

**Normative Influences on the Non-Medical Use of Prescription Stimulants
Among College Students**

by

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Abstract

Recent epidemiological data has indicated an increasing trend in the non-medical use of prescription drugs (NMUPD) among college students. NMUPD involves using a prescription medication without a prescription, or using the medication in a manner inconsistent with a health care provider's instructions. Among college students, prescription stimulants having the highest ratio of non-medical to medical use and the highest rate of illicit selling and trading on college campuses. The increased prevalence is accompanied by increased risk, as 18-25 year olds have had the highest rate of emergency department visits for non-medical use of prescription stimulants (NMUPS). The current study examined the prevalence of self-reported NMUPS among college students and the impact of social norms on NMUPS. Social norm theory has accounted for other health related behaviors (e.g., alcohol and marijuana use) and has been utilized in brief interventions targeting risky health behaviors. To date, no studies have examined the impact of social norms on NMUPS. The current study included 959 participants who completed an on-line survey that assessed for NMUPS, self-approval for NMUPS, and perceived descriptive and injunctive norms for NMUPS. Similar to previous research on alcohol and marijuana use, students overestimated the prevalence of NMUPS and this overestimation was related to past year NMUPS. Perceived close friend and parental approval of NMUPS was positively related to self-approval and past-year NMUPS. Overall, the study broadens the existing literature on NMUPS and provides a platform for developing brief interventions that target this risky behavior.

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Introduction

National epidemiological studies have shown an increasing trend in the non-medical use of prescription drugs (NMUPD) within the United States, becoming the second highest category of illicit drug use, after marijuana [Substance Abuse and Mental Health Services Administration (SAMHSA), 2012a]. NMUPD may be defined as the use of a prescription medication not prescribed to the individual or using a prescribed medication in a way that is inconsistent with the prescriber's instructions (e.g., taking higher doses to achieve a desired high, taking the medication for longer than prescribed, alternative routes of administration for a desired effect, etc. i.e., Garnier et al., 2010; Johnston, O'Malley, Bachman, & Schulenberg, 2012; Hernandez & Nelson, 2010). NMUPD has been recognized as a major public health epidemic in the United States, as about 20% of those 12 or older have engaged in NMUPD at least once in their lifetime (Johnston et al., 2012). The prevalence is the highest among 18-25 year olds, particularly among college students (SAMHSA, 2012a). Among this population the annual prevalence has continued to increase over the past decade, with 14.8% reporting any NMUPD (i.e., stimulants, opioids, sedatives, or tranquilizers) at least once in the past year (Johnston et al., 2012; American College Health Association, 2012). The increase in NMUPD is not reflected in other illicit drug use; marijuana use has stayed relatively the same and at times gradually declined over the past decade (Johnston et al., 2012).

In the past 4 years there has also been an increase in the annual use of prescription stimulants among college students, from 5.7% to 9.3% (Johnston et al., 2012). Among college students, the annual prevalence of NMUPD is highest for opioids, followed by stimulant medication, sedative or anxiety medication, and sleeping medication (McCabe, Teter, & Boyd, 2006). However, the ratio of non-medical use to medical use is highest among stimulant

medications (2.2% medical use and 5.4% non-medical use; McCabe et al., 2006b). One possible contributor may be the elevated rate of diversion (e.g., selling, sharing, giving away the drug by an individual prescribed the medication) of prescription stimulants: Across all classes of prescription medications, prescription stimulants have the highest rate of diversion (Garnier et al., 2010).

Like virtually any medical intervention, prescription stimulant use includes several health risks, such as increased irritability, panic, aggressiveness, increased heart rate, insomnia, seizures, heart attack, and stroke (U.S. Department of Health and Human Services, 2011a, 2011b). At greater doses and used without proper medical supervision, an individual may be at a greater risk to experience these health risks. The trends in increased non-medical use of prescription stimulant (NMUPS) suggest that individuals experience greater health risks relative to their use. For example, yearly emergency department (ED) visits related to prescription stimulant use increased 196% between 2004-2010, with 50% of the visits due to non-medical use of the prescription stimulants (SAMHSA, 2012b; SAMHSA, 2013). Compared to other prescription drug classes, prescription stimulants had the highest percentage increase for ED visits between 2004 and 2010 (SAMHSA, 2012b). The trend in increased use among 18-25 year olds is also reflected in ED visits of NMUPS: Across all age groups, 18-25 year olds had the greatest number of ED visits for NMUPS, and the greatest increase in ED visits related to NMUPS between 2005 and 2010 (SAMHSA, 2013).

For college students within this age range, NMUPS is also associated with a number of negative consequences beyond ED visits. Among college students, some of these consequences include experiencing withdrawal symptoms, feeling bad or guilty about drug use, interpersonal consequences, and engaging in illegal activities to obtain drugs (McCabe & Teter, 2007).

Compared to illicit drug users who do not engage in NMUPS, NMUPS users tend to report more drug related consequences (McCabe & Teter, 2007). Compared to non-users, NMUPS users are also more likely to engage in risky alcohol consumption and use of other illicit drugs (McCabe, Cranford, Morales, & Young, 2006). Outside of increased risky behavior and drug-related consequences, NMUPS is also associated with greater psychological distress, such as depressed mood and mental restlessness (Teter, Falone, Cranford, Boyd, & McCabe, 2010; Weyandt et al., 2009). Although students may report occasional NMUPS for academic reasons (e.g., improve concentration, enhancing studying ability) (Teter, McCabe, Cranford, Boyd, & Guthrie, 2005; Rabiner et al., 2009), students who engage in NMUPS tend to report greater academic problems, such as skipping more classes, having a lower GPA, and spending less time studying compared to non-users (Arria, O'Grady, Caldeira, Vincent, & Wish 2008).

Social Norms Approach

Theoretically driven examinations of NMUPS may help inform researchers and health care professionals and contribute to the development of interventions designed to reduce the harm associated with NMUPS. Friedman (2006) has argued that the increase in NMUPS is due to the perceived safety of prescription drugs compared to illicit drugs. Qualitative data supports this notion; student interviews indicate that students may not be fully aware of the dangers (physiological or psychosocial) associated with NMUPS (DeSantis, Webb, & Noar, 2008). Social norms theory provides a model for conceptualizing substance use and abuse by positing that perceptions of peer drug use affect an individual's own drug use. Over the past two decades, the social norms approach has received much attention in regard to its applicability in addressing health related behaviors (Berkowitz, 2004; Borsari and Carey, 2003). For example, the approach has been incorporated into brief interventions for alcohol use, especially among college students.

The Brief Alcohol Screening and Intervention for College Students (BASICS; Dimeff, Baer, Kivlahan, & Marlatt, 1999) is a brief, personalized intervention designed to reduce risky alcohol use among college students. BASICS includes several components, such as psychoeducation, personalized feedback regarding risk from use, as well as normative comparisons as a part of the integral individualized feedback, and has shown to be effective in reducing college student drinking (e.g., Neighbors et al., 2010). A review of intervention studies that utilized personalized normative feedback, both as a part of a larger intervention and as a standalone intervention, showed that descriptive normative feedback is effective at reducing students' perceptions of others' drinking (Borsari & Carey, 2001). More specifically, descriptive normative feedback is effective at reducing a range of alcohol-related variables, including alcohol consumption, risks, and perceptions of other students drinking (Neighbors, Larimer & Lewis, 2004).

Overview of Social Norms Theory

Social norm theory examines the manner by which one's behavior and attitudes are influenced by a social group's codes. These codes, referred to as "norms," may highlight behaviors considered acceptable or inappropriate at the group and/or individual level (Berkowitz, 2004; Lapinski & Rimal, 2005). Norms serve to describe attributes of a given social group and vary across dimensions for a given group. Norms may include attitudes, appearances, opinions, personal characteristics, and specific group behaviors (Miller & Prentice, 1996). Social norms are established via interpersonal interactions, and they are viewed as being embodied in other people, both real and imaginary (Miller & Prentice, 1996).

Norms and the Individual

At the group level, norms serve to facilitate an individual's cooperation and adherence to the group (Horne, 2001). As a result, group norms may stimulate beliefs and actions among

individuals by providing a road map of the status quo. In turn, this roadmap may be a strong influence when individuals attempt to act in accordance with group expectations (Festinger, 1954; Perkins, 2002).

Social norms can be distinguished by their properties. Descriptive norms serve to describe what is commonly done whereas injunctive norms describe what is commonly approved or disapproved (Berkowitz, 2004; Horne, 2001). In turn, descriptive norms may serve to tell the individual what behavior is likely effective (Cialdini, Reno, & Kallgren, 1990). Individuals are likely to follow the descriptive norms because they may provide a shortcut when a person is deciding on how to behave in a given context (Cialdini, 2009). Injunctive norms are often referred to as the “ought” behavior and inform an individual whether a behavior is acceptable or not (Cialdini et al., 1990). Similar to descriptive norms, they may direct individuals toward behaviors deemed acceptable by the social group.

Individuals may perceive different normative behavior across their social and other identified groups. For example, an individual may perceive the norms of a more immediate social group (e.g. closest friends at a university; “local norms”) differently than the norms of a more distal social group (e.g. the average student/general student body). Perceptions of these group norms are referred to as “perceived norms” (Lapinski & Rimal 2005; Berkowitz, 2004). Perceived norms are fostered by observed behaviors of the group members, direct and indirect communications with other group members, and knowledge of oneself (Berkowitz, 2004).

Misperceptions of Norms

Unfortunately, perceived norms may not accurately reflect the actual norms of one’s social groups (Berkowitz, 2004). Typically, misperceptions increase as social distance increases, and social groups that are more immediate tend to exert a stronger influence (Berkowitz, 2004).

Misperceptions are particularly salient when considering the manner by which people examine risk and health behaviors of other individuals (Berkowitz, 2005). Misperceptions may reflect a phenomenon known as “pluralistic ignorance” whereby an individual incorrectly assesses the attitudes/behaviors of group members to be different from their own; when in reality they are similar (Miller & McFarland, 1991; Toch & Klofas, 1984). Individuals may engage in pluralistic ignorance when evaluating the risky health behaviors of other individuals (Berkowitz, 2005). In these cases, an individual may believe that they themselves engage in risky health behaviors less often than others, when in reality the individual is similar to the majority (Berkowitz, 2005). One potential outcome of this misperception is adjusting one’s behavior to match the perceived behavior of the other group members (Berkowitz, 2005, p.194).

Misperceptions may also occur when individuals believe their own behaviors or attitudes are common among the majority, when in reality they are not, a phenomenon known as the “false consensus effect” (Ross, Green, & House, 1976). As such, an individual engaging in a particular behavior may believe that others also engage in the same behavior. Individuals who engage in risky behaviors may believe that others engage in the risky behaviors as well, and may use the misperception to justify their engagement in the behavior (Berkowitz, 2005).

Misperceptions Observed in Health Related Behaviors

Research regarding college student alcohol use highlights the occurrence of pluralistic ignorance. Several studies have demonstrated that college student drinkers overestimate their peers’ alcohol use relative to their own, and that this perception impacts one’s own drinking (e.g., Borsari & Carey, 2001; Berkowitz, 2004; Neighbors, Dillard, Lewis, Bergstrom, & Neil, 2006; Perkins, 2002). Consistent with theory, the degree of the misperception differs depending on the social distance of a peer group (Crawford & Novak, 2010; Sessa, 2007). Students perceive

that they drink less than their close friends drink; however, they also perceive that the typical university student drinks more than the individual's close friends (Berkowitz, 2005).

The proximity of a given group can have a considerable impact on one's drinking: The more students identify with a given group, the more likely they are going to endorse that group's norms regarding consumption (Neighbors, O'Connor, Lewis, Chawla, Lee, & Fossos, 2008). Across all peer groups, perceived closest friends' consumption, regardless of gender, has the strongest influence on one's alcohol use (Lewis & Clemens, 2008). Overall, these findings demonstrate that descriptive norms regarding alcohol use likely impact one's own alcohol consumption.

The pattern is similar when considering injunctive norms. Specifically, greater perceived friend approval for risky drinking is positively related to heavy drinking; however, distal referents (e.g., typical university student) have less of an impact (Neighbors et al., 2008). Similar to the pattern observed in descriptive norms, students believe that other students are more approving of heavier drinking than oneself (Neighbors et al., 2008). Even after accounting for other predictors of consumption (e.g., gender, Greek membership, motives, alcohol expectancies), perceived descriptive and injunctive norms continue to influence one's alcohol consumption, further demonstrating the impact of social norms on college student alcohol use (Neighbors, Lee, Lewis, Fossos, & Larimer, 2007).

In addition to alcohol, misperceptions of social norms have been documented for other health-related behaviors (e.g., cigarette smoking, tobacco use, eating behaviors) (c.f. Berkowitz, 2003). The trend in these misperceptions for these health behaviors is relatively similar: Individuals tend to misperceive group engagement in risky behaviors, and overestimations of problematic health behavior may increase one's engagement in these risky behaviors (Berkowitz,

2003). For example, when examining marijuana use on college campuses, college students are likely to overestimate perceived frequency of marijuana use, and this overestimate predicts self-reported use (e.g., Kilmer et al., 2006). Likewise students tend to overestimate peer approval of marijuana use, and this approval is positively associated with self-approval and self-report use (LaBrie, Hummer, Lac, & Lee, 2010a). Moreover, self-approval appears to mediate the relationship between peer approval and self-report use (LaBrie et al., 2010a).

Norms and Prescription Drugs

Despite the application of social norms theory to alcohol and other risky health behaviors, there is a dearth of research concerning NMUPS and social norms. To date, only one published study has examined the impact of social norms on NMUPS among college students. McCabe (2008) examined the actual and perceived frequency of NMUPS, specifically examining prescription stimulants and opioids. Consistent with the social norms theory and pluralistic ignorance, McCabe (2008) found that students overestimated the prevalence of past-year non-medical use of prescription stimulants and opioids. NMUPS was also more prevalent among those who had used it medically in the past year. Finally, users perceived greater NMUPS than non-users, suggesting the presence of the false consensus effect.

Beyond this study, little is known regarding norms and NMUPS. Given the recent national concern regarding NMUPS, it is worthwhile to examine possible contributors to this epidemic. Although other variables have shown to be predictors of NMUPS (e.g., heavy drinking, marijuana use, gender) (McCabe, Cranford, & Boyd, 2006; McCabe, Boyd, & Teter, 2009) it is also worthwhile to examine social norms given their predictive value in understanding substance abuse (Berkowitz, 2003). Understanding the social influences on NMUPS may be beneficial when developing treatment modalities to address the current epidemic. Social norms

theory has been used to develop social marketing campaigns on college campuses to reduce risky alcohol consumption among college students. Multiple studies have demonstrated a reduction in student consumption following the implementation of these campaigns (see Berkowitz, 2005 for a review), and these effects are observed after controlling for alternative predictors (Dejong et al., 2006). As a stand-alone intervention, the social norms approach has been shown to result in reductions in consumption, alcohol-related consequences, peak blood alcohol content, drinking quantity, binge drinking, and drinking norms (Moreira, Smith, & Foxcroft, 2010). Similar interventions may prove effective in reducing NMUPS, but more basic research on how social norms theory applies to the use of stimulants is needed before effective prevention and intervention efforts can be developed.

Purpose

Overall, the social norms approach demonstrates a strong capacity to reduce risky drinking behavior. It also may be useful in addressing other risky health behaviors (e.g., NMUPS). However, basic research is needed to inform these interventions and campaigns. The current study attempts to bridge the gap between social norms and risky drug use. The current study focused on undergraduate college students given the prevalence of NMUPS among this population. We chose stimulants as the only drug class to be examined in the current study given its prevalence, increases in use, and proportion of NMUPS related to medical use of prescription stimulants. Therefore, the current study focused on participants' perceived injunctive and descriptive norms related to NMUPS, self-approval of NMUPS, and self-reported NMUPS.

Prior to examining the existence of social norms misperceptions among our sample, the study examined the presence of misperceptions for alcohol and marijuana. Identifying alcohol and marijuana misperceptions would confirm that our sample engages in normative

misperceptions observed with previous studies. Therefore, the study expected similar patterns in misperceptions for NMUPS. After presenting the findings for alcohol and marijuana, the current study will present its findings for NMUPS.

Hypotheses

Based on the theory of pluralistic ignorance the current study expected that students will overestimate the prevalence of NMUPS. Consistent with the false consensus effect, it is expected that users (i.e., report NMUPS at least once in the past year) will have higher descriptive norm estimates and injunctive norm estimates than nonusers. The current study expected a positive relationship between descriptive norms and one's own use. Likewise, the current study expected a relationship to emerge among injunctive norms, one's approval of NMUPS, and self-reported NMUPS. Similar to LaBrie et al., (2010a), the current study expected that one's own approval will mediate the relationship between perceived approval and self-reported use.

Consistent with the theory, the current study expects differences in perceived approval across different social groups. Consistent with previous research and to minimize participant demands, the current study examined participants' self-approval and their perceptions of approval among three social groups: typical university students, close friends, and parents. The current study expects students to have higher estimates of approval for the typical university student compared to the student's close peers and one's own approval. Finally, the current study expects demographics (e.g., gender, Greek involvement), alcohol and marijuana use to impact one's self-reported NMUPS. Previous research has suggested that being male, Greek, and a history of binge drinking to be associated with greater NMUPS (Lanier & Farley, 2011; McCabe et al., 2006a).

Method

Participants

The current study recruited participants from a sample of undergraduate students enrolled in a large public Southeastern university. The current study recruited participants on-line via the Psychology department's SONA system, and the survey was administered through the Qualtrics survey website. Data collection occurred during the fall and spring semesters. Participants had to be at least 19 years of age. No other exclusion criteria were utilized in recruitment. The current sample included 959 participants (73.8% female, Mean age: 20.32, 88.4% White, 44.1% Greek affiliated). The demographics are generally reflective of the overall campus characteristics (49% female, mean age: 21, 85% White, 30% Greek affiliated), with females over-represented in the current sample. The study compensated all participants with 1 hour of extra credit for their psychology courses.

Measures

The data were inspected for missing values, outliers, normal distributions, linearity, and homoscedasticity. The current study defined univariate outliers as any value above or below 2 interquartile ranges from the median. Values that fell beyond this range were recoded into the minimum or maximum value of two interquartile ranges from the median. Theoretical score ranges and actual score ranges of the measures are noted below.

General information questionnaire. The measure assessed basic demographic information such as sex, age, years of school completed, Greek membership, ethnicity, and current residence. This information was used for descriptive purposes (See Appendix A).

Daily Drinking Questionnaire (DDQ). The DDQ (Collins et al., 1985) is a self-report questionnaire that assesses participant's alcohol consumption during the past 28 days. The

questionnaire asks participants about their alcohol consumption for a typical drinking day, the number of drinks consumed during a heavy drinking week, the types of alcohol consumed, and episodes of binge drinking [defined as four drinks (five for males) in a single sitting] (See Appendix A). After examining for extreme outliers, the actual range was 0 to 26 drinks in a typical week and 0 to 45 drinks during a heavy drinking week. Previous research supports the use of self-reported substance use when participants' confidentiality is assured (Johnston & O'Malley, 1985).

The Drinking Norms Rating Form. The Drinking Norms Rating Form (Baer et al., 1991) was used to assess perceived norms for alcohol consumption. The measure is similar to the DDQ in that it asks students to estimate the frequency and amount of consumption among other university students. This measure has previously demonstrated good convergent validity with measures of drinking (Baer et al., 1991; Borsari & Carey, 2000; Neighbors et al., 2004). Perceived descriptive norms were assessed by asking participants: "How much alcohol, on average (measured in number of drinks), does a typical student at Auburn University drink on each day of a typical week." Response options and scoring are similar to the DDQ, and the perceived quantity was calculated by summing the number of drinks for a given week. After examining for extreme outliers, the actual range of perceived typical weekly drinks was 0 to 45 drinks (See Appendix B).

Perceived injunctive norms for alcohol. Baer's (1994) measure was used to assess approval and perceived injunctive alcohol norms. This measure assesses approval of four specific behaviors: drinking every weekend, daily, after driving, and enough to pass out. Items were asked in parallel for three referent groups: close friends, parents, and typical Auburn University student. Participants also reported their own level of self-approval. Response options

were based on a 7-point Likert scale ranging from 1 (*strong disapproval*) to 7 (*strong approval*) (See Appendix B).

Composites were computed for self-approval, perceived close friend approval, perceived parent approval, and perceived typical university student approval, with higher scores indicating greater perceived approval. Theoretical ranges for each group were 4 to 28. After examining for extreme outliers, the actual ranges were the following: Self-approval (4 to 17), perceived close friend approval (4 to 20), perceived parental approval (4 to 12), and perceived typical university student (4 to 23). Perceived close friend and typical university student approval were above Nunally's (1978) 0.70 recommendation for internal reliability (Cronbach's alphas: 0.79 and 0.76 respectively); however, self-approval and perceived parental approval fell just below this cutoff (Cronbach's alpha: 0.67 and 0.65 respectively). These reliability values are similar to previous studies that utilized this measure (e.g., LaBrie, Hummer, Neighbors, & Larimer, 2010b, Neighbors et al., 2008)

Marijuana use. To assess for self-reported marijuana use, the current study adapted measures from the Core Alcohol and Drug Survey (Core Institute, 2006) to assess for use in the past year and past 30 days. The response set ranges for past year use ranged from: 1 (*Did not use*) to 9 (*Every Day*) and for past 30 day use ranged from 1 (*0 days*) to 7 (*All 30 days*) (See Appendix C).

Perceived descriptive norms for marijuana. To assess for perceived descriptive norms for marijuana use in a manner similar to self-reported marijuana use, the current study adapted the descriptive norms measure from the Core Drug and Alcohol Survey. Similar to the self-report item from this measure, the perceived descriptive norm item asked participants to estimate how often they believed the average student on campus used marijuana in the past year. Response

options range from 1 (*Did not use*) to 9 (*Everyday*). Actual ranges were from 1 to 9. In order to allow across drug comparisons, the perceived descriptive norms measure for marijuana was also adapted from McCabe's (2008). The measure contained one item and asks participants to "Please estimate the percentage of Auburn University students who, in the past 12 months used marijuana or hashish. Please estimate a numeric percentage ranging from 0 to 100%" (See Appendix C). After examining for extreme outliers, the actual range was 0 to 90%.

Perceived injunctive norms for marijuana. The injunctive norms measure was adapted from Labrie et al., (2011). Similar to Baer's (1994) injunctive norms measure for alcohol, this measure assesses approval of four specific behaviors: abstaining from marijuana use, trying marijuana once or twice, smoking marijuana occasionally, and smoking marijuana regularly. Similar to Labrie et al., (2011), items were asked in parallel for three referent groups: close friends, parents, and typical Auburn University student. Participants also reported their own level of self-approval. Response options were based on a 7-point Likert scale ranging from 1 (*strong disapproval*) to 7 (*strong approval*). The first item, referring to abstinence, was reversed scored. Composites were then computed for self-approval, perceived close friend approval, perceived parent approval, and perceived typical university student approval, with higher scores indicating greater perceived approval. See Appendix C.

Theoretical ranges for each group were 4 to 28. After examining for extreme outliers, the actual ranges were the following: Self-approval (4 to 28), perceived close friend approval (4 to 22), perceived parental approval (4 to 12), and perceived typical university student (7 to 23). The measures demonstrated adequate to good reliability according to Nunnally's (1978) 0.70 internal reliability recommendation for measures that are in the early stages of development (Cronbach's alpha range: 0.70-0.87).

Prescription Stimulant Use Survey. Participants were asked if they have a current medical prescription for stimulants, received a medical prescription for stimulants in the past year, and if they have ever received a medical prescription for stimulants in their lifetime. The remainder of the prescription stimulant use survey was adapted from McCabe et al. (2009) to assess the prevalence of non-medical use of prescription stimulants in the individual's lifetime (e.g. "In your entire lifetime, how many times have you used prescription stimulants either without the recommendation of a health professional, or for any reason other than a health professional's instructions to do so") and in the past year (e.g. "In the past year, how many times have you used prescription stimulants either without the recommendation of a health professional, or for any reason other than a health professional's instructions to do so?"), and to assess occurrences of mixing alcohol and prescription stimulants in the past year (e.g. "In the past year, how many times have you mixed prescription stimulants and alcohol?"). Participants selected from seven distinct options (*Never, to 40+ Occasions*). Participants were provided with a brief explanation about prescription stimulants, its' common uses, as well as examples of prescription stimulants. See Appendix D.

Descriptive norms for prescription stimulants. The descriptive norm measure was adapted from McCabe (2008). The measure was adapted to reflect the Prescription Stimulant Use Survey in that it assessed for perceived lifetime use, past year use, and mixing prescription stimulants and alcohol for the typical university student at the participant's university (e.g., "Please estimate the percentage of Auburn University students who, in the past 12 months used stimulant medication (e.g., Ritalin, Dexedrine, Adderall, Concerta, methylphenidate) that was not prescribed to them, or for any reason other than a health professional's instructions to do so (some reasons might include to get high, to help them party longer, or taking more than the

prescribed dose). Please estimate a numeric percentage ranging from 0 to 100%” (See Appendix D). Theoretical ranges for descriptive norms ranged from 0 to 100. After examining for extreme outliers, the actual ranges were the following: Perceived lifetime use (0 to 100%), Perceived past year use (0 to 99%), Perceived mixing prescription stimulants and alcohol (0 to 79%).

Injunctive norms for prescription stimulants. The injunctive norm survey was developed for the current study. No previous study has examined injunctive norms for NMUPS; therefore the current study adapted previous measures from LaBrie et al., (2011) designed to assess injunctive norms relevant to marijuana use. Similar to Baer’s (1994) injunctive norms measure for alcohol, this measure assesses approval of four specific behaviors: abstaining from NMUPS, engaging in NMUPS once or twice, occasionally, and regularly. Similar to Labrie et al., (2011), items were asked in parallel for three referent groups: close friends, parents, and typical Auburn University student. Participants also reported their own level of self-approval.

The prompts differed depending on the participant’s current medical prescription for stimulants. For example, those currently prescribed stimulants received the following prompt: “How would **your close friends** feel about you **occasionally** using your prescription stimulant medication for any reason other than a health professional’s instructions to do so (some reasons might include to get high, to help you party longer, or taking more than the prescribed dose)?” Participants who did not report a current medical prescription for stimulants received the following prompt: “How would **your close friends** feel about you **occasionally** using prescription stimulants (e.g., Ritalin, Dexedrine, Adderall, Concerta, methylphenidate) not prescribed to you?”

Response options were based on a 7-point Likert scale ranging from 1 (*strong disapproval*) to 7 (*strong approval*). The first item, referring to abstinence, was reversed scored.

Composites were then computed for self-approval, perceived close friend approval, perceived parent approval, and perceived typical university student approval, with higher scores indicating greater perceived approval (See Appendix D). Theoretical range of scores for each measure was 4 (*Low Approval*) to 28 (*High Approval*). After recoding extreme univariate outliers, the actual range of scores were the following: Self Approval (4 to 24), Perceived Student Approval (7 to 23), Perceived Parental Approval (4 to 12), Perceived Close Friend Approval (4 to 26). The measures demonstrated poor to good internal reliability. Perceived student, parent, and close friend approval scales exceeded Nunnally's (1978) 0.70 internal reliability recommendation for measures that are in the early stages of development (Cronbach's alpha range: 0.75-0.84). However, self-approval showed weak internal consistency (Cronbach alpha: 0.58). After examining the inter-item correlations, it was discovered that the first item regarding abstinence showed a mixed relationship with the other items. Specifically, higher approval ratings for abstinence were positively related to approval ratings for once or twice use, but not with occasional or regular use. The inter-item correlations may suggest that students who disapproved NMUPS also disapproved of occasional and regular use, but not once or twice use. This pattern was not revealed in inter-item correlations for self-approval of illicit drug use (i.e., marijuana). The unique relationship illustrated for NMUPS may be accounted for by the lack of proper psychometric development for this measure, and by Berkowitz's (2006) proposition that students may view NMUPD in general as safer than illegal drugs. Given the exploratory nature of the current study, no items were deleted from this measure.

Diversion. Participants also completed a brief measure on diversion of prescription stimulants. This measure was given to participants who reported being prescribed prescription stimulants in their lifetime. The measure assessed for the number of times they were approached

to sell, trade, or give away their prescription stimulants, as well as the number of times they sold, traded, or gave away their prescription stimulants. Participants reported the number of occasions in both the past year and in their lifetime. Participants selected from seven distinct options (*No occasions*, to *40+ Occasions*). The measure was developed for the sake of the current study and adapted from previous studies on prescription stimulant diversion (Garnier et al., 2010; McCabe et al., 2006b).

Social Desirability Scale. Participants completed the 13-item Marlowe-Crowne's Social Desirability Scale (Reynolds, 1982) to assess for participants' levels of social desirability or need for approval. This measure was included to measure to account for desirability as it relates to normative perceptions. The short-form correlates strongly with the 33-item long form ($r=0.93$) and has shown adequate reliability (Kuder-Richardson formula 20 reliability: 0.76; Reynolds, 1982). Social desirability scale scores were computed by counting the number of socially desirable responses with higher scores indicating more socially desirable response bias. The theoretical range of this measure is 0 (Low Social Desirability) to 13 (High Social Desirability). In the current sample, the actual range was 0 to 13 ($M=6.84$, $SD=2.81$). The measure fell below acceptable reliability standards (Cronbach's alpha: 0.68).

Results

Alcohol Consumption

On average, 65.5% ($n=628$) of the current sample reported consuming alcohol at least once in the past month, and 49% ($n=466$) reported engaging in binge drinking [defined as four drinks (five for males) in a single sitting] at least once in the past month. On average, participants reported consuming about 6.5 drinks in a typical week ($SD=7.7$), 11.9 drinks in a heavy week ($SD=13.8$), and 2.6 binge drinking episodes ($SD=3.9$) in the past month. Males

reported greater typical weekly drinking than females (9.50 and 5.52 drinks respectively) [$t(931) = 7.13, 95\% CI: 5.08, 2.88, p < 0.001$].

Alcohol: Discrepancies in descriptive norms. Participants overestimated the amount of alcohol consumed in a typical week by their peers. In the current sample, participants reported consuming on average 6.5 drinks in a typical week. However, participants perceived that the typical student consumes an average of 21.2 ($SD=10.3$) drinks in a typical week. Paired sample t-tests found this discrepancy to be significant [$t(925) = -41.87, p < 0.001$]. Consistent with the false consensus effect, binge drinkers perceived more (22.8 drinks per week) weekly alcohol consumption among the typical student than non-binge drinkers (perceived 19.2 drinks per week) [$t(875) = -5.34, p < 0.001, 95\% CI: -4.93, -2.23$].

Alcohol: Discrepancies in injunctive norms. To replicate previously identified trends in the perceived approval of alcohol use, we examined differences in approval ratings on the Perceived Injunctive Norms for Alcohol Scale (Baer, 1994). Specifically, we examined differences between actual/self-approval and perceived approval for the three referent groups (close friends, parents, typical student at their university) using a within-subject ANOVA with Least Significant Differences for pairwise comparisons. Mean scores were highest for perceived typical-student approval ($M=13.01$), followed by perceived close friends' approval ($M=9.52$), then actual/self-approval ($M=8.84$), and lowest for perceived parental approval ($M=6.15$). All possible pairwise comparisons between these four composites were statistically significant ($ps < 0.001$).

Independent samples t-test between binge drinkers and non-bingers indicated that binge drinkers endorsed higher self-approval, perceived higher approval across close friends and

parents ($p < 0.001$). However, non-binge drinkers perceived greater typical university student approval ($p < 0.001$) (See Table 1).

Alcohol: Influence of injunctive and descriptive norms on self-approval and use.

Bivariate correlations were run to determine the relationship between injunctive norms and self-reported typical weekly alcohol consumption. Self-approval was positively correlated with perceived approval, perceived use, and self-reported weekly alcohol consumption ($p < 0.001$). Self-reported use was positively associated with perceived use, and perceived close friend and parental approval; however, it was negatively related to perceived typical university student approval ($p < 0.001$) (See Table 2).

Marijuana Use

In the current sample, 29.4% ($n=282$) of the current sample reported using marijuana at least once in the past year, and 13.7% ($n=132$) at least once in the past month. Past year users reported using marijuana on average 3-5 occasions in the past year. Males reported greater past year marijuana use than females [$t(944) = 4.27, 95\%CI 0.32, 0.87, p < 0.001$].

Marijuana: Discrepancies in descriptive norms. Although 29.4% of the current sample reported using marijuana at least once in the past year, on average, participants perceived that 40.4% of students engaged in past year marijuana use. On average, participants reported not using marijuana in the past year. However, when asked how often they believed the typical student engages in marijuana use, participants perceived that the typical student uses marijuana at least once a month. The difference between actual past year use and the perceived frequency of past year use was significant [$t(947) = 28.98, p < 0.001, 95\% CI 2.01, 2.30$]. Consistent with the false consensus effect, users (defined as those who used marijuana at least once in the past

year) perceived greater marijuana use among their peers than non-users [$t(945) = -4.37$ $p < 0.001$, 95% CI -0.77,-0.29].

Marijuana: Discrepancies in injunctive norms. We examined differences in approval ratings on the Perceived Injunctive Norms for Marijuana (LaBrie et al., 2011). Specifically, we examined differences between actual/self-approval and perceived approval for the three referent groups using a within-subject ANOVA with Least Significant Differences for pairwise comparisons. Consistent with the social norms theory and previous research (e.g., LaBrie et al., 2010), mean scores were highest for perceived typical-student approval ($M=14.25$), followed by perceived close friends' approval ($M=11.25$), then by actual/self-approval ($M=10.22$), and lowest for perceived parental approval ($M=6.22$). All possible pairwise comparisons among these four composites were statistically significant ($ps < 0.001$). Independent samples t-test between marijuana users and nonusers indicated that users reported significantly higher self-approval, and higher perceived approval for all three referent groups ($ps < 0.001$) (See Table 3).

Marijuana: Influence of injunctive and descriptive norms on self-approval and use. Finally, bivariate correlations were run to determine the relationship between injunctive norms, perceived use, and self-reported use. Self-approval was positively correlated with past year marijuana use, perceived use, and perceived approval across the three referent groups ($p < 0.001$). Moreover, self-reported use was positively correlated with perceived injunctive norms for all three referent groups, as well as perceived descriptive norms for marijuana use ($p < 0.001$) (See Table 4).

Social Normative Influences on Alcohol and Marijuana

Consistent with previous social normative literature on alcohol and marijuana use, participants overestimated the prevalence of alcohol and marijuana use among the typical

university student. Participants also perceived that the typical university student was more approving of alcohol and marijuana use than the participant, and the participant's friends and parents. Moreover, perceived injunctive and descriptive norms also appear to have a modest relationship with use, a pattern consistent with previous literature (e.g., Neighbors et al., 2008; Neighbors, Lostutter, Whiteside, Fossos & Walker, 2007b; Borsari & Carey, 2001). Thus, the current sample is likely susceptible to social normative influences on health-related behaviors, and one may expect to see similar trends in social normative influences on NMUPS.

NMUPS

On average, 29.7% ($n=285$) of the current sample reported NMUPS at least once in their lifetime, 22.9% ($n=221$) in the past year, and 12.0% ($n=115$) mixing alcohol and NMUPS. Males and females were not significantly different with respect to past year NMUPS ($p=ns$). Binge drinkers reported greater past year NMUPS than non-binge drinkers [$t(882) = -9.47$, 95%CI: -0.85,-0.56, $p<0.001$]. Marijuana users reported greater past year NMUPS than non-users [$t(944)=-13.16$, 95%CI:-1.12,-0.83, $p<0.001$], and this difference held after accounting for binge drinking status. Students with Greek affiliations were not significantly different in their self-reported past year NMUPS than non-greeks ($p=ns$). White students did not significantly differ from non-white students on self-reported past year NMUPS ($p=ns$).

In regard to current medical prescription for stimulants, 12.8% ($n=123$) reported having a current medical prescription for stimulants. Of those currently prescribed, 61.8% ($n=75$) reported being approached to sell, trade, or give away their prescription stimulants in the past year, whereas 35.8% ($n=44$) reported sharing for free their prescription stimulants with someone else in the past year, and 16.3% ($n=20$) reported selling or trading their prescription stimulants to someone else in the past year.

NMUPS: Discrepancies in descriptive norms. Consistent with the first hypothesis, students overestimated perceived peer engagement in lifetime, past year, and past year mixing with alcohol NMUPS (See Table 5). Based on the false consensus effect, it was expected that users (i.e., participants reporting NMUPS at least once in the past year) will have higher descriptive norm estimates than non-users (i.e., participants reporting no NMUPS in the past year). This second hypothesis was tested via independent sample t-tests and was partially supported: Users reported significantly higher descriptive norms for lifetime, and past year NMUPS; however, users were not significantly different from non-users in their perception of past year mixing NMUPS with alcohol (See Table 5).

NMUPS: Discrepancies in injunctive norms. Based on the false consensus effect, it was also expected that users would report greater actual/self-approval for NMUPS, and report higher perceived injunctive norms compared to non-users. This third hypothesis was tested via independent sample t-tests. Users reported significantly greater actual/self-approval, perceived approval of their close friends, parents, and the typical university student for NMUPS (See Table 6).

The fourth hypothesis posited that students will have higher estimates of approval for the typical university student compared to student's close peers, parents, and one's own approval. That is, more proximal groups will have lower ratings than more distal groups. To examine this hypothesis, the current study examined differences between self-approval and perceived approval among the three referent groups via within-subject ANOVA with Least Significant Differences for pairwise comparisons. Consistent with the hypothesis, students perceived a higher approval rating among the typical university student compared to their own self-approval, and perceived approval of close friends and parents. Mean scores were highest for perceived

typical-student approval ($M=13.90$), followed by actual/self-approval ($M=10.10$), then by perceived close friends' approval ($M=10.02$), and lowest for perceived parental approval ($M=6.04$). Self-approval was not significantly different from perceived close friend approval; however, all other possible pairwise comparisons between these four composites were statistically significant ($ps<0.001$).

NMUPS: Influence of perceived injunctive and descriptive norms on use. The fifth and sixth hypotheses predicted a positive relationship between perceived descriptive and injunctive norms and one's own self-reported NMUPS. Bivariate correlations examined the relationship between perceived descriptive norms (perceived lifetime, past year, and past year mixing alcohol with NMUPS) and actual use (self-reported lifetime, past year, and past year mixing alcohol with NMUPS).

Self-approval was positively associated with perceived approval, perceived use, and self-reported lifetime, past year, and mixing with alcohol NMUPS. Perceived use was also positively associated with lifetime, past year, and past year mixing with alcohol NMUPS. Perceived friend and parent approval were positively associated with self-reported lifetime, past year, and mixing with alcohol NMUPS. However, perceived typical student approval was only significantly associated with past year NMUPS, but not lifetime or mixing with alcohol NMUPS. We also examined the relationship between perceived levels of approval and social desirability. Social desirability was not significantly correlated with perceived approval of the three referent groups (See Table 7).

Overall, it appears as if perceived descriptive and injunctive norms are positively and significantly related to self-reported use. Perceived descriptive norms are positively related to perceived approval, self-approval, and self-reported NMUPS. For perceived injunctive norms,

perceived close friend approval appears the most closely related to self-approval and self-reported NMUPS. Similarly, increases in perceived parental approval also appear closely related to increases in self-approval and self-reported NMUPS. However, perceived typical student approval appears weakly associated with self-reported NMUPS. To further examine the relationship between injunctive norms, self-approval, and self-reported NMUPS, a path analysis model was utilized. Similar to LaBrie et al., (2010), it was expected that one's own approval will mediate the relationship between the perceived injunctive norms and self-reported use.

Mediational pathways of approval on NMUPS. In the hypothesized path model, perceived injunctive norms of the typical university student, close friends, and parents were allowed to correlate. These three referent groups were specified to predict self-approval. Self-approval was specified to predict past year NMUPS. We also examined the indirect effects of the three referent groups on past year NMUPS (See Figure 1).

Missing data and data issues. The data were examined for patterns of missing using Little's t-test. Little's t-test was not significant, suggesting that the missing data are missing completely at random (MCAR). As recommended by Enders (2010), Full Information Maximum Likelihood (FIML) was utilized for dealing with missing values as it would yield unbiased estimates in our path model.

Data analytic strategy. Robust Maximum Likelihood (MLR) was chosen as the estimator. Skewness and kurtosis fell within acceptable limits (2.6 and 6.32 respectively) for "Past Year NMUPS"; however, skewness approached an extreme value. This elevation suggests a non-normal distribution for 'Past Year NMUPS' that may influence mean and covariance estimates in the analytic model, leading to bias in our path estimations and fit statistics. MLR was chosen as the estimator to reduce the impact of these biases on our path estimations. MLR

would also allow the use of FIML to handle missing data appropriately. To test for indirect effects of the three referent groups on NMUPS, PRODCLIN (distribution of the PRODUCT Confidence Limits for INdirect effects; MacKinnon, Fritz, Williams, & Lockwood, 2007) was used to obtain confidence limits for the indirect effects. The indirect effect is considered significant if the 95% confidence limit of the indirect effect does not include zero.

Splitting the sample. To allow for cross validation in the event of modifying the original path model, the sample was split using a random number generator in SPSS. Two samples emerged (Sample 1: 456 participants, Sample 2: 503 participants). Sample 1 (73% female, Mean age: 20.3, 89% White) was similar to Sample 2 with respects to demographics (74% female, Mean age: 20.4, 88% White). The two samples were not significantly different in their scores on perceived injunctive norms, self-approval of NMUPS, and self-reported past year NMUPS.

Model identification. In the current model, the number of parameters estimated (t) was 12 (5 variances, 3 covariance, and 4 direct paths) and the number of variables available (q) was 15. Therefore, the model is considered over identified with 3 degrees of freedom.

Power analysis: Sample 1. To determine if the analysis had adequate power given Sample 1, degrees of freedom were computed based on the number of parameters estimated (t) and variables available (q). In the current path analysis, there are five variables being used ($q=5$) and 12 parameters being estimated (5 variances, 3 covariance, and 4 direct paths; $t=12$). Using the formula $df = [(q(q+1)/2)] - t$, it was determined that there were 3 degrees of freedom. Based on MacCallum, Browne, and Sugawara (1996), 3 degrees of freedom with 456 participants suggests low power (power < 0.32) for the not-close fit hypothesis and indicates a low probability of rejecting the null hypothesis that the fit is not excellent. This low probability suggests that if our model fit is good, then there is danger of model fit indices suggesting that the fit is bad.

Model fit: Sample 1. Several criteria were used to evaluate model fit. These included (a) chi-square, (b) root mean square error of approximation (RMSEA) value, which indicates that models greater than or equal to 0.10 are poor fitting, and models less than or equal 0.05 indicate good fit, (c) standardized root mean square residual (SRMR; evaluates the difference between values in observed and applied variance/covariance matrices) with a cutoff value of 0.08 (Hu & Bentler, 1999), (d) Tucker-Lewis Index (TLI; compares fit of model to a baseline model) with values 0.95 or better indicating good fit (Hu & Bentler, 1999), and Comparative Fit Index (CFI) with values ranging from 0 to 1.00 (higher values representing a model that better approximates the underlying data; Kline, 2010).

For the current model, we rejected the null hypothesis that the fit is perfect (chi-square=26.70, $df=3$ $p<0.001$), we failed to reject the null hypothesis that the fit is close (RMSEA lowerbound=0.03), and we rejected the null that the fit is poor (RMSEA upperbound=0.09). SRMR indicated good fit (SRMR=0.06). CFI and TLI did not indicate good fit (CFI=0.92, TLI=0.80). Although RMSEA and SRMR show promising signs of good fit, the overall fit indices suggest the current model may be poorly fitting the data.

Interpretation of results. Perceived close friend approval [Standardized Estimate of the path coefficient (STDYX): 0.59, $p<0.001$], and parental approval (STDYX: 0.21, $p<0.001$) had significant positive direct effects on actual/self-approval; however, perceived typical university student approval did not have a significant direct effect on self-approval (STDYX: -0.04, $p=0.23$). Self-approval had a significant positive direct effect on past year NMUPS (STDYX: 0.64, $p<0.001$); (See Figure 2).

When controlling for self-approval, perceived friend approval had a significant positive indirect effect on NMUPS (95% CI: 0.25, 0.50), suggesting that self-approval mediates the

relationship between friend approval and NMUPS. When controlling for self-approval, perceived parental approval had a significant positive indirect effect on NMUPS (95%CI: 0.06, 0.20.), suggesting that actual/self-approval mediates the relationship between perceived parental approval and NMUPS. When controlling for actual/self-approval, perceived typical student approval did not have a significant direct effect on NMUPS (95%CI: -0.08, 0.024), suggesting that actual/self-approval does not mediate the relationship between perceived typical student approval and NMUPS.

Modifications. Modification indices suggested that the model could be improved by adding a direct path from perceived close friend's approval to past-year NMUPS. Adding a direct path from perceived close friend approval to past-year NMUPS is consistent with previous research on social norms and drug use (i.e., LaBrie et al., 2010). Adding in the direct path changed the parameters of the model: The number of parameters estimated (t) is now 13 (5 variances, 3 covariance, and 5 direct paths) and the number of variables available (q) is 15. Therefore, the revised model is still considered over identified, but with two degrees of freedom.

The path analysis with this revised model was re-run on Sample 1. The revised model showed improved fit. We rejected the null hypothesis that the fit is perfect (chi-square=6.83, $df=2$ $p<0.05$), we failed to reject the null hypothesis that the fit is close (RMSEA lowerbound=0.02), and we failed to reject the null that the fit is poor (RMSEA upperbound=0.14). SRMR indicated good fit (SRMR=0.04). CFI indicated good fit (0.98); however, TLI fell short of the desired 0.95 cutoff (TLI=0.94). Overall, the fit indices suggested an improved fit in the model; however, there is indication that the fit is still poor.

Interpretation of Results: Sample 1, revised model. In the revised model, perceived close friend (STDYX=0.62) and parental approval (STDYX=0.19) had significant positive direct

effects on actual/self-approval ($ps < 0.001$); however, perceived typical university student approval did not have a significant direct effect on self-approval (STDYX = -0.04; $p = 0.29$). Both actual/self-approval (STDYX=0.41) and perceived close friend approval (STDYX=0.32) had significant positive direct effects on past year NMUPS ($p < 0.001$).

When controlling for actual/self-approval, perceived friend approval had a significant positive indirect effect on NMUPS (95% CI: 0.13, 0.38), suggesting that self-approval partially mediates the relationship between friend approval and NMUPS. When controlling for self-approval, perceived parental approval had a significant positive indirect effect on NMUPS (95% CI: 0.03, 0.13.), suggesting that self-approval mediates the relationship between parental approval and NMUPS. When controlling for actual/self-approval, perceived typical student approval did not have a significant direct effect on NMUPS (95% CI: -0.05, 0.02), suggesting that self-approval does not mediate the relationship between perceived typical student approval and actual/self-approval.

Sample 2 was utilized to cross-validate these findings with the revised model. In this final model, perceived typical student approval, perceived close friends' approval, and perceived parental approval were allowed to correlate. These three referent groups were specified to predict actual/self-approval. Self-approval and perceived close friend approval were specified to predict past year NMUPS.

Model identification: Sample 2. The number of parameters estimated (t) was 13 (5 variances, 3 covariance, and 5 direct paths) and the number of variables available (q) was 15. Therefore, the model is considered over identified with 2 degrees of freedom.

Power analysis: sample 2. To determine if the analysis had adequate power given Sample 1, degrees of freedom were computed based on the number of parameters estimated (t)

and variables available (q). In the current path analysis, there are five variables being used ($q=5$) and 13 parameters being estimated (5 variances, 3 covariance, and 5 direct paths; $t=13$). Using the formula $df = [(q(q+1)/2)] - t$, it was determined that there were two degrees of freedom. Based on MacCallum, Browne, and Sugawara (1996), two degrees of freedom with 503 participants suggests low power (power < 0.39) for the not-close fit hypothesis and indicates a low probability of rejecting the null hypothesis that the fit is not excellent. This low probability suggests that even if our model fit is good, then there is danger of concluding that the fit is bad.

Model Fit: Sample 2. For the final model, we failed to reject the null hypothesis that the fit is perfect (chi-square=2.67, $df=2$, $p=0.26$), we failed to reject the null that the fit is close (RMSEA lowerbound=0.00), but we failed to reject the null that the fit is poor (RMSEA=0.10). SRMR indicated good fit (0.03), as well as CFI (0.99) and TLI (0.99). Overall, the fit indices suggest that the current model fits the data well.

Interpretation of results. In the revised model, perceived close friend (STDYX=0.61) and parental approval (STDYX=0.18) had significant positive direct effects on actual/self-approval ($ps < 0.001$); however, perceived typical university student approval did not have a significant direct effect on self-approval (STDYX = -0.04; $p=0.25$). Both self-approval (STDYX = 0.32) and perceived close friend approval (STDYX=0.30) had significant positive direct effects on NMUPS ($p < 0.001$); (See Figure 3).

When controlling for actual/self-approval, perceived parental approval had a significant positive indirect effect on NMUPS (95% CI: 0.02, 0.108), suggesting that self-approval mediates the relationship between parental approval and NMUPS. When controlling for actual/self-approval, perceived typical student approval did not have a significant direct effect on NMUPS (95%CI: -0.039, 0.009), suggesting that self-approval does not mediate the relationship between

perceived typical student approval and NMUPS. When controlling for actual/self-approval, perceived close friend approval had a significant positive indirect effect on NMUPS (95%CI: 0.084, 0.307). The significant indirect and direct effect of perceived friend approval on NMUPS suggests that self-approval partially mediates the relationship between friend approval and NMUPS.

Predicting NMUPS: Norms, demographics, alcohol, and marijuana variables. To further examine the unique effects of social norms on past year NMUPS, we ran two separate hierarchical multiple regression models. The first examined the impact of demographic variables, alcohol use, and marijuana use on self-reported past year NMUPS. Predictors with significant loadings on past year NMUPS were then included in the final model. The final model entered these demographics and substance use variables first, followed by descriptive norms, injunctive norms, and lastly self-approval. The order of entry was decided upon based on previous social normative work in predicting alcohol and marijuana use (e.g., LaBrie et al., 2010; Fabiano, 2006; Neighbors et al., 2008; Neighbors et al., 2007a). Collinearity diagnostics were performed for all regression analyses. Multivariate collinearity was determined problematic using the following collinearity statistics: (a) squared multiple correlations between each variable was beyond 0.90 (b) tolerance values below 0.10 and (c) variance inflation factor (VIF) values beyond 10.0 (Kline, 2010).

Impact of demographics, alcohol, and marijuana use on NMUPS. It was expected that demographics (e.g., gender, Greek involvement), alcohol, and marijuana use to impact one's self-reported past year NMUPS. Previous research has suggested that being male, Greek, and a history of alcohol and marijuana use to be associated with greater NMUPS. We also included current prescription status. Gender, Greek involvement, and current prescription status were

entered at Step 1. Typical weekly drinking amount and past year marijuana use frequency were entered at Step 2. No collinearity statistics approached levels indicating problems. Regression results are presented in Table 8.

Overall, after adjusting for the number of predictors, the current regression model accounted for 25% of the variance in past year NMUPS. In the first step, current prescription status significantly predicted past year NMUPS; however, gender and Greek involvement did not. In the second step, typical weekly alcohol consumption and past year marijuana use both significantly predicted past year NMUPS. In the second step, gender now predicted past year NMUPS, with the sign of the beta weight suggesting that being female significantly predicted past year NMUPS. Given the unusual nature of this relationship and the lack of previous empirical evidence for this finding (i.e., males are typically at greater risk for NMUPS than females), we examined for possible suppression effects. Suppression occurs when correlations among predictors hide (suppresses) the true relations of predictors with the dependent variable. It was proposed that when marijuana and alcohol were included in the model, these variables may have suppressed the true relationship between gender and NMUPS, leaving gender as an improved predictor of NMUPS. According to Kline (2010), suppression occurs when either the predictor's absolute value of the beta weight is greater than its zero-order correlation with the outcome variable, or the beta weight and the zero-order correlation have opposite signs. Suppression was evident based on these criteria. Gender had a positive (though non-significant) correlation with past year NMUPS ($r=0.008$), and a negative beta weight. Moreover, the absolute value of the beta weight was greater than the zero-order correlation. These findings provided evidence for classical suppression. Therefore, despite gender significantly predicting NMUPS in the second step, the true relationship between gender and NMUPS is likely observed in the first

step, suggesting that gender may not be a key predictor in NMUPS for the current sample. As such, current prescription status, typical weekly alcohol consumption, and past year marijuana use will be used as covariates in the final predictive model examining the impact of norms on past year NMUPS.

Demographics, alcohol, marijuana, and social norms predicting NMUPS. To determine the predictive utility of social norms after accounting for demographics, we ran a second hierarchical multiple regression model. In the first step, we entered current prescription status. In the second step, we entered typical weekly alcohol consumption and past year marijuana use. In the third step, we entered perceived descriptive norms for NMUPS. In the fourth step, we entered perceived typical university student approval for NMUPS. In the fifth step, we entered perceived parental approval and perceived close friend approval for NMUPS. In the sixth and final step, we entered self-approval of NMUPS. The order of entering the descriptive norms and injunctive norms was modeled after LaBrie et al., (2010). No collinearity statistics approached levels indicating problems. Regression results are presented in Table 9.

Overall, adjusting for the number of predictors, the final regression model accounted for 31% of the variance in past year NMUPS. In the first step, current prescription status significantly predicted past year NMUPS. In the second step, typical weekly alcohol consumption and past year marijuana use both significantly predicted past year NMUPS above and beyond current prescription. In the third step, perceived campus descriptive norms significantly predicted NMUPS. In the fourth step, perceived typical student approval did not predict NMUPS. In the fifth step, perceived close friend approval, but not perceived parental approval, significantly predicted past year NMUPS. In this step, perceived student approval now predicted past year NMUPS; however, the negative beta weight suggested that decreases in

perceived student approval were associated with greater NMUPS. This unusual relationship warranted a closer examination at the zero-order correlation between perceived student approval and NMUPS to determine if suppression effects were occurring. Suppression appeared to be occurring as perceived student approval's beta weight was in the opposite direction and its absolute value was greater than the zero order correlation ($r=0.02$). It may be that perceived friend approval and parental approval are suppressing the true (non-significant) relationship between perceived student approval and NMUPS. Finally, in the sixth and final step, self-approval significantly predicted past year NMUPS. Similar to the fifth step, perceived student approval's significant relationship in the sixth step may be best explained by suppression effects. Overall, the model suggests that perceived descriptive norms and injunctive norms predict self-reported NMUPS above and beyond demographic variables and alcohol and marijuana use.

Discussion

The current study provides an exploratory analysis of the relationship between social norms and NMUPS. The increasing trend and risks associated with NMUPS among college students warranted a closer examination at possible predictors of this risky health behavior. Social normative theory provides one approach in understanding the unique environmental factors that contribute to risky health behaviors. This theory has shown predictive utility in understanding other risky health behaviors, such as heavy alcohol, nicotine, and marijuana use, and gambling behaviors. As such, the study sought to extend the theory to predict NMUPS.

First and foremost, the study replicated previous findings from social normative work in alcohol and marijuana use among college students: Perceived social norms were related to marijuana and alcohol use. Similar to previous studies (e.g., Neighbors et al., 2007) the difference between actual and perceived rates of consumption across the sample may be

accounted for by pluralistic ignorance, and the difference between binge drinkers and non-binge drinkers in their perceptions of approval for alcohol use may be best accounted for by the false consensus effect. Likewise, the difference between marijuana users and non-users in their perceptions of approval for marijuana use may also be accounted for by the false consensus effect. Consistent with the social normative theory, the current sample's perception of approval for both alcohol and marijuana use became greater with increases in social distance. This finding is consistent with previous research findings that a distal referent groups' approval of drinking tends to be weakly associated with one's self-reported drinking (Neighbors et al., 2008; Chawla, Neighbors, Lewis, Lee, & Larimer, 2007). Although a negative relationship emerged between perceived student approval for alcohol use and self-reported alcohol consumption, this finding is not unique to our sample. Neighbors et al. (2008) found that perceived typical student approval of alcohol use was negatively (but not significantly) associated with one's self-reported alcohol use. Outside of alcohol use, perceived typical student injunctive norms for gambling (though overestimated) were negatively associated with self-reported gambling (Neighbors et al., 2007b). It is also consistent with Neighbors et al. (2008) finding that proximal groups tend to exert a greater influence on one's behaviors. As expected, in the current sample close friends approval had a strong relationship with self-approval and self-reported use for alcohol and marijuana.

Support for Social Normative Influences on NMUPS

As hypothesized, students in general overestimated the perceived rate of NMUPS on campus, with past year users perceiving greater use than non-users. Users and non-users also differed in regard to perceived approval of NMUPS. Users reported greater self-approval and greater perceived approval across the three referent groups than non-users. These differences are consistent with the trends observed in alcohol (binge drinkers vs. non-binge drinkers) and

marijuana (users vs. non-users), and may be best explained by the false consensus effect:

Individuals that engage in NMUPS perceive others to be like them and may be using their own self-approval as a baseline to help them determine the perceived approval of other social groups. Thus, users may believe that others are just as approving, if not more approving, and that others engage in the behaviors as often (if not more often) than they themselves do.

It was also hypothesized that differences in perceived approval would emerge across the different referent groups. As observed with alcohol and marijuana, more distal social groups (i.e., typical university students) were perceived to have greater levels of approval than more proximal groups (i.e., close friends). The exaggeration in the differences between the groups may be accounted for by pluralistic ignorance: Participants believe they are unique individuals and although they may be approving of risky health behavior, they believe others (i.e., typical university students) are more approving.

Consistent with our hypotheses, a positive relationship emerged between perceived injunctive and descriptive norms and self-reported NMUPS. Perceived descriptive norms were positively related to self-reported past year, lifetime, and mixing with alcohol NMUPS. Self-approval, perceived friend and parental approval were all positively related to self-reported past year, lifetime, and mixing with alcohol NMUPS. Similar to our findings for marijuana and alcohol, perceived typical university student approval had a weak (but positive) relationship with self-reported past year use. Perceived student approval was not related to lifetime or mixing NMUPS with alcohol. The weak impact of perceived student approval for NMUPS appears consistent with our findings for alcohol and marijuana, and previous social norms studies (e.g., Neighbors et al., 2008; Chawla et al., 2007; Neighbors et al., 2007a). Descriptive norms, close friend approval, parental approval, and self-approval all appear positively related to use.

However, perceived student approval does not appear as strongly related. Consistent with previous research on alcohol and marijuana, the current study suggests that perceived student use appears to have a stronger relationship with self-reported use than perceived student approval.

Similar to LaBrie et al. (2010) and our expected hypotheses, self-approval mediated the relationship between perceived parental and close friend approval and use. Perceived close friend approval had a direct impact on self-reported NMUPS, indicating that self-approval partially mediates the relationship between use and perceived friend approval. Perceived parental approval also appeared to have an impact on NMUPS via its influence on self-approval. Finally, the path model further supported our previous findings on the weak relationship between perceived student approval and self-approval, suggesting that student approval may not have a strong impact on NMUPS.

Our regression models provided further support for the impact of social norms on NMUPS, beyond other established predictors. Descriptive norms, close friend approval, and self-approval significantly predicted past year NMUPS above and beyond alcohol consumption, marijuana use, current medical prescription. This trend is consistent with alcohol and marijuana literature, suggesting that perceived descriptive and injunctive social norms (i.e., perceived friend approval) play key roles in predicting risky substance use behavior (Neighbors et al., 2007a; Kilmer et al., 2006).

Unexpected Findings for NMUPS

Despite the majority of our original hypotheses being supported, there were several unexpected findings and outcomes inconsistent with previous literature. First, users and non-users were not significantly different in their perceived rates of NMUPS mixed with alcohol. This finding conflicts with the false-consensus effect observed in other perceived rates of use.

Given the low prevalence of mixing NMUPS with alcohol, sample size and power may have been an issue in finding a statistically significant difference. Therefore, in a larger sample (with more individuals that mix alcohol and NMUPS), the expected differences may emerge.

Second, although previous research (e.g., Lanier & Farley, 2011; McCabe et al., 2006a) has found that being male and involved in a Greek organization to be affiliated with increased use, the current sample did not support these findings. It is unclear why Greek involvement and gender were not significant predictors of NMUPS. However, our sample was predominantly female thus a sample with more male representation may have produced significant findings for gender.

Third, our path analyses and regression models both suggested a unique relationship between injunctive norms and use. In the path analysis, parental approval predicted use via self-approval. However, parental approval was not predictive of NMUPS in our regression model. Social norm researchers have proposed that parental influence on drug use behaviors do not continue when one enters college because peers “become more important determinants” of one’s behavior (Perkins, 2002; p.165). On the contrary, longitudinal studies have identified that perceived parental disapproval of alcohol consumption before one enters college exerts a protective influence on risky drinking during college (Fairlie et. al., 2012; Abar & Turrisi, 2008; Walls, Fairlie, & Wood, 2009). Similar trends are observed in perceived parental permissiveness for marijuana use in college; however, little has been done to examine the longitudinal impact of parental permissiveness of marijuana use prior to matriculation (LaBrie et al., 2011). In the bivariate correlations, parental approval was positively related to NMUPS. However, after accounting for other predictors, parental approval was not significantly associated with use. The current study provides support for Perkins (2002): Once close friend approval is accounted for,

parental approval is no longer associated with use. However, the study also provides some support for the previous longitudinal work on parental approval and drug use. Future research will need to examine parental permissiveness of NMUPS and its long-term impact to determine if the same lasting effects of parental permissiveness on alcohol use apply to NMUPS.

Limitations

The findings of the current study should be considered in light of its limitations. First, the current sample was fairly homogenous; therefore the results of the current study may not generalize to other populations. Like other social normative studies, the current study assumes that the sample is representative of the population when comparing perceived use with actual use. Without sampling the entire population of interest, the current study is making assumptions regarding actual use and approval based on the current sample's self-report. Although the sample's demographics paralleled the university, caution should be exercised when generalizing our findings. Moreover, given that the study is cross-sectional, the observations regarding injunctive norms and use should not suggest causality. The path analytic model may fit the data well if the paths were reversed: Self-reported NMUPS directly predicts self-approval, which in turn predicts perceived friend and parental approval.

Second, the prevalence of NMUPS in the current sample was higher than previous studies, suggesting possible sampling biases. For example, in a study of 119 college campuses in the United States, the average prevalence of past year NMUPS among students attending southern universities was 4.6% (95% CI: 3.3-6.3%) (McCabe, Knight, Teter, & Wechlser, 2005). Moreover, larger national studies have indicated that the prevalence of lifetime use may range between 5.7% to 9.3% (Johnston et al., 2012). Our sample reported a higher occurrence of both past year and lifetime prevalence compared to these larger national studies. However, a recent

literature review found that the prevalence of any lifetime NMUPS ranged across a number of cohort studies, with rates ranging from 5.3% to 34% across samples (c.f., Weyandt et al., 2013). It appears that the rate of use may be sample specific, thus limiting the generalizability of prevalence from the current study.

Third, due to the low power for our path analyses, our model fit interpretation may have been erroneous: With lower power, we may assume the fit is poor when in reality the fit is good. This limitation is particularly important when considering our initial proposed model. The poor fit of this initial model may not have been poor with a larger sample (well over 1,000 participants to achieve adequate power). Therefore, the modifications made to the model may not have been necessary, thus affecting our conclusions regarding the relationship between perceived norms, self-approval, and past year NMUPS.

Fourth, given the exploratory nature of the study, several measures were adapted or developed for the sake of the current study, and thus may not have strong psychometric properties. These included measures central to our main analyses (e.g., perceived and self-approval of NMUPS) thereby raising caution when interpreting our outcomes. Weak internal reliability and mixed inter-item correlations for self-approval of NMUPS indicated that this measure may be poorly assessing self-approval. On the contrary, the mixed inter-item correlations may provide evidence regarding students' perceptions of perceived safety (i.e., abstinence and 1-2 time NMUPS are approved similarly). Previously established measures (e.g., Baer Injunctive Norms for Alcohol Use) also showed weak internal reliability. Previous research has shown mixed internal reliabilities for these established injunctive norms measures (e.g., LaBrie et al., 2010, Neighbors et al., 2008) as well. Until better validated measures of approval

are developed, the interpretations of the study's results are limited by these psychometric weaknesses.

Concluding Statements

This study adds to the current literature on college students NMUPS and to the social normative theory as it applies to risky health behaviors. Overall, the current sample's trends in misperceptions regarding descriptive and injunctive norms are consistent with the social normative theory and previous drug and alcohol use literature. Perceived rates of NMUPS, self-approval, close friend approval, and (to an extent) parental approval of NMUPS all warrant further consideration when identifying possible contributors to the increasing rates of NMUPS across college students. More importantly, differences in these perceptions emerged as a function of self-reported use. Taken together, the study suggests that the social normative theory may be useful in understanding or predicting key factors associated with NMUPS.

Social normative work in alcohol and marijuana has informed brief intervention and treatment approaches for these substances. For example, the BASICS manual indicates that the normative data used in brief feedbacks are derived from previous studies at the student's/client's university (Dimeff et al., 1999). Given the effectiveness of normative feedback in brief interventions for alcohol (e.g., Neighbors et al., 2010, Borsari & Carey, 2001), a similar approach may be utilized for brief interventions targeting NMUPS. Given the impact of descriptive norms on NMUPS in the current study, we may see benefits of using descriptive normative feedback for NMUPS (in interventions or social normative campaigns), similar to those observed for alcohol (Neighbors et al., 2004).

The referent groups may nuance the effectiveness of injunctive normative feedback in interventions. The specificity of the reference group may impact personal attitudes about

NMUPS. Both parental and close friends attitudes appear to play a central role in influencing self-approval, and close friends attitudes may impact use. Interventions that intend to utilize perceived friend approval as a component may require a more individual approach regarding the associations between NMUPS, friendships, and need for peer approval. For parents, it may be worth exploring the benefits of increasing communication between parents and students about NMUPS and associated risks. Perceived approval of typical students may be less useful particularly if students do not identify as closely with this broader student body as they do with close friends.

Given the initial implications and findings of the current study, follow-up work is warranted. Future steps may include examining the impact of social norms on NMUPS related consequences. Previous social normative literature has found a strong relationship between perceived injunctive norms and consequences, above and beyond one's own alcohol use (e.g., LaBrie et al., 2010b). Similarly, the social normative work in alcohol and marijuana provide a number of models to help us understand this hazardous health behavior. Future studies may utilize longitudinal models that examine the temporal precedence of norms and NMUPS, as well as the stability of normative misperceptions throughout college (e.g., Neighbors et al., 2006). Moreover, these longitudinal studies may also highlight the unique impact of parental norms on NMUPS throughout one's college career. The current preliminary study provides credence to further research examining normative influences on NMUPS, from longitudinal and cross-sectional perspectives. Future research is needed to elucidate the complex relationship between normative influences and NMUPS, providing data to develop and inform effective social-normative prevention campaigns and interventions.

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Table 1

Injunctive Norm Differences between Binge Drinkers and Non-Binge Drinkers

	Overall Sample (<i>N</i> =946) <i>M</i> (<i>SD</i>)	Binge Drinker (<i>n</i> =466) <i>M</i> (<i>SD</i>)	Non-Binge Drinker (<i>n</i> =420) <i>M</i> (<i>SD</i>)	Absolute Difference
Self-Approval	8.83 (3.33)	10.18 (2.98)	7.29 (2.77)	2.88***
Perceived Friend Approval	9.52 (4.02)	10.88 (3.82)	7.98 (3.68)	2.91***
Perceived Parent Approval	6.15 (2.17)	6.69 (2.12)	5.52 (2.02)	1.17***
Perceived Student Approval	13.00 (3.67)	12.49 (3.66)	13.52 (3.61)	1.03***

Note. Absolute Difference: Difference between binge drinker and non-binge drinker's rating on injunctive norm measures.

*** $p < 0.001$

Table 2

Bivariate Correlations for Approval for Alcohol Consumption

	1	2	3	4	5
1. Perceived Friend Approval	-				
2. Perceived Parent Approval	0.49***	-			
3. Perceived Typical Student Approval	0.22***	0.12***	-		
4. Perceived Typical Student Use	0.15***	0.08*	0.15***	-	
5. Self-Reported Consumption	0.45***	0.32***	-0.13***	0.33***	
6. Actual/Self-Approval	0.68***	0.54***	0.14***	0.12***	0.55***

Note. Perceived Typical Student Use: Perceived number of drinks consumed per week by typical student. Self-Reported Consumption: Number of drinks consumed by participant in a typical week.

* $p < 0.05$, *** $p < 0.001$

Table 3

Injunctive Norm Differences between Marijuana Users and Non-Users

	Overall Sample (<i>N</i> =945) <i>M</i> (<i>SD</i>)	Marijuana Users (<i>n</i> =282) <i>M</i> (<i>SD</i>)	Non-Users (<i>n</i> =663) <i>M</i> (<i>SD</i>)	Absolute Difference
Self-Approval	10.22 (5.28)	15.29 (4.02)	8.07 (4.17)	7.22***
Perceived Friend Approval	11.25 (5.39)	15.55 (3.68)	9.42 (4.93)	6.13***
Perceived Parent Approval	6.22 (2.88)	7.91 (3.11)	5.50 (2.44)	2.41***
Perceived Student Approval	14.25 (3.53)	15.05 (2.95)	13.91 (3.70)	1.34***

Note. Absolute Difference: Difference between marijuana users and non-user's rating on injunctive norm and self-approval measures.

*** $p < 0.001$

Table 4

Bivariate Correlations for Approval for Marijuana Use

	1	2	3	4	5
1. Perceived Friend Approval	-				
2. Perceived Parent Approval	0.53***	-			
3. Perceived Typical Student Approval	0.39***	0.21***	-		
4. Perceived Typical Student Use	0.26***	0.14***	0.37***	-	
5. Self-Reported Use	0.50***	0.34***	0.16***	0.23***	-
6. Actual/Self-Approval	0.80***	0.62***	0.32***	0.23***	0.62***

Note. Perceived typical student use: Participant's perceived percentage of students that used marijuana at least once in the past year. Self-Reported Use: Number of times participant used marijuana in the past year.

*** $p < 0.001$

Table 5

Discrepancies in descriptive norms for NMUPS

	Actual Rate	Average Perceived Rate	User's Estimate (<i>n</i> =221) <i>M</i> (<i>SD</i>)	Non-user's estimate (<i>n</i> =724) <i>M</i> (<i>SD</i>)	Difference between user and non-user estimates
Lifetime	29.7% (<i>n</i> =285)	50.0%	59.6% (22.3)	47.8% (24.3)	11.8%***
Past Year	22.9% (<i>n</i> =221)	44.3%	53.4% (21.8)	41.5% (23.8)	11.9%***
Past Year Mixing	12.0% (<i>n</i> =115)	28.4%	30.7% (19.0)	27.8% (19.8)	2.8%

Actual Rate: Percentage of students in current sample who reported engaging in NMUPS.

Average Perceived rate: Average of perceived descriptive norms for NMUPS.

User: reported any NMUPS at least once in the past year.

Past Year Mixing: Mixing NMUPS and alcohol at least once in the past year.

****p*<0.001

Table 6.

Discrepancies in Injunctive Norms

	Overall Sample (<i>n</i> =944) <i>M</i> (<i>SD</i>)	User (<i>n</i> =220) <i>M</i> (<i>SD</i>)	Non-User (<i>n</i> =724) <i>M</i> (<i>SD</i>)	Difference
Self-Approval	10.10 (4.37)	13.71 (3.78)	9.00 (3.90)	4.72***
Perceived Friend Approval	10.01 (4.66)	13.64 (3.91)	8.91 (4.31)	4.73***
Perceived Parent Approval	6.04 (2.76)	7.25 (2.80)	5.52 (2.38)	1.73***
Perceived Student Approval	13.90 (3.63)	14.41 (3.19)	13.72 (3.78)	0.69*

User: reported NMUPS at least once in the past year.

Difference: Difference between user and non-user's rating on injunctive norm measures.

* $p < 0.05$ *** $p < 0.001$

Table 7

Bivariate Correlations for Descriptive and Injunctive Norms

	1	2	3	4	5	6	7
1. Perceived Friend Approval	-						
2. Perceived Parental Approval	0.58***	-					
3. Perceived Typical Student Approval	0.39***	0.22***	-				
4. Perceived Past Year Use	0.27***	0.12***	0.35**	-			
5. Lifetime Use	0.43***	0.29***	0.05	0.17***	-		
6. Past Year Use	0.41***	0.26***	0.06*	0.18***	0.86***	-	
7. Past Year Mixing	0.28***	0.24**	0.04	0.13***	0.52***	0.55*	-
8. Actual/Self-Approval	0.65***	0.50***	0.22***	0.21***	0.46***	0.42***	0.29***

Note. Perceived Past Year Use: Perceived percentage of students that engaged in NMUPS at least once in the past year. Lifetime Use: Number of times participant reported engaging in NMUPS in their lifetime. Past Year Use. Number of times participant reported engaging in NMUPS in the past year. Past Year Mixing: Number of times in the past year participant reported mixing NMUPS and alcohol.

* $p < 0.05$ *** $p < 0.001$

Table 8

Regression Results for Past Year NMUPS as a Function of Demographics, and Alcohol and Marijuana Use (N=931)

Predictor	<i>B</i>	<i>SE B</i>	β	<i>t</i>
Step 1: $R^2 = 0.02$ $R^2\Delta = 0.02^*$				
Gender (0=Female, 1=Male)	0.03	0.08	0.01	0.37
Greek (0=Non-Greek, 1=Greek)	0.05	0.08	0.02	0.66
Current Prescription (0=No, 1=Yes)	0.53	0.11	0.16	4.83***
Step 2: $R^2 = 0.25$ $R^2\Delta = 0.23^*$				
Gender (0=Female, 1=Male)	-0.26	0.07	-0.10	-3.36**
Greek (0=Non-Greek, 1=Greek)	-0.01	-0.07	-0.03	-0.82
Current Prescription (0=No, 1=Yes)	0.23	0.10	0.07	2.28*
Weekly Alcohol Consumption	0.04	0.01	0.25	7.48***
Past Year Marijuana Use	0.21	0.02	0.34	10.92***

Note: *B* refers to unstandardized coefficient, *SE B* refers to the standard error of the unstandardized coefficient, β refers to the standardized regression coefficient.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 9

Regression Results for Past Year NMUPS as a Function of Demographics, Alcohol and Marijuana Use, Perceived Descriptive Norms, and Injunctive Norms (N=931)

Predictor	<i>B</i>	<i>SE B</i>	β	<i>t</i>
Step 1: $R^2 = 0.02$ $R^2\Delta = 0.02^*$				
Current Prescription (0=No, 1=Yes)	0.54	0.10	0.16	4.89***
Step 2: $R^2 = 0.24$ $R^2\Delta = 0.22^*$				
Current Prescription (0=No, 1=Yes)	0.24	0.10	0.07	2.41*
Weekly Alcohol Consumption	0.03	0.01	0.22	7.03*
Past Year Marijuana Use	0.20	0.02	0.34	10.93*
Step 3: $R^2 = 0.25$ $R^2\Delta = 0.01^*$				
Current Prescription (0=No, 1=Yes)	0.20	0.10	0.06	1.98*
Weekly Alcohol Consumption	0.03	0.01	0.21	6.76***
Past Year Marijuana Use	0.20	0.02	0.34	10.98***
Descriptive Norms	0.01	0.001	0.12	4.02*
Step 4: $R^2 = 0.25$ $R^2\Delta = 0.00$				
Current Prescription (0=No, 1=Yes)	0.20	0.10	0.06	2.00*
Weekly Alcohol Consumption	0.03	0.01	0.21	6.76***
Past Year Marijuana Use	0.20	0.02	0.34	10.96***
Descriptive Norms	0.01	0.001	0.11	3.63***
Perceived Student Approval	0.003	0.01	0.01	0.35
Step 5: $R^2 = 0.29$ $R^2\Delta = 0.04^*$				
Current Prescription (0=No, 1=Yes)	0.17	0.10	0.05	1.70
Weekly Alcohol Consumption	0.02	0.01	0.13	3.90***
Past Year Marijuana Use	0.18	0.02	0.29	9.48***
Descriptive Norms	0.004	0.001	0.09	2.97**
Perceived Student Approval	-0.02	0.01	-0.08	-2.41*
Perceived Close Friend Approval	0.06	0.01	0.25	6.22*
Perceived Parental Approval	0.01	0.01	0.01	0.36
Step 6: $R^2 = 0.31$ $R^2\Delta = 0.02^*$				
Current Prescription (0=No, 1=Yes)	0.15	0.10	0.05	1.57
Weekly Alcohol Consumption	0.02	0.01	0.11	3.27**
Past Year Marijuana Use	0.17	0.02	0.28	9.02***
Descriptive Norms	0.004	0.001	0.08	2.67**
Perceived Student Approval	-0.02	0.01	-0.07	-2.29*

Perceived Close Friend Approval	0.04	0.01	0.17	3.92***
Perceived Parental Approval	-0.01	0.01	-0.02	-0.63
Self-Approval	0.05	0.01	0.18	4.85*

Note: *B* refers to unstandardized coefficient, *SE B* refers to the standard error of the unstandardized coefficient, β refers to the standardized regression coefficient.
 * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

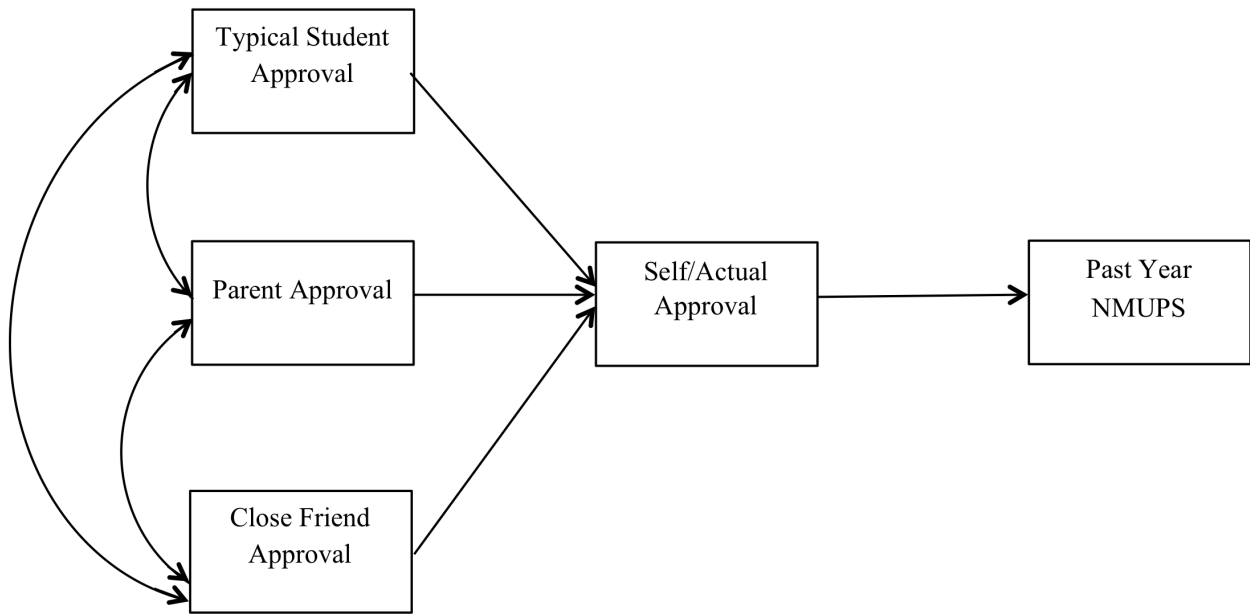


Figure 1.
Hypothesized Path Analysis Model Examining Injunctive Norms on Use

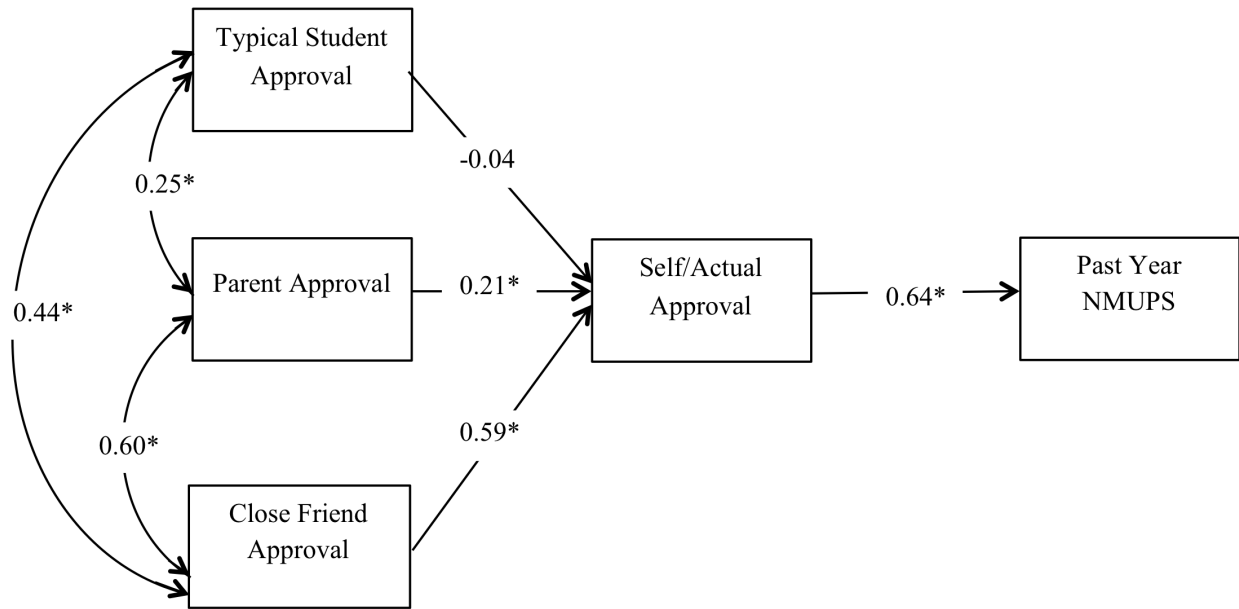


Figure 2. Initial Path Analysis Model Examining Injunctive Norms on Use ($n=449$). All values are standardized coefficients.

* $p < 0.001$.

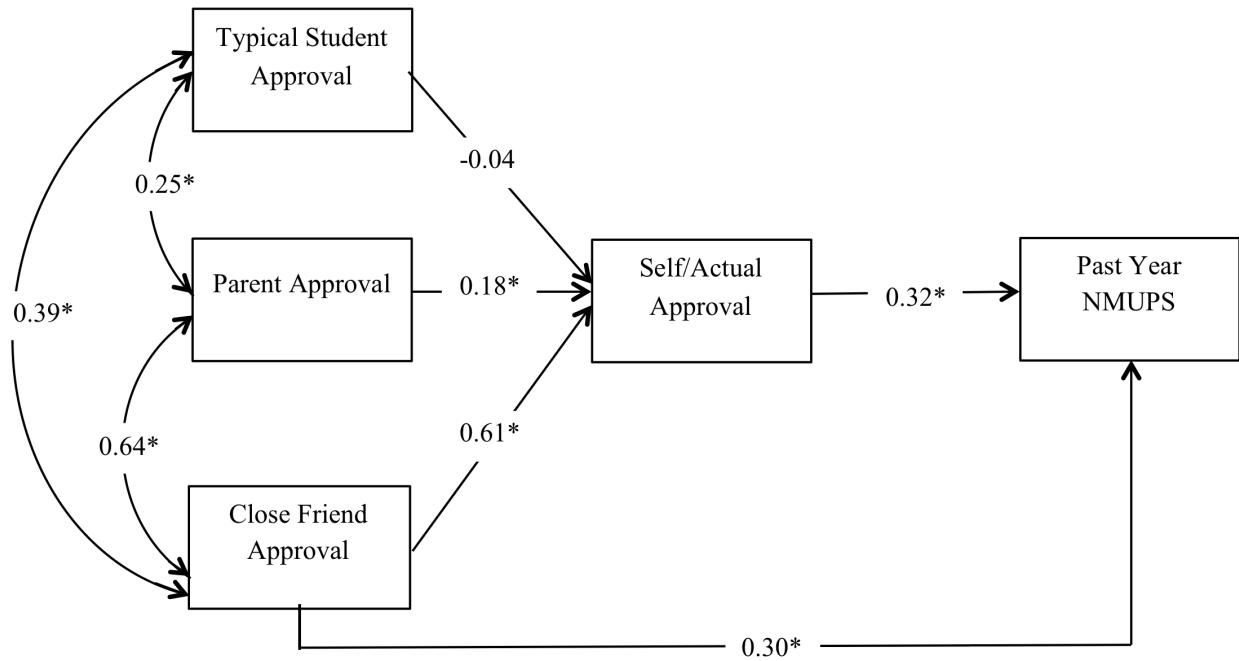


Figure 3. Final Path Analysis Model Examining Injunctive Norms on Use ($n=503$). All values are standardized coefficients.

* $p < 0.001$.

Appendix A

Demographics

Do not place your name or any other identifying information on this questionnaire

1. Please indicate your gender: Male (1) Female (2)

2. How old are you? years.

3. What is your class standing:

1. Freshman 2. Sophomore 3. Junior 4. Senior 5. Other

4. Are you a member of a fraternity or sorority? Yes (1) No (2)

5. Please check one of the following Ethnic categories:

Hispanic or Latino (1) Not Hispanic or Latino (2)

6. Please check as many of the following Racial categories that apply to you:

American Indian or Alaska Native Asian
 Black or African American Native Hawaiian or Other Pacific Islander
 White

7. Where do you currently reside?

Off campus house or apartment (1) At home with parents/guardians (2)
 Fraternity House (3) Campus dormitory (4)
 Sorority House (5) Other : _____ (6)

Alcohol Survey

Please use the charts below to describe your recent drinking patterns. Please report your drinking in standard drinks, where 1 standard drink equals 12 ounces of beer, 4 ounces of wine, and or a 1 ounce shot of hard liquor.

For the **past month** fill in for each calendar day the number of standard drinks you **usually drink** on that day.

<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday

Now fill in for the **past month** the **maximum number** of standard drinks you had on each calendar day.

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday

- 1) During the last 28 days, on how many days did you drink alcohol? _____
- 2) During the last 28 days, on how many days did you drink beer? _____
- 3) During the last 28 days, on how many days did you drink wine? _____
- 4) During the last 28 days, on how many days did you drink a shot of hard liquor? _____
- 5) During the last 28 days, on how many days did you drink a mixed-drink? _____
- 6) During the last 28 days, on how many days have you been drunk? _____
- 7) MALE ONLY: During the last 28 days, on how many days did you have 5 or more standard drinks? _____
- FEMALES ONLY: During the last 28 days, on how many days did you have 4 or more standard drinks? _____
- 8) During the last 28 days, what is the largest number of standard drinks you consumed in one night? _____
- 9) Approximately how many hours did it take you to finish the largest number of drinks mentioned in #7? _____
- 10) How much do you weigh? _____

Appendix B

DRINKING NORMS MEASURES

Drinking Norms Rating Form (Baer et al., 1991)

“How much alcohol, on average (measured in number of standard drinks), does a **typical student at Auburn University** drink on **each day of a typical week.**”

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday

Perceived Injunctive Norms for Alcohol Use (Baer, 1994)

The following section is a survey of your close friends’ attitudes about alcohol. We want you to tell us about your perception of your close friends.

Strong disapproval (1), moderate disapproval (2), mild disapproval (3), wouldn't care (4), mild approval (5), moderate approval (6), strong approval (7)

- How would your **close friends** respond if they knew you drank alcohol every weekend?
- How would your **close friends** respond if they knew you drank alcohol daily?
- How would your **close friends** respond if they knew you drove a car after drinking?
- How would your **close friends** respond if they knew you drank enough to pass out?

The following section is a survey of your parents’ attitudes about alcohol. We want you to tell us about your perception of your parents.

Strong disapproval (1), moderate disapproval (2), mild disapproval (3), wouldn't care (4), mild approval (5), moderate approval (6), strong approval (7)

- How would your **parents** respond if they knew you drank alcohol every weekend?
- How would your **parents** respond if they knew you drank alcohol daily?
- How would your **parents** respond if they knew you drove a car after drinking?
- How would your **parents** respond if they knew you drank enough to pass out?

The following section is a survey of other students’ attitudes about alcohol. We want you to tell us about your perception of other students.

Strong disapproval (1), moderate disapproval (2), mild disapproval (3), wouldn't care (4), mild approval (5), moderate approval (6), strong approval (7)

- How would the **typical Auburn University** student respond if they knew you drank alcohol every weekend?
- How would the **typical Auburn University** student if they knew you drank alcohol daily?
- How would the **typical Auburn University** student if they knew you drove a car after drinking?

How would the **typical Auburn University** student if they knew you drank enough to pass out?

The following section is survey of your attitudes about alcohol.

Strong disapproval (1), moderate disapproval (2), mild disapproval (3), wouldn't care (4), mild approval (5), moderate approval (6), strong approval (7)

How approving (or disapproving) are you about drinking alcohol every weekend?

How approving (or disapproving) are you about drinking alcohol daily?

How approving (or disapproving) are you find driving a car after drinking?

How approving (or disapproving) are you about drinking enough to pass out?

Appendix C

MARIJUANA MEASURES

SELF-REPORTED USE

Within the last year about how often have you used marijuana or hashish?

Did not use Once/year 6 times/year Once/month Twice/Month Once/Week
3 times/week 5 times/week Every day

During the past 30 days on how many days did you have marijuana?

0 days 1-2 days 3-5 days 6-9 days 10-19 days 20-29 days All 30 days

PERCEIVED DESCRIPTIVE NORMS FOR MARIJUANA:

How often do you think the average student on your campus uses marijuana or hashish?

Did not use Once/year 6 times/year Once/month Twice/Month Once/Week
3 times/week 5 times/week Every day

PERCEIVED DESCRIPTIVE NORMS FOR MARIJUANA FOR ACROSS DRUG COMPARISONS:

“Please estimate the percentage of Auburn University students who, in the past 12 months used marijuana or hashish.” Please estimate a numeric percentage ranging from 0 to 100%.

PERCEIVED INJUNCTIVE NORMS FOR MARIJUANA

The following section is a survey of your close friends' attitudes about marijuana. We want you to tell us about your perception of your close friends.

*Strong disapproval (1), moderate disapproval (2), mild disapproval (3), wouldn't care (4),
mild approval (5), moderate approval (6), strong approval (7)*

How would **your close friends** feel about you **abstaining from marijuana use**?

How would **your close friends** feel about you **trying marijuana once or twice**?

How would **your close friends** feel about you **smoking marijuana occasionally**?

How would **your close friends** feel about you **smoking marijuana regularly**?

The following section is a survey of your parents' attitudes about marijuana. We want you to tell us about your perception of your parents.

*Strong disapproval (1), moderate disapproval (2), mild disapproval (3), wouldn't care (4),
mild approval (5), moderate approval (6), strong approval (7)*

How would **your parents** feel about you **abstaining from marijuana use**?

How would **your parents** feel about you **trying marijuana once or twice**?
How would **your parents** feel about you **smoking marijuana occasionally**?
How would **your parents** feel about you **smoking marijuana regularly**?

The following section is a survey of other students' attitudes about marijuana. We want you to tell us about your perception of other students.

Strong disapproval (1), moderate disapproval (2), mild disapproval (3), wouldn't care (4), mild approval (5), moderate approval (6), strong approval (7)

How would **the typical Auburn University student** feel about you **abstaining from marijuana use**?
How would **the typical Auburn University student** feel about you **trying marijuana once or twice**?
How would **the typical Auburn University student** feel about you **smoking marijuana occasionally**?
How would **the typical Auburn University student** feel about you **smoking marijuana regularly**?

The following section is survey of your attitudes about marijuana.

Strong disapproval (1), moderate disapproval (2), mild disapproval (3), wouldn't care (4), mild approval (5), moderate approval (6), strong approval (7)

How approving (or disapproving) are you about **abstaining from marijuana**?
How approving (or disapproving) are you about **trying marijuana once or twice**?
How approving (or disapproving) are you about **using marijuana occasionally**?
How approving (or disapproving) are you about **using marijuana regularly**?

Appendix D

CURRENT PRESCRIPTION

In your lifetime, have you been prescribed any stimulant medication for any reason (e.g., Attention-Deficit Hyperactivity Disorder, Narcolepsy). Examples of prescription stimulants include Ritalin, Concerta, Dexedrine, Strattera, Vyvanse Adderall, Concerta, Provigil, Focalin, Dexedrine, Nuvigil, dextroamphetamine, and methylphenidate.

Yes No

In the past year, have you been prescribed any stimulant medication for any reason (e.g., Attention-Deficit Hyperactivity Disorder, Narcolepsy). Examples of prescription stimulants include Ritalin, Concerta, Dexedrine, Strattera, Vyvanse Adderall, Concerta, Provigil, Focalin, Dexedrine, Nuvigil, dextroamphetamine, and methylphenidate

Yes No

Do you currently have a prescription for any stimulant medication? Examples of prescription stimulants include Ritalin, Concerta, Dexedrine, Strattera, Vyvanse Adderall, Concerta, Provigil, Focalin, Dexedrine, Nuvigil, dextroamphetamine, and methylphenidate?

Yes No

USE OF PRESCRIPTION DRUGS

For the following questions, we are interested in your use of prescription medications. We are not interested in your use of "over-the-counter" medications that can be bought in drug stores or grocery stores without a doctor's prescription.

Stimulants

Stimulants are known as 'uppers,' or 'speed.' People sometimes take these drugs to lose weight, to stay awake, to help them focus or concentrate, or for attention deficit disorders. Examples of prescription stimulants include Ritalin, Concerta, Dexedrine, Strattera, Vyvanse Adderall, Concerta, Provigil, Focalin, Dexedrine, Nuvigil, dextroamphetamine, and methylphenidate.

In your entire lifetime, how many times have you used prescription stimulants either without the recommendation of a health professional, or for any reason other than a health professional's instructions to do so (some reasons might include to get high, stay awake longer, to help you party longer, or taking more than the prescribed dose)?

(1) Never (2) 1-2 Occasions (3) 3-5 Occasions (4) 6-9 Occasions
(5) 10-19 Occasions (6) 20-39 Occasions (7) 40+ Occasions

In the past year, how many times have you used prescription stimulants either without the recommendation of a health professional, or for any reason other than a health

professional's instructions to do so (some reasons might include to get high, stay awake longer, to help you party longer, or taking more than the prescribed dose)?

- (1) Never (2) 1-2 Occasions (3) 3-5 Occasions (4) 6-9 Occasions
(5) 10-19 Occasions (6) 20-39 Occasions (7) 40+ Occasions

In the past year, how many times have you mixed prescription stimulants with alcohol?

- (1) Never (2) 1-2 Occasions (3) 3-5 Occasions (4) 6-9 Occasions
(5) 10-19 Occasions (6) 20-39 Occasions (7) 40+ Occasions

PERCEIVED DESCRIPTIVE NORMS FOR NMUPS

“Please estimate the percentage of (name of university) students who, in the past 12 months used stimulant medication (e.g., Ritalin, Dexedrine, Adderall, Concerta, methylphenidate) that was not prescribed to them, or for any reason other than a health professional's instructions to do so (some reasons might include to get high, to help them party longer, or taking more than the prescribed dose)” **Estimate a numeric percentage ranging from 0 to 100%**

“Please estimate the percentage of (name of university) students who, in their lifetime used stimulant medication (e.g., Ritalin, Dexedrine, Adderall, Concerta, methylphenidate) that was not prescribed to them, or for any reason other than a health professional's instructions to do so (some reasons might include to get high, to help them party longer, or taking more than the prescribed dose)” **Estimate a numeric percentage ranging from 0 to 100%**

“Please estimate the percentage of (name of university) students who, in the past 12 months mixed stimulant medication (e.g., Ritalin, Dexedrine, Adderall, Concerta, methylphenidate) with alcohol (e.g., took the medication right before they started drinking so they could stay up longer or drink more, or took the medication while they were drinking). **Estimate a numeric percentage ranging from 0 to 100%**

PERCEIVED INJUNCTIVE NORMS FOR NMUPS

Injunctive Norms for NMUPS for those not currently prescribed stimulants

The following section is a survey of your close friends' attitudes about prescription stimulants. We want you to tell us about your perception of your close friends.

Strong disapproval (1), moderate disapproval (2), mild disapproval (3), wouldn't care (4), mild approval (5), moderate approval (6), strong approval (7)

How would **your close friends** feel about you **never** using prescription stimulants (e.g., Ritalin, Dexedrine, Adderall, Concerta, methylphenidate) not prescribed to you?

How would **your close friends** feel about you **once or twice** using prescription stimulants (e.g., Ritalin, Dexedrine, Adderall, Concerta, methylphenidate) not prescribed to you?

How would **your close friends** feel about you **occasionally** using prescription stimulants (e.g., Ritalin, Dexedrine, Adderall, Concerta, methylphenidate) not prescribed to you?
How would **your close friends** feel about you **regularly** using prescription stimulants (e.g., Ritalin, Dexedrine, Adderall, Concerta, methylphenidate) not prescribed to you?

The following section is a survey of your parents' attitudes about prescription stimulants. We want you to tell us about your perception of your parents.

Strong disapproval (1), moderate disapproval (2), mild disapproval (3), wouldn't care (4), mild approval (5), moderate approval (6), strong approval (7)

How would **your parents** feel about you **never** using prescription stimulants (e.g., Ritalin, Dexedrine, Adderall, Concerta, methylphenidate) not prescribed to you?
How would **your parents** feel about you **once or twice** using prescription stimulants (e.g., Ritalin, Dexedrine, Adderall, Concerta, methylphenidate) not prescribed to you?
How would **your parents** feel about you **occasionally** using prescription stimulants (e.g., Ritalin, Dexedrine, Adderall, Concerta, methylphenidate) not prescribed to you?
How would **your parents** feel about you **regularly** using prescription stimulants (e.g., Ritalin, Dexedrine, Adderall, Concerta, methylphenidate) not prescribed to you?

The following section is a survey of other students' attitudes about prescription stimulants. We want you to tell us about your perception of other students.

Strong disapproval (1), moderate disapproval (2), mild disapproval (3), wouldn't care (4), mild approval (5), moderate approval (6), strong approval (7)

How would **the typical Auburn University student** feel about you **never** using prescription stimulants (e.g., Ritalin, Dexedrine, Adderall, Concerta, methylphenidate) not prescribed to you?
How would **the typical Auburn University student** feel about you **once or twice** using prescription stimulants (e.g., Ritalin, Dexedrine, Adderall, Concerta, methylphenidate) not prescribed to you?
How would **the typical Auburn University student** feel about you **occasionally** using prescription stimulants (e.g., Ritalin, Dexedrine, Adderall, Concerta, methylphenidate) not prescribed to you?
How would **the typical Auburn University student** feel about you **regularly** using prescription stimulants (e.g., Ritalin, Dexedrine, Adderall, Concerta, methylphenidate) not prescribed to you?

The following section is survey of your attitudes about prescription stimulants.

Strong disapproval (1), moderate disapproval (2), mild disapproval (3), wouldn't care (4), mild approval (5), moderate approval (6), strong approval (7)

How approving (or disapproving) are you about **never** using prescription stimulants (e.g., Ritalin, Dexedrine, Adderall, Concerta, methylphenidate) without a prescription or using prescription stimulant medication for any reason other than a health professional's

instructions to do so (some reasons might include to get high, to party longer, or taking more than the prescribed dose) ?

How approving (or disapproving) are you about **once or twice** using prescription stimulants (e.g., Ritalin, Dexedrine, Adderall, Concerta, methylphenidate) without a prescription or using prescription stimulant medication for any reason other than a health professional's instructions to do so (some reasons might include to get high, to party longer, or taking more than the prescribed dose) ?

How approving (or disapproving) are you about **occasionally** using prescription stimulants (e.g., Ritalin, Dexedrine, Adderall, Concerta, methylphenidate) without a prescription or using prescription stimulant medication for any reason other than a health professional's instructions to do so (some reasons might include to get high, to party longer, or taking more than the prescribed dose) ?

How approving (or disapproving) are you about **regularly** using prescription stimulants (e.g., Ritalin, Dexedrine, Adderall, Concerta, methylphenidate) without a prescription or using prescription stimulant medication for any reason other than a health professional's instructions to do so (some reasons might include to get high, to party longer, or taking more than the prescribed dose) ?

Injunctive Norms for NMUPS for those currently prescribed stimulants

The following section is a survey of your close friends' attitudes about prescription stimulants. We want you to tell us about your perception of your close friends.

Strong disapproval (1), moderate disapproval (2), mild disapproval (3), wouldn't care (4), mild approval (5), moderate approval (6), strong approval (7)

How would **your close friends** feel about you **never** using your prescription stimulant medication for any reason other than a health professional's instructions to do so (some reasons might include to get high, to help you party longer, or taking more than the prescribed dose)?

How would **your close friends** feel about you **once or twice** using your prescription stimulant medication for any reason other than a health professional's instructions to do so (some reasons might include to get high, to help you party longer, or taking more than the prescribed dose)?

How would **your close friends** feel about you **occasionally** using your prescription stimulant medication for any reason other than a health professional's instructions to do so (some reasons might include to get high, to help you party longer, or taking more than the prescribed dose)?

How would **your close friends** feel about you **regularly** using your prescription stimulant medication for any reason other than a health professional's instructions to do so (some reasons might include to get high, to help you party longer, or taking more than the prescribed dose)?

The following section is a survey of your parents' attitudes about prescription stimulants. We want you to tell us about your perception of your parents.

Strong disapproval (1), moderate disapproval (2), mild disapproval (3), wouldn't care (4), mild approval (5), moderate approval (6), strong approval (7)

How would **your parents** feel about you **never** using your prescription stimulant medication for any reason other than a health professional's instructions to do so (some reasons might include to get high, to help you party longer, or taking more than the prescribed dose)?

How would **your parents** feel about you **once or twice** using your prescription stimulant medication for any reason other than a health professional's instructions to do so (some reasons might include to get high, to help you party longer, or taking more than the prescribed dose)?

How would **your parents** feel about you **occasionally** using your prescription stimulant medication for any reason other than a health professional's instructions to do so (some reasons might include to get high, to help you party longer, or taking more than the prescribed dose)?

How would **your parents** feel about you **regularly** using your prescription stimulant medication for any reason other than a health professional's instructions to do so (some reasons might include to get high, to help you party longer, or taking more than the prescribed dose)?

The following section is a survey of other students' attitudes about prescription stimulants. We want you to tell us about your perception of other students.

Strong disapproval (1), moderate disapproval (2), mild disapproval (3), wouldn't care (4), mild approval (5), moderate approval (6), strong approval (7)

How would **the typical Auburn University student** feel about you **never** using your prescription stimulant medication for any reason other than a health professional's instructions to do so (some reasons might include to get high, to help you party longer, or taking more than the prescribed dose)?

How would **the typical Auburn University student** feel about you **once or twice** using your prescription stimulant medication for any reason other than a health professional's instructions to do so (some reasons might include to get high, to help you party longer, or taking more than the prescribed dose)?

How would **the typical Auburn University student** feel about you **occasionally** using your prescription stimulant medication for any reason other than a health professional's instructions to do so (some reasons might include to get high, to help you party longer, or taking more than the prescribed dose)?

How would **the typical Auburn University student** feel about you **regularly** using your prescription stimulant medication for any reason other than a health professional's instructions to do so (some reasons might include to get high, to help you party longer, or taking more than the prescribed dose)?

The following section is survey of your attitudes about prescription stimulants.

Strong disapproval (1), moderate disapproval (2), mild disapproval (3), wouldn't care (4), mild approval (5), moderate approval (6), strong approval (7)

How approving (or disapproving) are you about **never** using prescription stimulants (e.g., Ritalin, Dexedrine, Adderall, Concerta, methylphenidate) without a prescription or using prescription stimulant medication for any reason other than a health professional's instructions to do so (some reasons might include to get high, to party longer, or taking more than the prescribed dose) ?

How approving (or disapproving) are you about **once or twice** using prescription stimulants (e.g., Ritalin, Dexedrine, Adderall, Concerta, methylphenidate) without a prescription or using prescription stimulant medication for any reason other than a health professional's instructions to do so (some reasons might include to get high, to party longer, or taking more than the prescribed dose) ?

How approving (or disapproving) are you about **occasionally** using prescription stimulants (e.g., Ritalin, Dexedrine, Adderall, Concerta, methylphenidate) without a prescription or using prescription stimulant medication for any reason other than a health professional's instructions to do so (some reasons might include to get high, to party longer, or taking more than the prescribed dose) ?

How approving (or disapproving) are you about **regularly** using prescription stimulants (e.g., Ritalin, Dexedrine, Adderall, Concerta, methylphenidate) without a prescription or using prescription stimulant medication for any reason other than a health professional's instructions to do so (some reasons might include to get high, to party longer, or taking more than the prescribed dose) ?