hands for the medication, and quantities being obtained at one time. The current findings lend themselves to respondents perhaps feeling as though recreational prescription stimulant use is not on the same level as illicit drug use; however, this feeling could certainly be detrimental when legal consequences are taken into consideration. Buying, selling, and receiving recreational prescription stimulant medication without a prescription is a felony charge and not to be taken lightly among

users. This and other universities could certainly benefit from education regarding prescription medication diversion and its legal repercussions.

Method of ingestion of stimulant medication also deserves to be monitored, especially when considered in conjunction with motive for use. The current study served only to document a potential predictive relationship between the two variables, and further research could definitely do well to explore this relationship in a more concrete, quantifiable way. Despite the differences in motives for use and methods of ingestion, the population of stimulant users in general could benefit from education surrounding the physiological effects and potential risks associated with doing so. For example, common side effects from ingesting prescription stimulant medication include upset stomach, rapid heartbeat, and insomnia. These symptoms increase in intensity when the medication is ingested intranasally due to the quicker absorption of the drug. Long-term intranasal use may also result in physiological dependence and the development of a tolerance for the medication that occurs with prolonged ingestion of cocaine and methamphetamine (Fuessner, 2002). Chronic abuse of prescription stimulant medication has also been associated with psychotic breaks and paranoid delusions (Fuessner, 2002).

Female college students may be a group that is particularly at risk for stimulant addiction when their use of stimulants is geared primarily toward appetite suppression or weight loss. Once more, further education on the risks of ingesting stimulant medication for this purpose may be warranted. Physical and mental health professionals should also be educated on the potential existence of dual-diagnoses when working with women who are having body image issues or eating disorder symptoms so that they may develop more appropriate treatment planning and continuity of care.

REFERENCES

Arria, A.M; Wish, E.D. (2002). Nonmedical Use of Prescription Stimulants Among Students. *Psychiatric Annals*, 35(3), 228-235.

Babcock, Q., and Byrne, T. (2000). Student perceptions of methylphenidate abuse at a public liberal arts college. *Journal of American College Health*, 49, 143-145.

Barkley, R. (2005). *Attention-Deficit Hyperactivity Disorder: A handbook for diagnosis and treatment*. (3rd ed.). New York: Guilford Press.

DEA. (2002). http://www.dea.gov.

Diagnosis and Treatment of Attention Deficit Hyperactivity Disorder. (1998). NIH Consensus Statement Nov 16-18; 16(2): 1-37.

DuPont, R.L; Bensinger, P.B. (2005). Abuse-resistant Drug Delivery. *Psychiatric Annals,* 35(3), 253-256.

Feussner, G. (2002). Diversion, trafficking, and abuse of methylphenidate. In Jensen and Cooper (Eds). *Attention deficit hyperactivity disorder: State of the science-best practices*. Kingston, NJ, US: Civic Research Institute.

Haislip, G.R. (1993). Drug diversion control systems, medical practice, and patient care. *NIDA Research Monograph*, 131, 120-31.

Hall, K.M., Irwin, M.M., Bowman, K.A., Frankenberger, W., and Jewett, D.C. (2005). Illicit use of prescribed stimulant medication among college students. *Journal of American College Health*, 53(4), 167-174.

Hoagwood, K., Kelleher, K.J., Feil, M., and Comer, D.M. (2000). Treatment services for children with ADHD: a national perspective. *Journal of the American Academy of Child and Adolescent Psychiatry*, 39(2), 198-206.

Jackson, Kristina M; Sher, Kenneth J; Park, Aesoon. Drinking among College Students. In Galanter (Ed). (2005). *Recent developments in alcoholism*: Volume 17. Alcohol problems in adolescents and young adults. New York, NY, US: Kluwer Academic/Plenum Publishers.

Johnston, L.D., and O'Malley, P.M. (1986). Why do the nation's students use drugs and alcohol? Self-reported reasons from nine national surveys. *Journal of Drug Issues*, 16, 29-66.

Johnston, L.D., O' Malley, P.M., & Bachman, J.G. (2003). *Monitoring the Future National Survey Results on Drug Use: 1975-2002: U. College Students and Adults Age 19-40.* NIH publication number 03-5376. Washington, D.C.: US Department of Health and Human Services.

Kollins, S.H. (2003). Comparing the abuse potential of methylphenidate versus other stimulants: A review of available evidence and relevance to the ADHD patient. *Journal of Clinical Psychiatry*, 64(suppl.11), 14-18.

Low, K.G., and Gendaszek, A.E. (2002). Illicit use of psychostimulants among college students: a preliminary study. *Psychology, Health, and Medicine*, 7(3), 283-287.

Marsh, L.D., Key, J.D., Payne, T.P. (2000). Methylphenidate misuse in substance abusing adolescents. *Journal of Child and Adolescent Substance Abuse*, 9, 1-14.

McCabe, S.E., and Boyd, C.J. (2005). Sources of prescription drugs for illicit use. *Addictive Behaviors*, 30, 1342-1350.

McCabe, S.E., Knight, J.R., Teter, C.J., Wechsler, H. (2005). Non-medical use of prescription stimulants among US college students: prevalence and correlates from a national survey. *Addiction*, 99, 96-106.

McCabe, S.E., Teter, C.J., and Boyd, C.J. (2004). The use, misuse, and diversion of prescription stimulants among middle and high school students. *Substance Use and Misuse*, 39(7), 1095-1116.

Morrow, R.C., Morrow A.L., Haislip G. (1998). Methylphenidate in the United States, 1990-1995 [letter]. *American Journal of Public Health*, 88, 1121.

MTA Cooperative Group. (1999a). A 14-Month randomized clinical trial of treatment strategies for attention-deficit/hyperactivity disorder. *Archives of General Psychiatry*, 56, 1073-1086.

Musser, C.J., Ahmann, P.A., Theye, F.W., Mundt, P., Broste, S.K., Mueller-Rizner, N. (1998). Stimulant use and the potential for abuse in Wisconsin as reported by school administrators and longitudinally followed children. *Developmental Behavior Pediatrics*,19, 187-192.

Poulin, C. (2001). Medical and nonmedical stimulant use among adolescents: from sanctioned to unsanctioned use. *Canadian Medical Association Journal*, 165(8), 1039-44.

Robison, L.M; Skaer, T.L., Sclar, D.A., and Galin, R.S. (2002). Is attention deficit hyperactivity disorder increasing among girls in the US? Trends in diagnosis and the prescribing of stimulants. *CNS Drugs*. Vol 16(2), 129-137.

Robison, L.M., Sclar, D.A., and Skaer, T.L. (2005). Trends in ADHD and stimulant use among adults: 1995-2002. *Psychiatric Services*, 56(12), 1497.

Robison, L.M; Skaer, T.L., Sclar, D.A., and Galin, R.S. (2004). Treatment modalities among U.S. children diagnosed with attention-deficit hyperactivity disorder: 1995-1999. *International Clinical Psychopharmacology*, 19(1), 17-22.

Safer, D.J., Zito, J.M., Fine, E.M. (1996). Increased methylphenidate usage for attention deficit disorder in the 1990s. *Pediatrics*, 98, 1084-1088.

Safer, D.J., Malever, M. (2000). Stimulant treatment in Maryland public schools. *Pediatrics*, 106, 533-538.

Sannerud, C., and Feussner, G. (2000). Is ritalin an abused drug? Does it meet the criteria of a schedule II substance? In Greenhill and Ossman (Eds). *Ritalin: Theory and Practice*. (2nd ed.). Mary Ann Liebert, Inc.: Larchmont, NY.

Sharp, J.T., and Rosén, L.A. (2005). Recreational stimulant use among college students. Unpublished.

Sharp, J.T., and Smith, B.H. (2002). Prescription drug abuse among adolescent inpatients at the William J. McCord Center. Unpublished.

Simoni-Wastila, L. (2000). The use of abusable prescription drugs: The role of gender. *Journal of Women's Health & Gender-based Medicine*, 9(3), 289-297.

Teter, C.J., McCabe, S.E., Cranford, J.A., Boyd, C.J., and Guthrie, S.K. (2005). Prevalence and motives for illicit use of prescription stimulants in an undergraduate student sample. *Journal of American College Health*, 53(6), 253-262.

Williams, R.J., Goodale, L.A., Shay-Fiddler, M.A., Gloster, S.P., and Chang, S.Y. (2004). *The American Journal on Addictions*, 13, 381-389.

Zito, J.M., Safer, D.J., dosReis, S., Magder, L.S., Gardner, J.F., Zarin, D.A. (1999). Psychotherapeutic medication patterns for youths with attention-deficit/hyperactivity disorder. *Archives of Pediatric and Adolescent Medicine,* 153, 1257-1263.

APPENDICES

Appendix A

RECREATIONAL STIMULANT USE SURVEY

All information provided is completely anonymous and confidential

1) Age: _____
2) Sex:
   a. Male
   b. Female
3) Ethnicity (please circle all that apply):
   a. White/Non-hispanic
   b. Black/African-American
   c. Asian/Pacific Islander
   d. American Indian/Native American
   e. Hispanic/Latino
   f. Other _____
4) Year in school
   a. Freshman
   b. Sophomore
   c. Junior
   d. Senior
   e. Graduate
5) GPA
   a. 0.0-1.00
   b. 1.01-2.00
   c. 2.01-2.50
   d. 2.51-3.00
   e. 3.01-3.50
   f. 3.51-4.00
6) Do you plan on applying for or attending graduate school?
   a. Yes
   b. No
7) Have you ever been diagnosed with ADD (Attention Deficit Disorder) or ADHD (Attention Deficit/Hyperactivity Disorder) by a physician?
   a. Yes
   b. No
8) If yes, when (year)? _____
9) Were you ever prescribed medication for ADD/ADHD by a physician? If 'no', please skip to question 13.
   a. Yes
   b. No

10) If yes, which medication?
   a. Ritalin® (methylphenidate)
   b. Adderall®
   c. Dexedrine®
   d. Metadate®
   e. Concerta®
   f. Focalin®
   g. Other (please specify)_____

11) How long did you take this medication?
   a. less than 1 year
   b. 1-2 years
   c. 2-3 years
   d. 3-4 years
   e. 4-5 years
   f. 5+ years

12) Are you still taking this medication?
   a. Yes
   b. No

13) Have you ***ever*** taken stimulant medication (Ritalin®, Adderall®, Dexedrine®, generic methylphenidate, etc.) recreationally (i.e., without a prescription)? **If 'No', please skip to question 30.**
   a. Yes
   b. No

14) If yes, how many times?
   a. 1-2
   b. 3-5 times
   c. 6-10 times
   d. 11-20 times
   e. more than 20 times

15) Are you ***currently*** taking stimulant medication (Ritalin®, Adderall®, Dexedrine®, generic methylphenidate, etc.) **without** a prescription (recreationally)?
   a. Yes
   b. No

16) If answered 'Yes' to question 15, how many times per month do you take stimulant medication without a prescription, on average?
   a. 1-2
   b. 3-5
   c. 5-10
   d. 10-20
   e. more than 20 times

17) If answered 'Yes' to question 13, for what *primary* purpose do/did you take the stimulant medication?

a. to concentrate/study for a test
b. to stay up later in a social situation, without the presence of alcohol or other illicit drugs
c. to prolong a night out while drinking or using other illicit drugs
d. to control appetite
e. to provide more energy for exercise/physical activity
f. Other (please specify): _____

18) If answered 'Yes' to question 13, how do/did you *most often* ingest the stimulant medication?

a. Intranasally (snorted)
b. Orally (swallowed)
c. Pulmonarily (smoked)
d. Intravenously (injected)

If answered 'Yes' to question 13, please answer the following series of questions regarding motives for use and method of ingestion of the medication.

19) When using recreational stimulants to concentrate/study for a test, which method of ingestion do/did you *most often* use?

a. Did not use for this purpose
b. Intranasally (snorted)
c. Orally (swallowed)
d. Pulmonarily (smoked)
e. Intravenously (injected)

20) When using recreational stimulants to stay up later in a social situation, without the presence of alcohol or other illicit drugs, which method of ingestion do/did you *most often* use?

a. Did not use for this purpose
b. Intranasally (snorted)
c. Orally (swallowed)
d. Pulmonarily (smoked)
e. Intravenously (injected)

21) When using recreational stimulants to prolong a night out while drinking or using other illicit drugs, which method of ingestion do/did you *most often* use?

a. Did not use for this purpose
b. Intranasally (snorted)
c. Orally (swallowed)
d. Pulmonarily (smoked)
e. Intravenously (injected)

22) When using recreational stimulants to control appetite, which method of ingestion do/did you *most often* use?

a. Did not use for this purpose
b. Intranasally (snorted)
c. Orally (swallowed)
d. Pulmonarily (smoked)
e. Intravenously (injected)

23) When using recreational stimulants to provide more energy for exercise/physical activity, which method of ingestion do/did you *most often* use?

a. Did not use for this purpose
b. Intranasally (snorted)
c. Orally (swallowed)
d. Pulmonarily (smoked)
e. Intravenously (injected)

24) If answered 'Yes' to question 13, from whom do/did you *most often* receive this medication?

a. From someone with a prescription
b. From someone else without a precription
c. Not sure

25) If answered 'Yes' to question 13, what is/was your *most frequent* relationship with the person who provided you with stimulant medication?

a. Family member
b. Close friend
c. Boyfriend/Girlfriend
d. Peer/Acquaintance
e. Drug dealer
f. Other (please specify): _____

26) If answered 'Yes' to question 13, how do/did you obtain this stimulant medication?

a. Purchased
b. Given for free
c. Traded for other illicit drugs or medication
d. Other (please specify): _____

27) If you purchased this stimulant medication, how much/how many pills do/did you purchase at one time?

a. 1-2
b. 3-5
c. 5-10
d. 10+
e. Did not purchase

28) If answered 'Yes' to question 13, please check any of the following social effects that you may have felt after taking the stimulant medication:

a. More awake/alert
b. More social/able to converse with others more easily
c. More confident in yourself
d. More attractive
e. More withdrawn/shy
f. Other (please specify): _____

29) If answered 'Yes' to question 13, please check any of the following physical effects that you may have felt after taking the stimulant medication:

a. Shaky/jittery
b. Rapid heartbeat
c. Sweating more than usual
d. Blurred vision
e. More sexually aroused
f. Other (please specify): _____

30) Have you ever sold or given away stimulant medication to someone?

a. Yes
b. No

31) Do you know anyone that has sold or given away stimulant medication?

a. Yes
b. No

32) Do you know anyone else that has taken stimulant medication recreationally (without a prescription)?

a. Yes
b. No

33) How would you rate the availability of recreational stimulant medication among Colorado State University students?

a. Very available
b. Somewhat available
c. Somewhat unavailable
d. Completely unavailable
e. Not sure

34) Is it against the law to take prescription medication without a prescription (recreationally)?

a. Yes
b. No
c. I don't know

35) If answered 'Yes' to question 34, what type of crime is taking prescription medication without a prescription?

a. Felony
b. Misdemeanor
c. I don't know

36) Is it against the law to give away or sell prescription medication to someone without a prescription?

a. Yes
b. No
c. I don't know

37) If answered 'Yes' to question 36, what type of crime is giving away or selling medication to someone without a prescription?

a. Felony
b. Misdemeanor
c. I don't know

38) Do you currently drink alcohol?

a. Yes
b. No

39) If answered 'Yes' to question 38, how many drinks do you have per week, on average?

a. 1-2
b. 3-5
c. 6-7
d. 7-10
e. 10+

40) If answered 'Yes' to question 38, how many times a week do you drink alcohol for the purpose of becoming drunk (also called 'binge drinking')?

a. I never drink to become drunk or engage in binge drinking
b. 1-2
c. 3-4
d. 5-6
e. 7

41) Have you ever encountered someone who you believed to be suffering from acute alcohol poisoning?

a. Yes
b. No

42) If answered 'Yes' to question 41, what course of action did you take (or *most often* take, if encountered multiple times) with this individual?

a. No action
b. Called poison control/911/other emergency number
c. Woke this person up/attempted to wake them up
d. Took this person to the hospital
e. Checked this person's breathing
f. Evaluated this person's reaction to touch, shouting, or other sensory stimulation

43) How confident do you feel in your ability to follow correct procedures when acute alcohol poisoning is suspected?

a. Very confident
b. Somewhat confident
c. Somewhat unconfident
d. Not at all confident

44) Do you currently smoke marijuana?
   a. Yes
   b. No
45) If answered 'Yes' to question 44, how many times a month do you smoke marijuana, on average?
   a. 1-2
   b. 3-5
   c. 6-10
   d. 11-20
   e. more than 20 times
46) Do you currently use cocaine?
   a. Yes
   b. No
47) If answered 'Yes' to question 46, how many times a month do you use cocaine, on average?
   a. 1-2
   b. 3-5
   c. 6-10
   d. 11-20
   e. more than 20 times
48) Do you currently use non-prescription amphetamines (MDMA/ecstacy, crank, crystal meth, speed)?
   a. Yes
   b. No
49) If answered 'Yes' to question 48, how many times a month do you use non-prescription amphetamines, on average?
   a. 1-2
   b. 3-5
   c. 6-10
   d. 11-20
   e. more than 20 times
50) Do you currently use heroin?
   a. Yes
   b. No
51) If answered 'Yes' to question 50, how many times a month do you use heroin, on average?
   a. 1-2
   b. 3-5
   c. 6-10
   d. 11-20
   e. more than 20 times
52) Have you ever ingested prescription benzodiazepines (Xanax®, Valium®, Halcion®, 'muscle relaxers', etc.) recreationally (without a prescription)?
   a. Yes
   b. No

53) If answered 'Yes' to question 52, how many times?
   a. 1-2
   b. 3-5
   c. 6-10
   d. 11-20
   e. more than 20 times

54) Have you ever ingested prescription opiate pain relievers (hydrocodone, Demarol®, Vicodin®, Lortab®, Oxycontin®, etc.) recreationally (without a prescription)?
   a. Yes
   b. No

55) If answered 'Yes' to question 54, how many times?
   a. 1-2
   b. 3-5
   c. 6-10
   d. 11-20
   e. more than 20 times

For the following set of questions, please indicate how important each item is/how much you value the item named. Please consider amount of time spent thinking about or engaging in each activity or item and its priority in your life.

56) Partying
   a. Not at all
   b. Slightly
   c. Neutral/do not engage in this activity
   d. Somewhat
   e. Very

56) Working
   a. Not at all
   b. Slightly
   c. Neutral/do not engage in this activity
   d. Somewhat
   e. Very

57) Studying
   a. Not at all
   b. Slightly
   c. Neutral/do not engage in this activity
   d. Somewhat
   e. Very

58) Money
   a. Not at all
   b. Slightly
   c. Neutral/do not engage in this activity
   d. Somewhat
   e. Very

59) Personal relationships
   a. Not at all
   b. Slightly
   c. Neutral/do not engage in this activity
   d. Somewhat
   e. Very
60) Food/Eating
   a. Not at all
   b. Slightly
   c. Neutral/do not engage in this activity
   d. Somewhat
   e. Very
61) Are you currently employed?
   a. Yes
   b. No
62) If you answered "yes" to question 61, how many hours per week do you currently work?
   a. 1-10
   b. 11-20
   c. 21-30
   d. 31-40
   e. more than 40
63) Approximately how much income do you currently earn each month from working, student loans, parental support, etc.?
   a. $1-200
   b. $200-400
   c. $400-600
   d. $600-800
   e. more than $800
64) How much do you currently worry or stress about personal finances?
   a. Not at all
   b. A small amount
   c. A moderate amount
   d. A large amount
   e. I worry constantly about personal finances

Appendix B

Your project, Characteristics of Recreational Stimulant use among College Students, has been approved as of May 23, 2006 with the condition that the approved consent form is used. Approval is for a maximum of 750 participants. The HRC ID is 06-094H.
The approval letter will contain more information about the approval and the researchers' responsibilities and will be sent in the next several days.
* *

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Appendix C

"The research you have just participated in is designed to assess characteristics of recreational (non-medical) prescription stimulant use on a college campus. The answers that you provided on this survey will be compiled and analyzed in order to determine possible trends in stimulant use on the college campus. These results will possibly be used in developing methods for treatment and prevention of recreational stimulant use in the future. If completing this survey has distressed you to the point that you feel that you need counseling-related services, please do not hesitate to call the University Counseling Center at (970) 491-6053. Additionally, if you feel that you may have a problem with recreational stimulant use, alcohol, or other drug abuse and wish to seek counseling and/or treatment for this use, please contact *Connections*, a mental health and substance use center in Fort Collins, Colorado. The phone number for *Connections* is (970) 221-5551, and they can be found on the Internet at http://www.larimercenter.org .

You have also answered several questions pertaining to alcohol toxicity and awareness of symptoms and appropriate action to be taken after encountering someone in this state. Again, if completing this survey has distressed you to the point that you feel that you need counseling-related services, please do not hesitate to call the University Counseling Center at (970) 491-6053."