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# Preventing and Reducing Non-Medical Prescription Stimulant Use: An Intervention Study

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Preventing and Reducing Non-Medical Prescription Use:  
An Intervention Study

A thesis submitted in partial fulfillment for the Bachelor's Degree in Psychology

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Trinity College

Fall 2015 - Spring 2016

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### Abstract

Numerous studies have shown that nonmedical prescription stimulant use (NMPSU), which refers to the use of drugs like Adderall or Ritalin without a prescription, is quickly becoming one of the most prevalent illicit activities on college campuses. In a recent study on Trinity's campus, 37% of students endorsed misusing prescription stimulants in the last year. Not all students are at equal risk, however. Risk factors for NMPSU include: being Caucasian, Greek involvement, low GPA (less than 3.5), binge drinking, marijuana use, and low self-efficacy to avoid using. Accordingly, we screened students for these risk factors and engaged students with two or more risk factors, or those who reported a history of NMPSU. Because only one intervention has been reported on in the literature, we utilized motivational interviewing (MI), a strategy that has been used to reduce heavy drinking in college students, in an attempt to reduce NMPSU and to potentially change NMPSU-related attitudes. MI works by "lowering patient resistance, allowing patients to arrive at their own decisions about the severity of their problem and a possible need for change" (Foote et al., 1999). Seventy participants screened in and 56 (80%) of the participants completed the 1-month follow-up survey. The intervention did not have an effect on study self-efficacy, or expectations for cognitive enhancement, feelings of guilt and dependence related to NMPSU, social enhancement expectancies, and concerns about anxiety and arousal from NMPSU. There was a trend towards intervention group participants being more knowledgeable about the side effects of stimulants when misused. Implications for future research are discussed.

## Preventing and Reducing Non-Medical Prescription Stimulant Use:

### An Intervention Study

“Attention deficit-hyperactive disorder (ADHD) is a common childhood behavioral disorder characterized by chronic problems with inattention, hyperactivity and impulsivity” (Glass & Flory, 2011, p.124). The onset and diagnosis of ADHD is common in childhood with a prevalence rate of approximately 5-7% (Preston, O’Neal & Talga, 2013). ADHD symptoms continue to afflict 50-75% of children into adolescence and adulthood (Glass & Flory, 2011). In addition, impairing symptoms of ADHD affect 1-4% of college students and 3-5% of the general adult population (Glass & Flory, 2011). With a growing rate of prevalence, it has been suggested that the number of college students suffering from ADHD may soon surpass the number of college students who are diagnosed with learning disorders (Glass & Flory, 2011). To treat ADHD symptoms, physicians, psychiatrists and other medical practitioners often prescribe amphetamine-based stimulants such as Ritalin, Adderall, and Concerta. To compensate for the increase in prevalence and duration of ADHD symptoms, pharmaceutical companies have had to increase production; for example drugs like methylphenidate (Ritalin) have seen a 298% increase in production from 1996 to 2006 (DuPont, Coleman, Bucher & Wilford, 2008). Stimulants have been noted to increase attention, increase focus and increase overall alertness by delaying the onset of sleep. When the diagnosis and dosage are accurate, stimulant use can result in approximately a 70% response rate, and 90% of ADHD patients have seen good outcomes with pharmacological treatment (Preston et al., 2013).

With the large proportion of ADHD diagnoses, non-medical prescription stimulant use has also become more common. Non-medical prescription stimulant use (NMPSU) is “use of any form of prescription stimulants that were not prescribed for you or that you took only for the

experience or feeling they caused” (Arria, Caldeira, O’Grady, Vincent, Johnson & Wish, 2008, p. 2). It was estimated that 52 million people have engaged in NMPSU (Volkow, 2014) and of the 52 million, 406,000 were young adults between the ages of 18 and 25 (samhsa.gov citation, 2014). Young adults in college are 176% more likely to engage in NMPSU than non-students (Looby, Kassman & Earleywine, 2014) and upwards of 37.4% of students reported lifetime NMPSU in one study (Looby, Kassman & Earleywine, 2014). The prevalence of NMPSU is alarming due to the illegality, and the potential health risks associated with this behavior.

Between 2005 and 2010, the overall number of emergency department (ER) visits related to prescription stimulants more than doubled from 13,379 to 31,244. Further, among adults aged 18 and older, visits related to adverse reactions from *prescribed use* increased from 1637 to 4983 during the same time period. Within the increase of overall visits from 2005 to 2010, the number of visits related to NMPSU increased as well. Adults who went to the ER for NMPSU increased from 3,175 to 13,570 from 2005 to 2010. Of those adults, many of them were college age (18-25) and the number of NMPSU visits for the college age group increased from 1,310 in 2005 to 5,766 in 2010 (Bavarian et al., 2013). These statistics underscore the need for NMPSU research and the development of effective interventions to curb NMPSU.

Accordingly, the present study will test a novel intervention strategy for NMSPU, group motivational enhancement, that draws on effective strategies for curbing binge drinking, another problematic and prevalent behavior in college students. In the present study, both users and non-users of prescription stimulants will examine their positive and negative expectancies of NMPSU and consider alternative study strategies. Through examination of positive and negative expectancies of NMPSU, we hope to enhance participants’ self-efficacy around more effective study behaviors, challenge their positive expectancies of NMPSU with data on the effects of

stimulant use among people without an ADHD diagnosis, and amplify negative NMPSU expectancies.

## **Background**

Several risk factors have been identified for NMPSU. Across the literature, risk factors that have been identified include: being white, male, a college student, involved with Greek life, and having a grade point average (GPA) below 3.5 (Arria & Dupont, 2010; Bavarian et al. 2013; Desantis, Webb & Noar, 2008; Dussault & Weyandt, 2013; Ford & Ong, 2014; Garnier-Dykstra et al., 2012; Weyandt et al., 2009). Although NMPSU occurs in females, non-whites, people who lack college experience and non-Greek members (Ford & Ong, 2014), NMPSU use among this group is lower when compared to white, male college students with a Greek affiliation. Specifically, one study reported that a NMPSU prevalence rate of 7.2% among whites, as opposed to 1.8% of non-whites (Dussault & Weyandt, 2011). Also, NMPSU was reported to occur in 7.2% of males in comparison to 4.5% of females (Dussault & Weyandt, 2011). In addition, NMPSU was reported to occur in 10.5% of members of Greek life, as opposed to 4.2% of non-Greek affiliated college students (Dussault & Weyandt, 2011). Another study indicated that of 1,253 college students, 34.2% of males and 27.8% of females indicated use (Garnier-Dykstra et al., 2012). NMSPU is most prevalent on college campuses; 70% of NMPSU initiation is reported in college (Bavarian et al. 2013).

In 2010 Arria and Dupont reviewed 15 studies on NMPSU and provided suggestions for NMPSU interventions based on the data they examined. The study reviewed common stimulants that are misused such as Adderall, Ritalin and Concerta. In addition, this study took a unique approach to understanding the underlying causes for NMPSU. To understand the underlying causes of NMPSU, this study suggested that researchers should continue to identify NMPSU risk



factors and attempt to understand them beyond the surface level. For example, low academic performance is a risk factor for NMPSU (Arria & Dupont, 2010). Researchers suggested that in order to understand why low GPA is a risk factor, delving into the underlying reasons for the low GPA is important for understanding NMPSU, as it may help to explain specific academic motivations behind NMPSU (Arria & Dupont, 2010). In addition to dispelling myths and postulating possible interventions for NMPSU, these researchers noted the frequency with which NMPSU occurs with other substance abuse. Specifically, they cited several studies that consistently reported a strong relationship between marijuana use, binge drinking and NMPSU (Arria & Dupont, 2010). A relationship was also found between NMPSU, cocaine use, tobacco use, ecstasy, and inhalant use; however it was significantly less common compared to the co-occurrence of binge drinking, marijuana use and NMPSU (Arria & Dupont, 2010). The data suggests that students who report marijuana use or binge drinking are at greater risk for NMPSU and that NMPSU commonly occurs among students who also report use of cocaine, tobacco, ecstasy or inhalants. Further, the connection of NMPSU and other substance misuse is important to consider when designing an intervention for NMPSU; that is, NMPSU cannot be considered as an isolated behavior but rather, part of a constellation of risky behaviors that might place students at risk for negative academic, legal, and psychological outcomes. .

### **Negative Physiological and Psychological Effects of NMPSU**

NMPSU has been linked to negative physiological effects. The use of stimulants has shown acute effects such as initial insomnia, stomachache, nausea, abdominal pain, headaches and tachycardia (Brown & La Rosa, 2002; Preston, O'Neal, & Talga, 2013). Stimulants may also cause lethargy, sedation or impaired concentration when the dose is too high (Preston et al., 2013) and this is the exact effect students are trying to eradicate. Other effects may include loss

of appetite or lack of sleep (Preston et al., 2013; Tesoro, 2007). Some physiological effects have the potential to be permanently damaging and potentially fatal such as increased risk of seizures, heart attack, stroke and even sudden unexplained death (SUD) (Arria & Dupont, 2010; Donaldson, Siegel & Crano, 2016; Tesoro, 2007).

Stimulants also have been linked to negative psychological effects, which may be as impairing as the physiological side effects. Common side effects include mild dysphoria, as well as loss of appetite, which may lead to weight loss (Brown & La Rosa, 2002; Preston, O'Neal & Talga, 2013). Continuation of weight loss related to stimulant use may lead to anorexia due to severe disordered eating (Brown & La Rosa, 2002). People that engage in NMPSU may also experience symptoms of anxiety, depression and obsessive-compulsive behavior (Brown & La Rosa, 2002; Weydant et al., 2009). NMPSU also has been linked to symptoms of internal restlessness and impulsivity (Dussault & Weyandt, 2011). Concurrently, people who reported frequently engaging in NMPSU reported higher rates of internal restlessness and impulsivity (Dussault & Weyandt, 2011). Other psychological effects that have been reported include: severe anxiety, panic attacks, mania, hallucinations, paranoia, delusions, aggressive behavior, and suicidal or homicidal tendencies (NAMI, 2007).

In addition to causing negative physiological and psychological reactions, NMPSU is associated with increased risk for substance use disorders (Looby, 2013). NMPSU has been linked to alcohol and marijuana dependence (Arria & Dupont, 2010). Research has found that 58.3% of people who engage in NMPSU engaged in illicit use of drugs besides marijuana (Arria & Dupont, 2010). Specifically, studies have also found that people who engage in NMPSU are 96% more likely to have engaged in marijuana use than non-users (Arria & Dupont, 2010). Moreover, 60% of people that engage in NMPSU also have engaged in cocaine use (Arria &

Dupont, 2010). Taken together, these findings demonstrate that it is likely for students who report NMPSU to also engage in illicit use of other substances. Although NMPSU is not necessarily casually related to the use of other illicit substances, students who engage in NMPSU are more like to use illicit substances and over use substances that are legal (binge drinking).

### **Expectations & Motives for NMPSU**

Several studies have explored what students expect from NMPSU and why they use. Academic and social motivations have emerged as the most common reasons for use. Motivations for use included a desire to perform well academically, to improve focus or concentration, and increase energy to enhance productivity (Bavarian et al. 2013; Garnier-Dykstra et al., 2012; Rabiner et al., 2009). In addition, 16% of students are motivated to use for fun (Dussault & Weyandt, 2013) and to enhance the party experience (Garnier-Dykstra et al., 2012; Looby, Kassman, & Earleywine, 2014). Students engaging in NMPSU typically have a lower GPA than their peers, and are more concerned about their academic work. They expect that the stimulants will aid them academically and socially. From an academic perspective, students who engage in NMPSU expect that studying will become easier and more enjoyable, focus or concentration will improve, and that they will have the ability to study for longer periods of time (Arria & Dupont, 2010; Garnier-Dykstra et al., 2012; Rabiner et al., 2009). Social expectancies for use include the desire of feeling high, to improve energy, and to feel better about oneself (Bavarian et al., 2013; Garnier-Dykstra et al., 2012; Looby, Kassman, Earleywine, 2014; Rabiner et al., 2009; Weyandt et al., 2009).

Since much of the past research on expectancies has focused on alcohol, Looby and Earleywine (2010) were interested in exploring the relation between expectancies in the context of stimulant misuse. Past research indicates that people's drinking, future alcohol use, and

treatment outcomes can be predicted through the examination of expectancies about the effects of alcohol (Looby & Earleywine, 2010). Accordingly, Looby and Earleywine posited that positive and negative expectations might predict current users and those at greatest risk for initiation. In 2010, Looby conducted a study that attempted to understand the expectancies that motivate initiation and continuation of NMPSU. Looby defined a positive expectancy as “the belief that the substance will produce a desirable consequence” and a negative expectancy as “the belief that the substance will produce undesirable consequences” (Looby & Earleywine, 2010, p. 375). Expectancies for alcohol influenced the creation of the Prescription Stimulant Expectancy Questionnaire (PSEQ). The PSEQ was developed to assess positive and negative expectancies among users and non-users of prescription stimulants. The PSEQ asks questions that attempt to understand expectancies associated with mood, performance enhancement, physiological and psychological effects, and cognitive and social motivations (Looby & Earleywine, 2010). The results of the study found recreational and users with a prescription had the greatest positive expectancies and nonusers had the least positive expectancies. Non-users and those with a prescription had the most negative expectancies; however, the non-users had the strongest negative expectancies.

In 2010, DeSantis and Hane conducted in-depth interviews with 175 undergraduate non-medical prescription stimulant users. The goal was to understand how students perceive ADHD, stimulants, and illicit use of stimulants. To conduct their interviews, Desantis and Hane utilized a 15-question script that attempted to assess students’ demographics, Adderall use patterns, perceived ethical/legal effects of NMPSU, and physical side effects (Desantis & Hane, 2010). After conducting the interviews, Desantis and Hane found that there were four commonly cited categories of justifications for use and they were described as: “comparison and contrast, all

things in moderation, self-medicating, and minimization arguments” (p. 35). The compare and contrast argument was representative of students’ understanding of the duality of using stimulants. Two of the most pertinent arguments of the compare and contrast category was “I’m doing it for the right reasons” and “no internal/physical side effects argument” (Desantis & Hane, 2010, pp. 36-37). Moderation was the second category that common justifications were grouped under. One of the moderation arguments was that students never felt guilty for using because they only used during academically stressful times such as exam weeks (Desantis & Hane, 2010). In the third category, self-medication, students argued that they probably had ADHD and thus stimulant use was a reasonable solution (Desantis & Hane, 2010). The self-medication argument was based upon three claims (Desantis & Hane 2010). Students claimed that they exhibited symptoms of ADHD such as difficulty focusing, or poor reading comprehension although undiagnosed (Desantis & Hane, 2010). In addition, students reported that stimulant use resolved their ADHD-like behaviors (Desantis & Hane 2010). To conclude, students also indicated that because the stimulant use successfully resolved their ADHD-like behavior that they must in fact suffer from ADHD and thus NMPSU was appropriate (Desantis & Hane, 2010). The final reported reason for use was minimization. Students argued that stimulants are harmless, and socially acceptable as a means to combat sleep deprivation. Students reduced NMPSU to being no different than consuming caffeine (Desantis & Hane, 2010).

### **Theory of NMPSU**

The theory of triadic influence (TTI) is a theory that seeks to explain the many causes that influence behavior and it has been proposed as a model for explaining one’s risk for NMPSU. TTI proposes that different influences can be divided into three groups: intrapersonal,

interpersonal-social, and cultural-environmental (Flay, Snyder, & Petraitis, 2009). Intrapersonal influences are characteristics that shape one's self-efficacy, such as sense of self-control and self-determination. This domain also encompasses demographic characteristics such as age, gender, and race/ethnicity (Flay, Snyder, & Petraitis, 2009). Interpersonal-social influences are the social contexts that guide societal beliefs about behavior. Examples of interpersonal-social influences include interpersonal bonding and motivation to comply with societal norms (Flay, Snyder, & Petraitis, 2009). Cultural-environmental influences are cultural and environmental factors that guide beliefs about behavior. Examples of cultural-environments influences include information/opportunities (access to resources) (Flay, Snyder, & Petraitis, 2009).

Within each of these three groups of influence are unique levels of causation. The first level of causation is the proximal level (Flay, Snyder, & Petraitis, 2009). The proximal level of causation directly influences behavior; an example of a proximal cause would be intent (Flay, Snyder, & Petraitis, 2009). Having the intention to engage in a specific behavior makes you the most likely to actually perform the behavior (Flay, Snyder, & Petraitis, 2009). The second level of causation is the distal level (Flay, Snyder, & Petraitis, 2009). A distal cause is less likely than a proximal cause to influence behavior; an example of a distal cause could be the motivation to please others (Flay, Snyder, & Petraitis, 2009). The third level of causation is the ultimate cause (Flay, Snyder, & Petraitis, 2009). Ultimate causes are the core causes for behavior. Examples of ultimate causes are personality, low socioeconomic status, and one's family system (Flay, Snyder, & Petraitis, 2009). Ultimate causes are the most difficult for any one person to change because they are the most pervasive influences and are at the core of one's behavior (Flay, Snyder, & Petraitis, 2009). However, if change to these influences does occur, we would expect the change to be long-term and highly influential (Flay, Snyder, & Petraitis, 2009).

TTI is a useful theory in understanding NMPSU and informing prevention and intervention efforts because it identifies the multitude of factors that influence this behavior (Bavarian, Flay & Smit, 2014). For example, TTI would suggest that in order to prevent and/or make NMPSU less likely to occur, we need to improve students' self-efficacy; specifically, their academic self-efficacy and their self-efficacy to avoid NMPSU in the face of academically stressful situations (Bavarian et al., 2014). Improving self-regulation, self-management and overall self-control, people will gain the ability to better handle situations where their health, academic careers and integrity are at risk.

Using TTI to understand social influence can help ameliorate the effect through the alleviation of social pressure. One method of alleviating the pressure of social influence on NMPSU is to correct misconceptions of stimulant use. Through the correction of social misconception, pressure to engage in NMPSU from external sources may be reduced (Bavarian et al., 2014). Correcting social misconceptions can create an environment where people who engage in NMPSU are surrounded by peers and relatives who do not endorse NMPSU and, ultimately, this changed understanding of social norms may discourage NMPSU. Through the understanding of environmental influences, TTI suggests that people who engage in NMPSU should be made knowledgeable about the facts and consequences of NMPSU. In the understanding of environmental factors, TTI explains that knowledge is crucial. TTI suggests that informing people who engage in NMPSU about the facts and consequences will improve their decision-making skills, ultimately leading them to be at lower risk for NMPSU. Although TTI acknowledges that knowledge is crucial, the theory would contend that simply educating people isn't enough if the ultimate cause is unchanged (Bavarian et al., 2014).

In 2013, Bavarian and colleagues conducted a study that tested which domains of TTI (i.e., intrapersonal, interpersonal, cultural) appeared to be most influential in predicting NMPSU. Significant predictors emerged from each domain. Specifically, intrapersonal factors such as identifying as white, lower grade point average (GPA), lower avoidance self-efficacy and academic motivations predicted NMPSU (Bavarian et al., 2013). Interpersonal factors such as sport participation and perception of NMPSU also were identified as significant predictors (Bavarian et al. 2013). Finally, sociocultural environmental factors including perception and endorsement of NMPSU from friends and family were identified as significant predictors at this third level of influence (Bavarian et al. 2013). Taken together, these findings suggest that any intervention effort needs to take into account the multiple factors in the intrapersonal, interpersonal, and sociocultural domains that converge to increase one's risk for NMPSU.

### **Intervention Approaches**

To our knowledge, there has only been one intervention study for NMPSU. The researchers attempted to modify positive expectancies for NMPSU and to prevent initiation of NMPSU. As aforementioned, it has been noted that low grade point average, Greek involvement, binge drinking and cannabis use are predictors for NMPSU (Looby, 2013). Accordingly, in order to screen into the study, participants must have indicated that they were a nonuser of prescription stimulants, but that met two of the qualifying risk factors (e.g., Greek life, past month marijuana use). Once screened in, all participants completed the Prescription Stimulant Expectancy Questionnaire-II (PESQ-II), which is a measure that assesses expectancies for stimulant use (Looby, Young & Earleywine, 2013). Following completion of the PSEQ-II, participants were placed into either the expectancy challenge (EC) group or the control group. Participants in the EC visited the laboratory twice, once to receive what they thought was methylphenidate, but was



actually a placebo (MPH), and a second time where they received no medication (Looby et al., 2013). Participants in the control group received no medication during both laboratory visits. While in the lab, all participants completed questionnaires examining mood, arousal, and a battery of cognitive tasks. After the second visit, participants in the EC group were debriefed, informed that they in fact only took a placebo, and participated in Looby and colleagues' 30-minute expectancy challenge (Looby et al., 2013). The expectancy challenge included a lecture followed by a discussion on expected effects and any negative consequences. During the challenge, participants were informed of the negative medical, legal and psychological consequences of NMPSU. In addition, participants reviewed their scores and how they reported on the questionnaires. Through examination of their scores and the indication that they only used a placebo, participants were able to understand that the only differences in mood or cognitive ability was due only to their expectation (Looby et al., 2013).

In the end, the intervention was successful in that it did modify positive expectancies related to the desired effects of stimulants, such that those expectancies became less positive following participation in the intervention. Also, negative expectancies were significantly related to a reduction in future use (Looby, 2013). This study was a great first step at attempting to understand and intervene where NMPSU occurs most frequently. Knowing that NMPSU has a prevalence rate of 35% and that 70% of NMPSU initiation occurs in college (Bavarian, Flay, Ketcham, & Smit, 2013a) this intervention attempted to target a specific demographic. However, although the study did yield the results desired, the effect on positive expectancies wasn't maintained in the six-month follow up. This indicates that there is more research and work to be done, because the hope of any intervention is to have and to maintain positive long-term effects.

More research and interventions for NMPSU use needs to occur because NMPSU users typically have lower GPAs than non-users but they believe stimulants will enhance cognitive ability and focus, thus creating the ability to study more efficiently. Similarly, college students have a strong desire to perform well academically and, as a result, an ever increasing number of students note that they are satisfied with illicit use, because they are using for the “right” reasons (Desantis & Hane, 2010). This is worrisome because NMPSU is replacing conventional and safe study habits. Besides the desire to perform well academically, 16% of students have reported using for fun (Looby et al., 2010). Students have also reported use to enhance the party experience and to feel high (Dussault and Weyandt, 2011). These risk factors can be predictive of future illicit drug use (Looby, 2010).

### **Motivational Interviewing as an Approach to Intervention**

Given the lack of evidence-based interventions for NMPSU, it may be fruitful to examine effective intervention approaches that target other misused substances among college students. One promising approach to changing substance use behaviors in college students is motivational interviewing (MI). MI is a non-judgmental, client centered style of counseling founded on the basic principles of expressing empathy, developing discrepancy, rolling with resistance, and supporting efficacy. The strategy focuses on helping individuals build motivation to change problematic behaviors (LaBrie et al., 2013). MI was developed as an individual approach to therapy, however it has been proven to also be successful in groups. It is noted that one of the greatest benefits of group MI is that larger numbers of people can benefit from MI while using the same amount of time and effort that one would use in an individual setting (LaBrie et al., 2013).

One of the key activities used in MI is the decisional balance. The decisional balance exercise (DB) is a therapeutic tool used “to help reduce decision making errors by making people more cognizant of the decision making process and the factors contributing to their decisions” (Collins & Carey, 2005, p. 1426). Stated differently, it is a way to help people understand their decisions and the reasons for their decisions. It is noted that the DB has been an effective way to motivate people to change maladaptive behavior, and is an indicator of readiness to change substance abuse use. The DB is in the spirit of MI because it supports people’s self-efficacy to change behavior. Importantly, however, the DB is most effective for people who have a higher readiness to change and people who are ready to create an active change strategy to reduce negative consequences (Collins & Carey, 2005). Accordingly, the DB might not have uniformly potent effects on maladaptive behavior if an individual does not anticipate making a change.

Several studies employing MI have demonstrated success in reducing heavy drinking in college students. In 2007 Joseph LaBrie conducted an intervention on alcohol with college freshman males using MI. The study focused on first-year college males because studies have shown that first-year students frequently misuse alcohol and are more likely to experience negative consequences as a result. Following exposure to MI, participants in the LaBrie study reduced their drinking and reported fewer alcohol-related problems as well. In addition, heavy drinking students and students who experienced the most alcohol-related problems reduced drinking the most. (LaBrie et al., 2013). The authors postulated that the MI intervention was effective in changing behavior because the active engagement from participants stimulated by the MI approach increased their motivation and readiness to change. It is believed that increasing motivation and readiness to change is essential for the reduction of a maladaptive behavior and the formation of a new behavior. However, an open question and one this study sought to explore

was whether the strategy employed by LaBrie et al. 2007 also could be effective in reducing NMPSU. That is, can MI be appropriately adapted to address NMPSU and can such an intervention yield similar results to those that have been obtained for heavy drinking.

In 2006, LaBrie and colleagues also conducted an intervention that aimed to reduce heavy drinking in college males using the decisional balance. LaBrie et al. targeted 47 college males who drank more than twice a week, and who had intercourse with two or more partners within the past two months. LaBrie utilized the decisional balance, which has participants identify the pros and cons of their heavy drinking and sexual behavior. LaBrie et al inquired about sexual behavior to see if merely tracking a risky behavior was the reason it became less frequent or was it actually the MI guided conversation. Further, participants rated each of their pros and cons on a scale from 0 to 10 with 0 meaning not important at all and 10 meaning extremely important. In addition, participants engaged in a MI guided conversation that explored why they felt their pros were important through open-ended questions. The intervention was successful and participants reduced drinking; it did not lead to a change in risky sexual behavior, which confirmed that merely tracking a risky behavior is not sufficient to change its frequency.

Further evidence to support the effectiveness of MI has also been shown in other studies on the prevention of heavy drinking and the negative consequences related to heavy drinking. Kim Fromme conducted an intervention study on alcohol. This intervention study utilized MI in a manner similar to LaBrie's study. However, this study attempted to assess some factors that may or may not produce changes in the effectiveness of MI. Two factors that the researchers assessed were participants' readiness to change and participants' perceptions of the effectiveness groups when they were led by either college-age peers or mental health professionals. MI was chosen as a tool in this study because it is a therapeutic tool that is met with little resistance and

MI focuses more on motives and positive benefits of change (Fromme & Corbin, 2004). MI was applied in this study during two, 50-minute group sessions where students focused on strategies for prevention and reduction of alcohol misuse (Fromme & Corbin, 2004). The results from the study indicated that participants with a higher readiness to change showed the greatest decrease in their drinking. Also, there was no significant evidence to support a significant difference between peer or professional led groups (Fromme & Corbin, 2004), although participants gave higher satisfaction ratings when the mental health professionals, as opposed to their college-age peers, were facilitating the group. Taken together, these findings suggest that a brief, group-based motivational interviewing intervention is effective in changing substance use behavior and although college students may prefer mental health professionals to peers as facilitators, using peers as facilitators did not diminish the effects of the intervention.

### **The Current Study**

The present study seeks to build upon previous research conducted on NMPSU in several ways: First, the present study draws on TTI in the development of an NMPSU intervention. In addition, this study will utilize draw on motivational interviewing as an evidence-based strategy for changing substance use behavior, and ultimately will determine if MI is an appropriate strategy for NMPSU. Further, the present study seeks to replicate Looby's intervention to prevent and reduce NMPSU.

I had three specific hypotheses, namely:

- Students' primary motivation for NMPSU will be to perform better academically,
- NMPS users will report lower levels of perceived disapproval from family, friends, faculty compared to non users,

- When compared to students in the control condition, students in the intervention condition will report: a reduction in positive cognitive expectancies, an increase in guilt and dependence expectancies, an increase in study self-efficacy, weaker intentions to use in the next six months, and greater knowledge of NMPSU side effects

## **Method**

### **Participants**

In the present study, we had 70 participants in total and of those, 27 identified as male and 43 identified as female. We had mostly white/non Hispanic participants and a variety of class years, with the majority being freshman and sophomores. Most of the students in the study were unaffiliated with Greek life. Participants' GPAs mostly ranged from 2.75-3.79. Most students in the study had not received a diagnosis of ADHD or ADD ( $n=53$ ). In addition, 33 participants reported a history of NMPSU (see Table 1).

### **Measures**

**Prescription stimulant expectancies.** The Prescription Stimulant Expectancy Questionnaire-II (PSEQ-II) (Looby and Earleywine, 2010) is a 45-item measure that assesses prescription stimulant expectancies across 4 factors believed to influence use. The four identified factors are: cognitive enhancement (20 items), anxiety and arousal (11 items), social enhancement (9 items) and guilt and dependence (5 items). These four factors are grouped into positive and negative expectancies: cognitive and social enhancements are deemed as positive, and anxiety and arousal and guilt and depression constitute the negative expectancies subscale. Each question is formatted using a 5-point Likert-like scale from 0 (never) to 4 (very often). An example of a positive expectancy question from the cognitive enhancement scale is "I would

learn/work more efficiently”. An example of the social enhancement subscale would include a question like “I would feel more relaxed in social situations”. An example of a negative expectancy from the guilt and dependence scale is “I would worry that I’m addicted to it”. An example from the anxiety and arousal subscale would include questions like: “I would get nervous and edgy”. A mean score was calculated for each of the four subscales. The mean reliabilities for baseline and the one-month follow-up of the subscales ranged from acceptable to excellent: cognitive  $\alpha=.94$ , social  $\alpha=.86$ , guilt and dependence  $\alpha=.78$ , anxiety and arousal  $\alpha=.88$ .

**Social influences on NMPSU.** The Behaviors, Expectancies, Attitudes and College Health Questionnaire (BEACH-Q) (Bavarian, Ketcham, Flay, & Smit, 2013b) is a 96-item assessment that examines various potential influences NMPSU including motives and expectancies for use, as well as the intrapersonal, interpersonal and environmental factors associated with NMSPU. Only a subset of questions from the BEACH-Q was used in the current study. Questions from the intrapersonal domain we included were questions about confidence to resist using under certain circumstances [e.g., “if someone (a family member or friend) offered you prescription stimulants how confident are you that you would refuse the offer?"]. Questions from the interpersonal domain included: perceived disapproval from family, friends, campus personnel (professors/advisors) such as “how would the following people react if they discovered that you engaged in prescription stimulant misuse” with response scales that ranged from 1=*very negatively* to 5=*very positively*. The BEACH-Q attempts to assess a variety of factors and in order to appropriately gauge information, participants are asked questions like “I often feel restless” or “It is difficult for me to concentrate on my academic work”; these questions seek to

understand the intrapersonal influences and are rated on a scale of 1=*strongly disagree* to 5=*strongly agree*.

**Readiness to change** (Plummer, Velcier, Redding, Prochaska, Rossi, Pallonen & Meier, 2001). If participants reported a history of NMPSU, we evaluated their desire to change at two intervals: first, we asked whether they expected to stop NMPSU in the next 30 days (Yes/No) and secondly, we asked if they expected to stop NMPSU in the next 6 months.

**Self-efficacy.** In 2005, Zimmerman and Kitsantas published a 57-item Self Efficacy for Learning assessment. This assessment was used to investigate students' beliefs regarding their homework and specific processes such as: organizing, memorizing, concentrating and monitoring (Zimmerman & Kitsantas, 2005). The self-efficacy scale uses a percentage scale from 0% (definitely cannot do it) to 100% (definitely can do it) in 10% increments. Questions from the assessment included: "When you feel moody or restless during studying, can you focus your attention well enough to finish your assigned work?" In the present study, the most pertinent pieces of the Self Efficacy for Learning Assessment were the 14 questions that asked about study behaviors, so only those items were administered. For the present study, study behavior was most pertinent because according to past research it is most related to the motivations of NMPSU. The reliability of this measure was good ( $\alpha=.89$ ).

**Motives for NMPSU.** The Stimulant Survey Questionnaire (SSQ) (Weyandt, Janusis, Wilson, Verdi, Paquin, Lopes, Varejo & Dussault, 2009) is a 40-item questionnaire used to assess the use and misuse, knowledge of prescription stimulants and motivations for use. Questions from the SSQ include items such as "I have used prescription stimulants for nonmedical purposes", "I have taken prescription stimulants to perform better on tests", and "I



have taken prescription stimulants to help me socialize better”. We analyzed eight questions from SSQ related to students’ motives for using.

**Non-medical prescription stimulant use.** The non-medical prescription stimulant use items were taken from the BEACH-Q (Bavarian et al., 2013). Sample questions include: “How many times have you used within the last 30 days?”, “When was the first time you used prescription stimulants?”, “How do you take prescription stimulants?”, and “During your time in college, how often have you felt worried, helpless or stressed about your academic performance?”

### **Design and Procedure**

**Study recruitment.** In the present study, we recruited 51 students from Trinity College and 19 from the University of North Dakota. Students ranged from freshman to seniors and in order to qualify for participation in the study, students first took a brief online screening survey. The screening survey inquired about six main risk factors found throughout past research including: Greek involvement, past month marijuana use, past two week binge drinking, intentions to use in the next 6 months, GPA below 3.5, and lower self-efficacy to avoid using. Students qualified for participation in the study if they met 2 of the 6 risk factors or if they indicated a history of use without a prescription (or, if they had a prescription, if they reporting using more than was prescribed to them).

**Group motivational enhancement intervention.** Students were randomized into one of two groups: a motivational enhancement group ( $n=40$ ) and a control group ( $n=30$ ). Approximately the same number of students was invited to each of the control and treatment groups; however, we yielded a larger sample for the treatment (intervention) condition for unknown reasons. There were four separate intervention groups, each with different students,

and each group session was approximately 60 minutes. The sessions were facilitated by two undergraduate students who received approximately 8 hours of training in MI; one of the facilitators had served as a facilitator the previous year. The intervention groups began by first having students complete the consent form (see Appendix A). Following the administration of the consent forms, the facilitators discussed key points from the form. All students who signed consent forms and agreed to participate first completed a 10-15 minute baseline survey on a laptop. (No one declined to participate after reviewing the consent form.) Immediately following, facilitators outlined the rules of group which included encouragement of creating a safe space where students can comfortably and anonymously share their personal thoughts and feelings.

To begin the intervention, students were asked to read a vignette given to them by the facilitators. The vignette was a story based upon a single male student and his experience with Adderall. It was created based on data from several qualitative studies focused on NMPSU (see Appendix B). The lead character, Rob, needed Adderall to get a large amount of work done in a single night. He obtained Adderall from a friend who had a prescription. The two briefly discussed their social lives, academic pressures, motivations and expectations for use. After reading the vignette, students were asked “what you noticed to be potentially good about using prescription stimulants without a prescription and what you thought might be not so good about it based on this student’s experience” and after generating a list of pros and cons, students were asked to “add their own ideas about what might be the benefits and the drawbacks of this behavior”. Finally, students were asked to rate the importance of each pro and con from 1 (slightly important) to 4 (very important). Facilitators created an open dialogue when they asked for volunteers to share their list of pros, cons and the ratings for each. When discussing the pros, a common theme was the notion that Adderall is a cognitive enhancing drug. When this point

was made, facilitators presented participants with the research done in the Illevia, Boland, and Farah (2013) study. In the Illevia et al. study, research indicated that when healthy participants without ADHD used Adderall, they did not perform significantly better than participants who used a placebo on a battery of tests that measured memory, inhibitory control, creativity and pieces of standardized tests. Students were given physical printed copies of the data and the graphs. Facilitators then discussed the data with participants and showed them that participants in the study who took the Adderall thought it would improve their performance, however their perceived enhancements did not match the scores they earned. When discussing the cons, common themes included potential abuse or dependence upon Adderall as well as how similar or dissimilar Adderall is to coffee and the potential side effects. When discussing the cons, facilitators highlighted the fact that the U.S. Drug Enforcement Agency (DEA) classified Adderall as a schedule II drug because it has a high potential for abuse and dependence. In addition facilitators also highlighted some of the side effects of Adderall: headaches, dizziness, tachycardia, nausea, loss of appetite, dry mouth, agitation, anxiety and insomnia. Less common but albeit serious side effects of Adderall use include abnormal high blood pressure, heart attack or stroke, sudden unexplained death (SUD) and exacerbation of psychiatric conditions such as bipolar disorder or anxiety. To conclude the intervention group sessions, participants completed two follow-up questions: one inquiring about their intentions to use in the next 6 months and another inquiring about their confidence to resist using if they had a large amount of work to complete in a short amount of time.

**Control.** In the present study, we conducted four separate control group sessions. In the control group, participants first obtained their consent forms and had them explained. Participants who consented were asked to take a brief 10-15 minute survey on their personal

computers. Similar to the participants in the intervention group, participants in the control group completed the questions about intentions to use and confidence to abstain in a high-risk situation.

**Follow-up.** Approximately 30 days after the intervention and control group sessions, all participants received a link to an online follow up survey via email. The follow-up survey asked the same questions that were asked in the initial survey. Completion of the follow up surveys were important because, in order to receive course credit, students needed to complete the 30-day survey in addition to the group session. For students who sought monetary compensation in lieu of course credit for the group (\$5), they also needed to complete the 30-day follow up survey in order to receive a \$5 gift card to an on-campus eatery.

## Results

### Participant Flow

70 participants (51 from Trinity, 19 from University of North Dakota) screened in and completed either the control or treatment group. Four-fifths ( $n=56$ ) completed the one month follow-up survey.

### Comparison of Users and Non-Users

I compared users and non-users on several of the study variables. Users and non-users did not differ with respect to the amount of academic stress they experienced at baseline [ $t(67)=-1.148, p=.255$ ], their perceptions of competition at their respective college/university [ $t(67)=-.783, p=.436$ ], or in how much they perceived faculty would disprove of their use [ $t(67)=-.385, p=.701$ ]. They did differ, however, in their perceptions of how much their family and friends would approve or disapprove of their use. Specifically, users reported that their friends would react more positively ( $M=3.12, SD=.65$ ) compared to nonusers ( $M=2.53, SD=.85$ ) [ $t(67)=3.29,$

$p=.002$ ]. In addition, users reported that their families would also react more positively ( $M=1.97$ ,  $SD=1.06$ ) compared to nonusers ( $M=1.47$ ,  $SD=.74$ ), [ $t(66)=2.26$ ,  $p=.027$ ] (see Figure 1).

**NMPSU and usage patterns.** Nearly half (48%) reported a history of NMPSU. Most (64%) reported that their first use was in college. 33% reported first using in high school and 3% in middle school.

### **Intervention Outcomes**

**NMPSU.** I hypothesized that participants in the treatment group who identified as users would decrease NMPSU in comparison to users in the control group. I also hypothesized that participants in the treatment group who reported being non-users would continue to report no use. Figure 2 shows the patterns of use and the transitions, if any, of users and non-users in both the control and treatment groups. There was no group by time interaction for NMPSU  $F(1,55)=.307$ ,  $p=.582$ .

**Intentions to use.** I hypothesized that, compared to the intentions to use in the next six months that they reported on the screening survey, participants in the treatment group would report weaker intentions to engage in NMPSU at the one-month follow-up. This hypothesis was not supported [ $F(1,54)=.307$ ,  $p=.582$ ] (see Figure 3).

### **NMPSU Expectancies**

*Guilt and dependence.* I hypothesized that participants in the treatment group would report an increase in expectations for guilt and dependence in comparison to the control group. Contrary to my hypothesis, there was no interaction effect of group and time:  $F(1,55)=.154$ ,  $p=.697$  (see Figure 4). The three-way interaction of NMPSU status (user vs. nonuser), group (control vs. treatment) and time (baseline vs. one-month follow-up) was not significant. However, there was a main effect of use status (non-user vs. user), such that users reported fewer

concerns about guilt and dependence ( $M=2.05$ ,  $SE=.14$ ) associated with NMPSU compared to nonusers ( $M=2.68$ ,  $SE=.13$ ) [ $F(1,52)=9.99$ ,  $p=.003$ ].

*Anxiety and arousal.* I hypothesized that participants in the treatment group would report a decrease on the anxiety and arousal measures in comparison to the control group. Contrary to my hypothesis, there was no interaction effect of group and time: [ $F(1,55)=.923$ ,  $p=.341$ ] (see Figure 5). The three-way interaction of NMPSU status (user vs. nonuser), group (control vs. treatment) and time (baseline vs. one-month follow-up) was not significant.

*Cognitive enhancement.* I hypothesized that, following the intervention; participants in the treatment group would show a decrease in their expectations for cognitive enhancement. Contrary to my hypothesis, there was no interaction effect of group and time:  $F(1,55)=.255$ ,  $p=.616$  (see Figure 6). The three-way interaction of NMPSU status (user vs. nonuser), group (control vs. treatment) and time (baseline vs. one-month follow-up) was not significant.

*Social enhancement.* I hypothesized that participants in the treatment group would indicate a decrease in social enhancement expectancies compared to the control group. Contrary to my hypothesis, there was no interaction effect of group and time:  $F(1,55)=.499$ ,  $p=.483$  (see Figure 7). The three-way interaction of NMPSU status (user vs. nonuser), group (control vs. treatment) and time (baseline vs. one-month follow-up) was not significant.

**Knowledge about side effects.** I hypothesized that participants in the treatment group would report greater knowledge about the side effects of NMPSU. There was a trend for knowledge in the treatment group to increase over time  $F(1,54)= 2.619$ ,  $p=.111$  (Figure 8). The three-way interaction of NMPSU status (user vs. nonuser), group (control vs. treatment) and time (baseline vs. one-month follow-up) was not significant.

**Study self-efficacy.** I hypothesized that there would be an increase in self-efficacy in the treatment group in comparison to the control group. However, there was no group by time interaction for this outcome [ $F(1,54)=.016, p=.898$ ] (see Figure 9). There was, however, a main effect of time, such that all participants evidenced a decline in study self-efficacy over the one-month period [ $F(1,54)=6.08, p=.017; T_{1Mean}=69.72, SE=1.66; T_{2Mean}=65.74, SE=2.18$ ].

### Discussion

My first hypothesis was that students' primary motivation for NMPSU would be to perform better academically. Although students in previous studies (Desantis & Hane, 2010; Looby et al., 2013; Weyandt et al., 2009) have reported NMPSU for other reasons, such as to socialize better, to lose weight and to feel energetic, in previous studies, participants reported using primarily for academic purposes and this is consistent with my findings. Specifically, students who reported NMPSU wanted to improve focus, alertness (relieve feelings of sleepiness), and to study harder for a longer duration of time. Perhaps students engage in NMPSU in reaction to a greater societal problem, namely the difficulty of getting a job in today's economy and making enough money to support oneself and one's family. Anecdotally, students often hear that the college degree is now the modern equivalent to the high school diploma, which reinforces the stress and the obligation of not only college being "mandatory," but exceptional being mandatory as well. It would appear that due to the obligation and stress of college, students would want to set themselves apart from their peers as best they can; one way is to earn a higher grade point average, which some students might only perceive to be possible with the assistance of non-prescribed stimulants.

My second hypothesis was that NMPS users would report lower levels of perceived disapproval from family and friends and faculty. In the present study, students who engaged in

NMPSU did, in fact, report lower levels of perceived disapproval from friends and family, which was consistent with my hypothesis. This finding largely was consistent with Bavarian et al. (2013), who reported that NMPS users reported significantly more approval from family and friends and significantly less from faculty. In the current study, although users reported lower disapproval compared to the non-users, interestingly, users reported that their family and friends would be the less disapproving when compared to faculty. Perhaps NMPS users perceive less disapproval from family and friends because, these individuals believe that those around them want them (i.e., their child or their friend) to succeed regardless of the challenges in their life and by any means necessary. Perhaps faculty are reported to be the most likely to disapprove because it is possible that students are under the impression that professors are old-fashioned and earned their grades without the help of medication. In addition, perhaps students think there is an age or culture gap between them and their professors and maybe professors would not understand the implications and justifications of use unlike their friends and family.

My third hypothesis was to examine the differences between the treatment group and the control; specifically, did students in the treatment group report a reduction in positive cognitive expectancies, and increase in guilt and dependence, an increase in study self-efficacy, greater knowledge of NMPSU side effects, and weaker intentions to use in the next six months. In the present study, students in the treatment group did not report a reduction of cognitive expectancies in comparison to the control. Interestingly, after reflecting on the conversation in the group, students did not seem to be under the impression that stimulants give you superior cognitive abilities; rather, they noted that their alertness and ability to focus is improved and their ability to remain awake is much greater. Similarly, students feel that stimulants allow them to perform at their best longer, however, there is no cognitive enhancement and this was



inconsistent with what I expected. Also inconsistent with my hypothesis was students' report on the guilt and dependence measure. The treatment group did not indicate elevated feelings of guilt and dependence in comparison to the control. Consistent with my hypothesis, there was a trend for an increase in knowledge about the side effects of stimulant use among participants in the treatment group. By exploring the cons through the decisional balance exercise, it is likely that participants became more cognizant of physiological effects they were previously unfamiliar with. Engaging in NMPSU may have serious legal, medical, and social implications, and although our study did not effectively decrease use overall or reduce initiation, an important aspect our study is that students reported feeling more knowledgeable following their participation. Hopefully, students will take this new knowledge and ability to assess the pros and cons, and apply it to decisions around NMPSU in the future, or perhaps even other aspects of life, which will hopefully lead to a decrease in other types of risky behaviors.

Two other areas where we did not observe any change in treatment participants over time were study self-efficacy and intentions to use in the next six months. It's possible that we did not affect participants' study self-efficacy because, directly following group, it seems logical to me that students would be reluctant to utilize alternative techniques to studying given that our study occurred close to midterms and finals. Perhaps at the beginning of next semester when students feel more comfortable and have given NMPSU more thought, they will utilize alternative methods for staying alert, finishing work and staying focused. Observing a change in students' intentions to use may take longer to observe. This may be the result of the timing of our intervention. Students may intend to engage in NMPSU during common high stress times such as midterms and finals. Perhaps we asked participants about their intentions to use at a time

when they are most likely to use. My other postulation is that perhaps we haven't given students enough time to process and utilize the discussion we had during group.

### **Limitations**

One limitation of the present study was the relatively small sample size. In addition, perhaps one reason that it is difficult to see desired movement in measures such as guilt and dependence is related to the fact that our non-users are arguably not a sample of traditional non-users. Stated simply, our non-users were students who met two or more of the established risk factors for NMPSU, so their attitudes and behaviors around NMPSU may be less amenable to change. Perhaps reports on measures such as social enhancement or guilt and dependence between pure non-users and our non-users would differ.

### **Future Directions**

For the future, perhaps a study skills intervention (SSI) study would be most helpful to students who either engage NMPSU or those at risk. A study skills intervention could teach students techniques to getting their work done quickly and efficiently organically without the use of stimulants. In addition, the SSI could stress the importance of doing work sooner, asking for help from peers and faculty, and the benefits of properly finishing work in a timely low stress way. This study skills intervention, coupled with the present study's design could perhaps increase knowledge about stimulant use, assess pros and cons, and provide students with an effective alternative that is permanent and adaptable. This intervention could be helpful for students whose primary motivation for use is academic. Also, since students also reported some social motivations for use, perhaps an interpersonal skills building intervention would be a better

approach. This intervention could be an opportunity for students to better learn how to socialize and develop alternative methods for achieving goals such as “partying longer.”

Given that NMPS users perceived less disapproval from friends and family, it also might be interesting to address this issue as part of an intervention. To address this, in the future facilitators could explicitly ask students about their use and how their family, friends and faculty would perceive use followed by weighing the pros and cons of their family, friends and faculty’s opinion. Perhaps the group setting coupled with the weighing of pros and cons, users may feel more feelings of guilt and dependence because other participants may indicate reasons that their family, friends and faculty would disapprove of use.

Finally, given that the decisional balance has been shown to be more effective with people who endorse a readiness to change (Collins & Carey, 2005), it may be beneficial to target the intervention at students (1) who express a desire to discontinue their NMPSU, or (2) who are concerned they might begin using and wish to avoid initiating use. This is important because participants who want to change their behavior are perhaps more likely to change their behavior. This would contrast with some of the participants in our study who did not want to change their behavior and thus indicated that they would use again which leads me to believe we may have to target a different group of NMPS users.

Table 1

*Demographic Characteristics of Participants*

Characteristic	<i>n</i>	Percentage (%)
Gender		
Male	27	38.6
Female	43	61.4
Race/ethnicity		
White/non-Hispanic	57	81.4
African American/Black	6	8.6
Asian/Pacific Islander	4	5.7
Hispanic/Latino	2	2.9
Other	1	1.4
Class Year		
Freshman	19	27.1
Sophomore	19	27.1
Junior	15	21.4
Senior	17	24.3
Greek Life		
Yes	9	12.9
No	61	87.1
Level of Mother's Education		
Junior high or middle school or less	1	1.4
Some high school	2	1.4
High school graduate	7	10.0
Postsecondary school other than college	4	5.7
Some college	8	11.4
College degree	28	40.0
Some graduate school	2	2.9
Graduate degree	19	27.1
Level of Father's Education		
Junior high or middle school or less	1	1.4
Some high school	2	2.9
High school graduate	9	13.0
Postsecondary school other than college	4	5.8
Some college	7	10.1
College degree	26	37.7
Some graduate school	0	0
Graduate degree	20	29.0
GPA		
Below 2.0	1	1.4
2.0-2.24	1	1.4
2.25-2.49	1	1.4

2.75-2.99	10	14.3
3.0-3.24	15	21.4
3.25-3.49	20	28.6
3.50-3.79	17	24.3
3.8 or above	5	7.1
Have you ever been formally diagnosed with ADHD or ADD?		
Yes	17	24.3
No	53	75.7
Are you currently prescribed stimulants?		
Yes	15	21.4
No	55	78.6
History of NMPSU		
Yes	33	47.8
No	36	52.2

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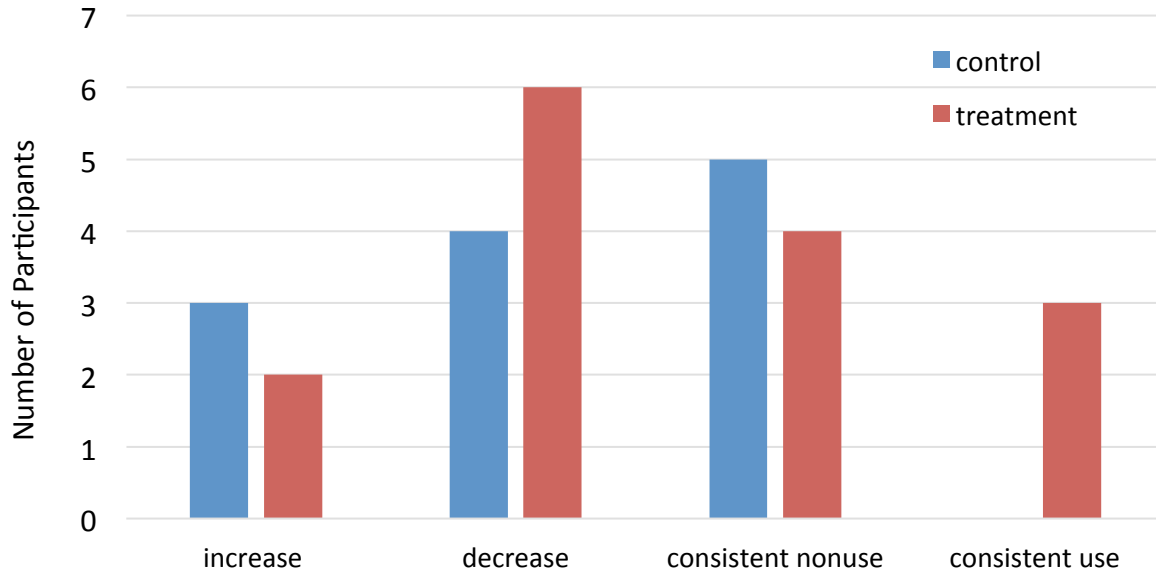
GPA = Grade point average; ADHD=Attention Deficit/Hyperactivity Disorder; ADD=Attention Deficit Disorder; NMPSU=Non-medical prescription stimulant use.

Table 2

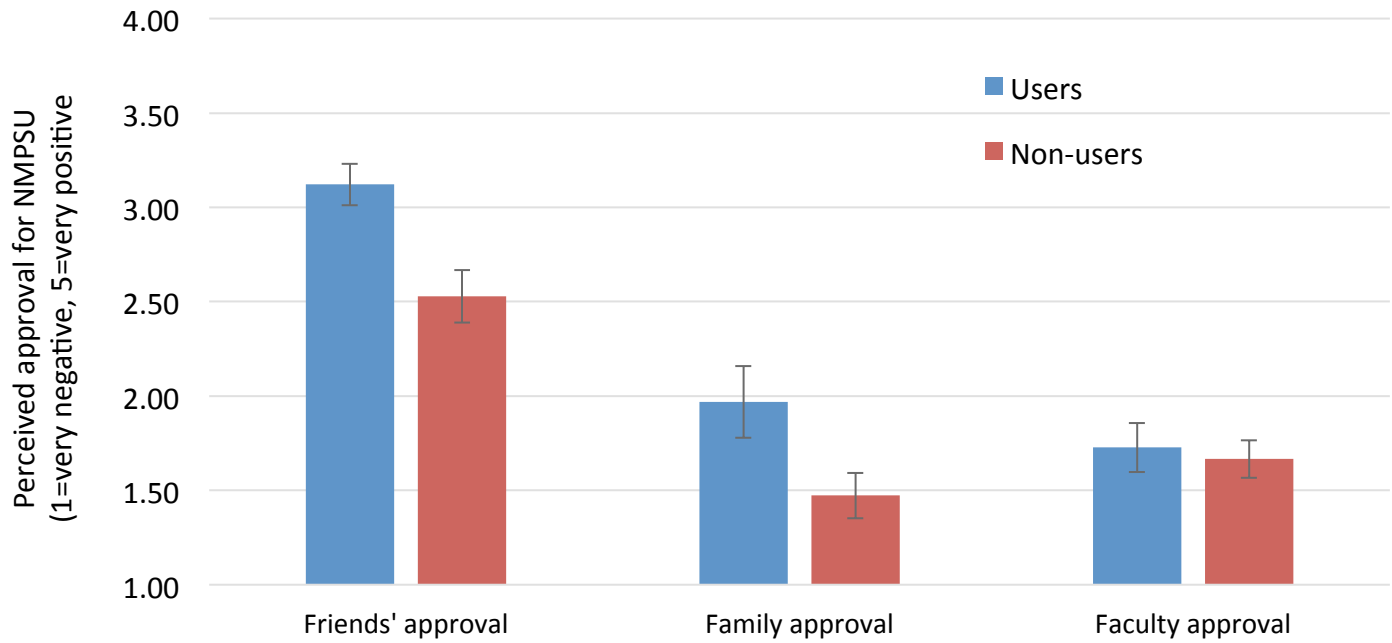
*Descriptive Statistics, Internal Consistency Reliabilities, and Two-Way ANOVA Results for Study Measures*

Study Measure	Control Group <i>n</i> =24		Treatment Group <i>n</i> =33		$\alpha^a$	<i>F</i>	<i>p</i>
	<i>M</i> ( <i>SE</i> ) <sub>T1</sub>	<i>M</i> ( <i>SE</i> ) <sub>T2</sub>	<i>M</i> ( <i>SE</i> ) <sub>T1</sub>	<i>M</i> ( <i>SE</i> ) <sub>T2</sub>			
PSEQ - Cognitive Enhancement	3.295(.167)	3.194(.150)	3.319(.142)	3.134(.128)	.94	.255	.616
PSEQ - Social Enhancement	2.225(.162)	2.473(.156)	2.237(.138)	2.350(.133)	.86	.499	.483
PSEQ - Guilt and Dependence	2.533(.187)	2.518(.179)	2.285(.159)	2.180(.153)	.78	.154	.697
PSEQ - Anxiety and Arousal	2.773(.170)	2.919(.152)	2.810(.145)	2.747(.130)	.88	.923	.341
Study Self-Efficacy	74.24(11.04)	71.70(14.04)	66.92(14.29)	63.95(18.4)	.89	.016	.898

*Note.*  $\alpha^a$  = average of T1 and T2 alpha levels. *F*- and *p*-values correspond to ANOVA statistics for the interaction effect (GROUP X TIME). PSEQ=Prescription Stimulant Expectancy Questionnaire.



*Figure 1.* Number of treatment and control participants who increased or decreased their use between baseline and follow-up.



*Figure 2.* Users reported that friends and family would be more tolerant of their NMPSU. There was no difference in perceptions of faculty between the two groups.



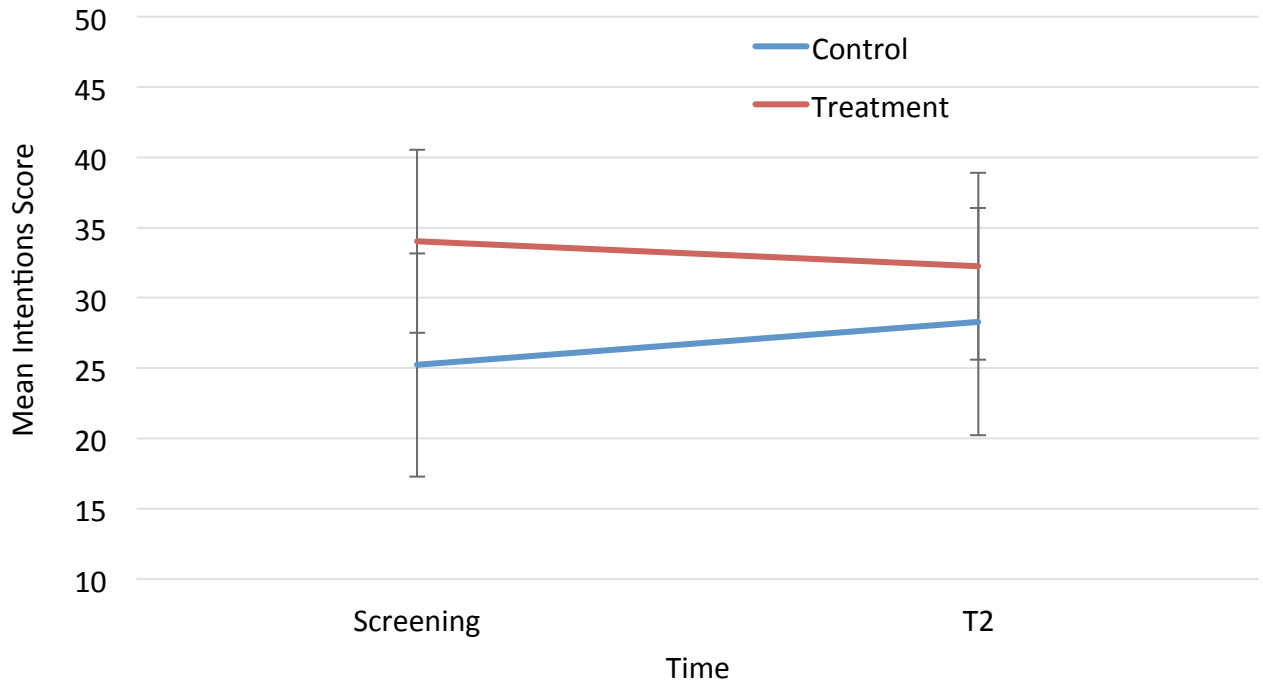
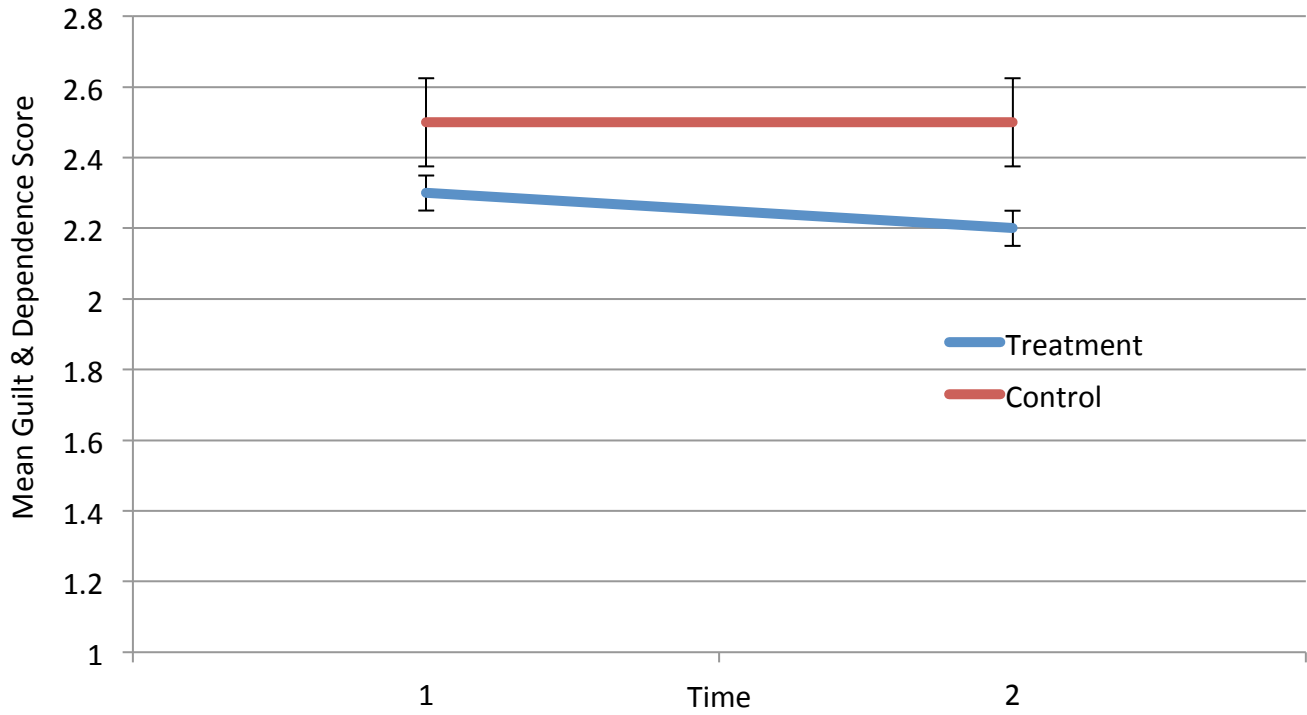
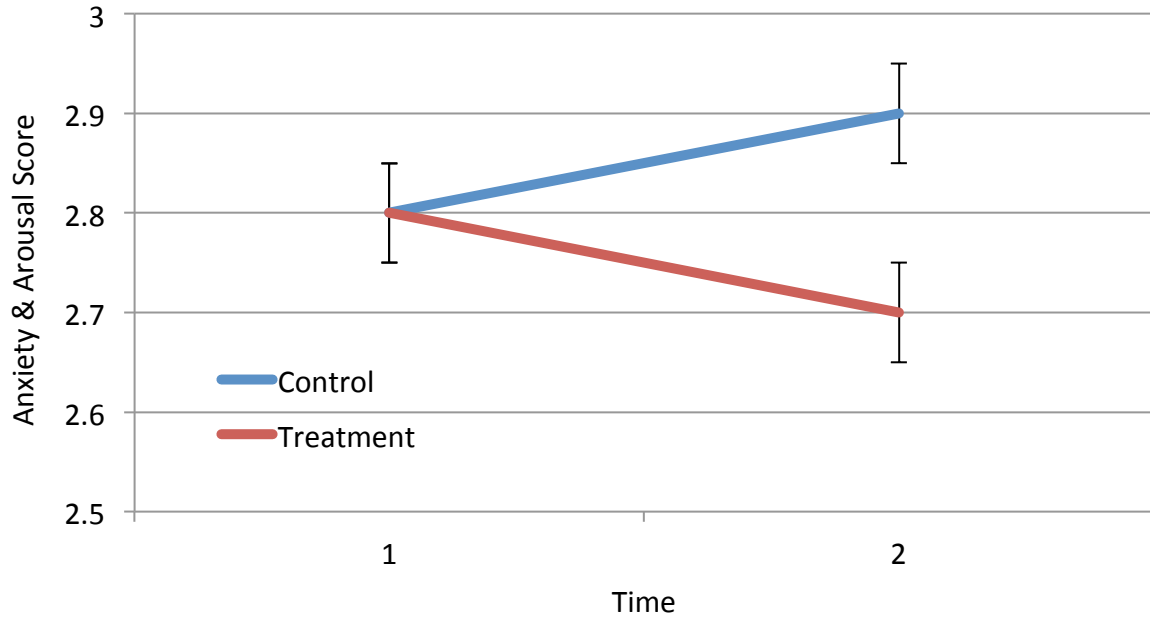


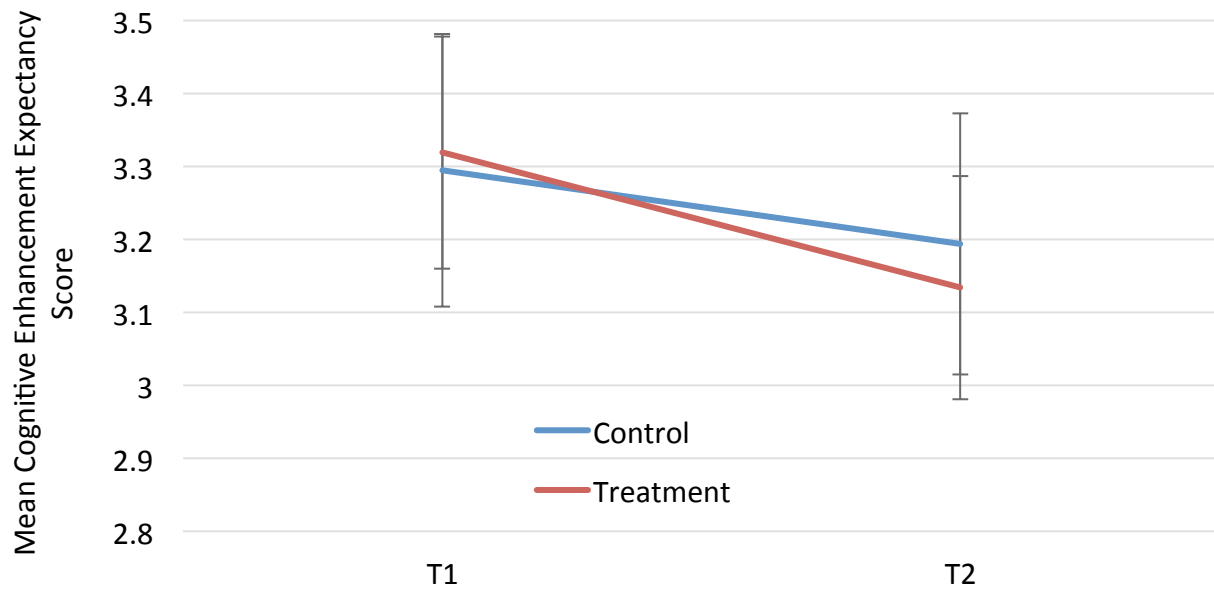
Figure 3. There was no interaction between group and time for intentions to use in the next six months.



*Figure 4.* There was no interaction between group and time for guilt and dependence expectancies.



*Figure 5.* There was no interaction between group and time for anxiety and arousal expectancies.



*Figure 6.* There was no interaction between group and time for cognitive enhancement expectancies.

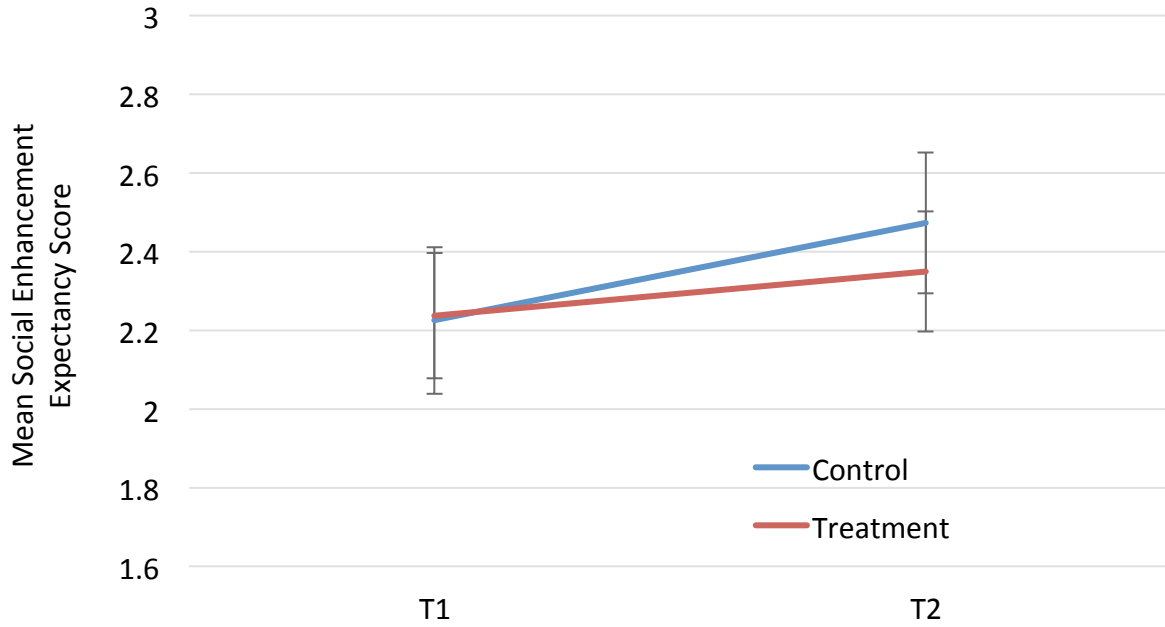
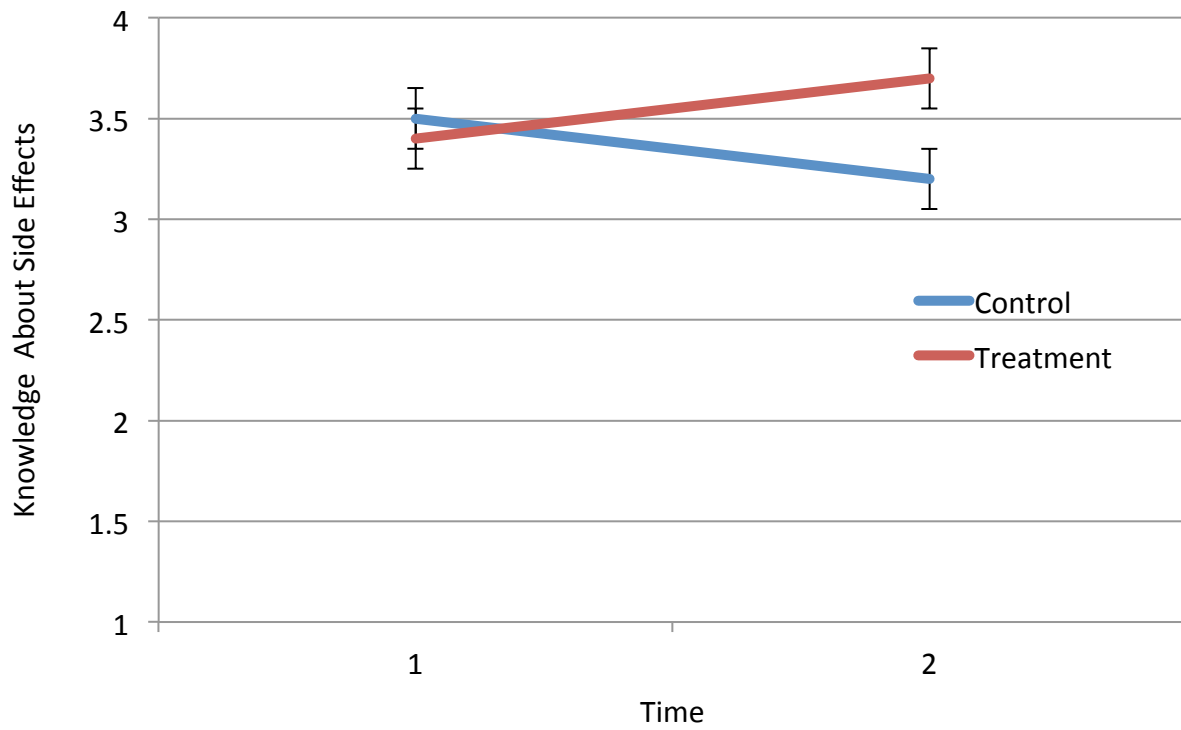


Figure 7. There was no interaction between group and time for social enhancement expectancies.



*Figure 8.* There was a trend for the treatment group to report greater knowledge of side effects over time.

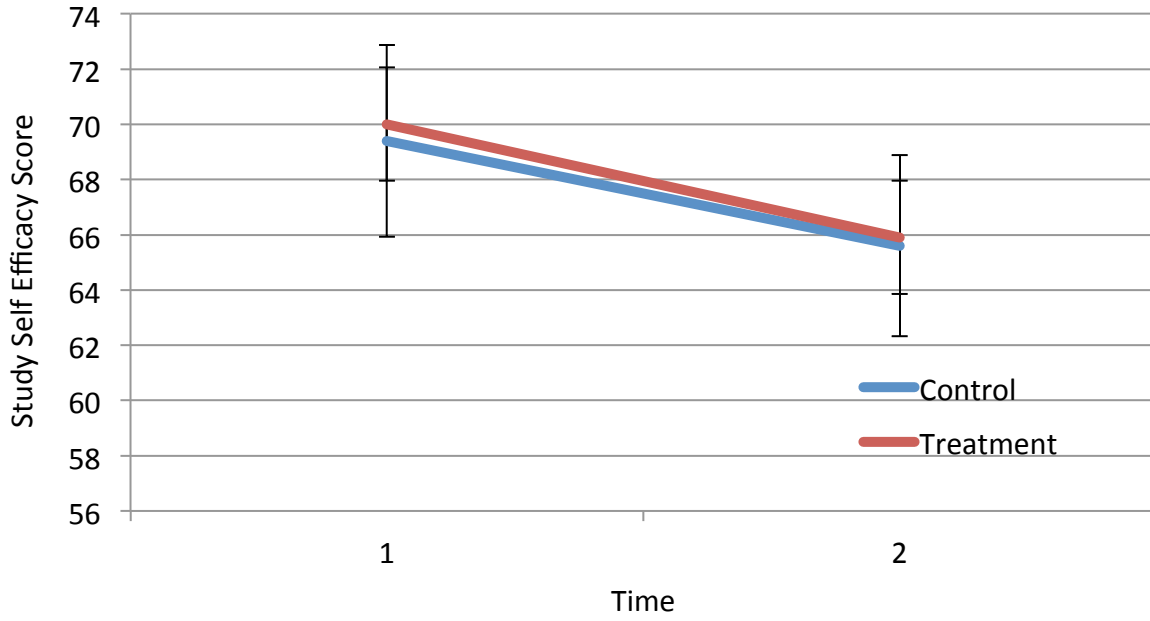


Figure 9. There was no interaction between group and time for study self-efficacy.

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## Appendix A

**Trinity College  
Consent for Participation in Research***Attitudes about Prescription Stimulants***Purpose of this Research**

Stimulant medications such as Ritalin and Adderall are commonly prescribed for the treatment of Attention Deficit Hyperactivity Disorder (ADHD); however, sometimes these medications are utilized without a prescription (non-medical use). The purpose of this research study is to better understand students' ideas about the non-medical use of these medications. You are being asked to participate in this study because you are part of a group of adults who may be more likely to use stimulant medication. Approximately 100 people will take part in this study at Trinity College.

**Procedures**

This study requires you to come to one group session ranging from 30-70 minutes and to complete 2 follow-up online surveys (one in March and one in April), each taking approximately 15 minutes. During today's group session, you will complete several brief questionnaires about your study habits and behavior around stimulant medication. Also, you may discuss your beliefs about prescription stimulant medication. If you participate in a discussion, the discussion may be audiotaped to ensure the group leaders are doing what they are supposed to be doing and to better interpret the study data. You would never be individually identified in the recording. Following today's group, you will be contacted via e-mail (and text, if you consent) reminding you to complete each of the follow-up surveys. We will send you a link to both online follow-up surveys via e-mail.

**Risks:**

The risks involved in participating in this study are minimal. You may become uncomfortable answering some of the questions regarding your substance use. You do not have to answer any questions that you are uncomfortable answering. If you are uncomfortable during the study and no longer wish to participate, you are free to leave at any time. Since you are providing sensitive information, there is a very minimal chance that this information could be exposed to outside parties. We take numerous steps to ensure that this does not happen. Your name will never be associated with the information that you provide.

If you engage in a discussion, you are encouraged to only disclose information that you are comfortable sharing with your peers. Your full name will not be made known to the others in the group. To minimize any legal risk, we instruct group members not to disclose what was said in the group to anyone else. We also encourage you not to use your full name.

**Benefits:**

Although you may not receive direct benefit from your participation, others may ultimately benefit from the knowledge obtained from this research regarding the factors that influence students' attitudes about, and behaviors around prescription stimulants.

### **Compensation**

**If you are seeking research participation credit or extra credit for a course, you can earn that credit by participating in today's group and the March online follow-up survey.** If you are not seeking credit, you will receive \$5 cash for your participation today and a \$5 Goldberg's gift card via campus mail for completing the March online survey. All participants who complete the online survey in April will be entered into a drawing for a \$50 Amazon gift card.

### **Confidentiality:**

All information obtained in this study will be treated confidentially and privately to the extent permitted by law. Records from the study are kept locked in file cabinets and identified by study numbers to preserve confidentiality. Only the research team will have access to these records. The information obtained in this study will be used for research purposes and your name will never be publicly disclosed at any time. Any information that is obtained in this study and that can be identified with you will remain confidential and will be disclosed only with your permission or as required by law. Records will be kept in our laboratory for a minimum of 3 years and then shredded and destroyed.

### **Voluntary Participation:**

Your participation in this project is voluntary. Even after you agree to participate in the research, you may decide to leave the study at any time without penalty. You may choose not to answer any questions and may refuse to complete any portions of the research for any reason. Your decision whether or not to participate will not affect your current or future relations with Trinity.

### **Questions/Concerns:**

If you have any questions or concerns, please contact the Principal Investigators, Tyler Hightower (student), at [Tyler.Hightower@trincoll.edu](mailto:Tyler.Hightower@trincoll.edu) or Laura Holt, Ph.D. (faculty) at [Laura.Holt@trincoll.edu](mailto:Laura.Holt@trincoll.edu) (860-297-4019). If you would like to receive feedback about the study results, please contact Mr. Hightower or Prof. Holt after June 15th, 2016. We will provide group results only, not individualized results. This study has been approved by the Institutional Review Board at Trinity College. If you have questions about your rights as a research participant, or further questions about the study, please feel free to contact the chair of Institutional Review Board, Sarah Raskin, Ph.D. ([Sarah.Raskin@trincoll.edu](mailto:Sarah.Raskin@trincoll.edu), 860-297-2342).

Your signature indicates that this study has been explained to you, that your questions have been answered, and that you agree to take part in this study. You will receive a copy of this form.

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Participant Name (please print)

Trinity Box # for gift card  
(if you aren't seeking course credit)

\_\_\_\_\_  
Participant Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Preferred e-mail address for follow-up surveys (please write legibly)

May we send a **text** reminder for the follow-up surveys?

NO

YES

.....▶

\_\_\_\_\_  
Phone #

\_\_\_\_\_  
*Signature of Researcher Who Obtained Consent*

\_\_\_\_\_  
*Date*

## Appendix B

**Vignette for Participants to Read (note that Participants will receive a version that does not include references to the literature).**

It's Wednesday night around 8:00pm and Rob is headed to the library. It's the last place he wants to be, but after a long day of classes, working as a tour guide and soccer practice<sup>1</sup> he's got to get some work done<sup>2</sup>. But before he hits the library for what's shaping up to be a five or six hour study session<sup>3</sup>, he stops by a friend's room.

'Hey Rob, what's up?' Kelly asks as she opens the door to her dorm room.

'Nothing much, how are you doing?' Rob responds on his way in, taking a seat on Kelly's leather couch beneath a framed print of her sorority composite<sup>4</sup> as she reaches for one of her desk drawers.<sup>5</sup>

'Doing okay. I've been on a bender getting all my Econ stuff done, but I keep forgetting to go to meals!<sup>6</sup> At least I'll be able to fit into my dress for the formal this weekend, haha.<sup>7</sup> Anyway I got your text, you wanted twenty milligrams?'<sup>8</sup>

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<sup>1</sup> Busy student, per discussion in research meeting. Athletics supported as a risk factor. (Weyandt et al., 2009)

<sup>2</sup> Students primarily take stimulants to do work (DeSantis et al., 2008)

<sup>3</sup> Students report being able to study for hours at a time (DeSantis et al., 2008, Vrecko, 2013)

<sup>4</sup> Sorority members reported having easy access (DeSantis et al., 2008)

<sup>5</sup> Hiding medication – people reported on our study, trying to find data to back that up.

<sup>6</sup> Appetite suppressant effect (DeSantis et al., 2008, Vrecko, 2013)

<sup>7</sup> Weight loss was seen as favorable by female students (DeSantis et al., 2008, DeSantis and Hane, 2010,

<sup>8</sup> This is a commonly reported dose.



‘Yeah, that would be great. I have, like, two papers and a bunch of History reading to get done. And I’m trying to go out tomorrow and not be stuck in the library all night.’<sup>9</sup>

Kelly holds her prescription bottle over Rob’s hand and carefully drops two pills – ten milligrams each of Adderall – into his palm.

‘How much do I owe you?’

‘Nothing. But consider it a favor – I need it for my ADHD, you know.’

‘Yeah, of course. I don’t need it every day, just once in a while. Anyway, thanks so much. See you out tomorrow night?’

‘If not then, see you at the formal. Good luck with your work!’

‘You, too.’ Rob briefly hugs Kelly and then sets off across campus, two pills of a ‘study aid’ now safely in his pocket. He takes Adderall before doing any major assignment, especially when working late at night.<sup>10</sup> Now, it’s not like Rob is ‘just taking drugs’<sup>11</sup> – he says the pills help him feel more awake and more interested in academics, and he even enjoys studying subjects he would otherwise find dull when he takes Adderall.<sup>12</sup> Sure, he might also smoke pot from time to time but that’s for fun. Rob takes Adderall to study.<sup>13</sup> And besides, he has so much trouble concentrating on work when he goes to the library that sometimes he feels like he might actually have ADHD and need the extra boost.<sup>14</sup>

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<sup>9</sup> He’s trying to get his work done so he can go out tomorrow night.

<sup>10</sup> Top two reasons (DeSantis et al., 2008)

<sup>11</sup> Justification as compared with other drugs (DeSantis and Hane, 2010, Petersen et al., 2014)

<sup>12</sup> These perceived effects are reported by multiple studies (DeSantis et al., 2008, DeSantis and Hane, 2010, Vrecko, 2013, and Petersen et al., 2014)

<sup>13</sup> Compare-and-contrast (DeSantis and Hane, 2010), Doing it for the right reasons (Petersen et al., 2014)

<sup>14</sup> Self-Medicating (DeSantis and Hane, 2010)

When he gets to the library at about 8:15pm, Rob takes the pills and unpacks his things while waiting for the Adderall to take effect. He makes sure to have his textbook and online resources open by the time it kicks in, otherwise he might end up watching Netflix for hours, or just scrolling through Facebook and Instagram<sup>15</sup>. He also fills his water bottle, and stops by the library café to grab a snack – often when he takes Adderall, Rob gets a dry mouth and forgets to eat.<sup>16</sup> His friend Brady, a barista at the library café, asks Rob why he’s not ordering his usual late-night iced latté as he rings up the snack, so Rob explains he just took Adderall.

‘Yeah, it is basically like coffee, isn’t it? I hope more people don’t get prescriptions or I’ll be out of a job,’ Brady jokes as he hands Rob’s debit card back to him.<sup>17</sup>

After about thirty minutes, Rob suddenly feels more awake, and his heart is beating faster.<sup>18</sup> With the stimulants now in effect, Rob sits down and gets to work, managing to crank out ten pages and read about fifty by 2:30am. As he leaves the library he notices there are still many students there – surely some of them will be there all night – also working away under the power of stimulants.<sup>19</sup>

Rob gets back to his room at about 2:45am. By the time he’s showered and ready for bed it’s well past 3am, but he’s still up from the Adderall and can’t fall asleep. He cleans his room for nearly an hour, carefully arranging his textbooks in alphabetical order.<sup>20</sup> Finally beginning to fade, he gets into bed, but stays up clicking through his Facebook news feed and texting Kelly – who doesn’t think she’s going to be sleeping tonight – until finally passing out by 4:30am. Soon enough it will be time for him to get up for

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<sup>15</sup> Vrecko, 2013

<sup>16</sup> Side effects

<sup>17</sup> ‘Basically coffee’ (DeSantis and Hane, 2010)

<sup>18</sup> More side effects

<sup>19</sup> Vrecko (2013)

<sup>20</sup> Focusing on something totally unrelated (Vrecko, 2013)

his 10am History class, and though he'll be running on only a few hours of sleep, at least he's done the reading.