Normative Perceptions of Non-medical Stimulant Use: Associations with Actual Use and Hazardous Drinking

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Abstract

Approximately 10% of US college students are engaged in non-medical use of prescription stimulants (NMUPS) and that use is linked to concerning health, educational, and societal consequences. Few studies have assessed normative perceptions surrounding NMUPS. Accordingly, we examined self-reported use and normative perceptions for NMUPS and demographic factors that may be associated with them. We also investigated whether higher normative perceptions for NMUPS were related to the most commonly used and abused substance among college students (alcohol).

METHOD—1106 undergraduates participated in an online survey of normative perceptions of NMUPS and students' own drinking and stimulant use habits.

RESULTS—Students overestimated NMUPS by other students and those normative estimates were associated with higher NMUPS. Living in a fraternity or sorority was related to higher NMUPS and perceived norms. Finally, higher normative perceptions of NMUPS were associated with higher hazardous drinking.

CONCLUSION—The large discrepancy between actual use (generally low) and students' perceptions (generally high), and the relationship of these perceptions to both one's own use of NMUPS and alcohol suggests that interventions aimed at correcting norms may be useful.

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1. Introduction

Non-medical use of prescription drugs has been defined as "using a psychotherapeutic drug, even once, that was not prescribed for you, or that you took for only the experience or the feeling it caused" by the Substance Abuse and Mental Health Administration (SAMHSA, 2002). Non-medical use of prescription drugs is a significant public health problem in the U.S., with emergency room admissions related to prescription drug abuse increasing substantially between 1997 and 2007 (SAMHSA, 2007, 2008; Fischer, Nakamura, Rush, & Rehm, 2010). On college campuses, there has been increasing attention paid to the non-medical use of prescription stimulants (NMUPS)[1], and concerns about their misuse have been in the spotlight in coverage by mainstream media. However, there is still a great deal to understand about NMUPS as well as about NMUPS' relationship to other health risk behaviors. For example, how do perceptions about others' frequency of use of NMUPS (i.e., normative perceptions of NMUPS) relate to one's own use of NMUPS? How do those perceptions relate to one's use of other substances? Normative perceptions of peer's substance use have a rich research tradition, and a robust finding is that higher normative perceptions of substance use are associated with greater personal use (see Larimer & Cronce, 2002, 2007, for reviews). Additionally, findings from large scale studies of substance use indicate that use of a single substance is commonly associated with use of other substances as well (e.g., Johnston, O'Malley, Bachman, & Schulenberg, 2013). Thus, the purpose of the current study was to (1) examine college students' NMUPS and their normative perceptions of the prevalence of NMUPS by others, and (2) investigate how these perceptions relate to students' other substance use behaviors, specifically to drinking behaviors.

1.1 Prevalence, Correlates, and Consequences of NMUPS in College Students

Nationally, prescription stimulant use (e.g., Ritalin and Adderall) in college students is at its highest level in the past 15 years. In the context of NMUPS, Adderall is the most commonly used substance with annual rates of 9.0% amongst college students (7.4% in non-college young adult respondents; Johnston, O'Malley, Bachman, & Schulenberg, 2013; McCabe, West, & Wechsler, 2007). NMUPS lifetime use rates are up to 20% (McCabe, 2008) and can be associated with a range of unwanted effects, including sleep difficulties (72% of users), irritability (62%), headaches (33%), stomachaches (33%), and sad mood (25%) (Rabiner et al., 2009a; 2009b). A growing number of studies have examined differences between students who report NMUPS and those who do not. Findings from those studies indicate that compared to students who do not report NMUPS, those who engaged in NMUPS had more social difficulties, lower GPA, and reported concerns about their academic performance

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[1]Abbreviations: Non-medical use of prescription stimulants (NMUPS); Medical use of prescription stimulants (MUPS)

(McCabe, Cranford, Morales, & Young, 2006; Rabiner et al., 2009b; Teter, McCabe, Boyd, & Guthrie, 2003).

Of additional concern, NUMPS is also associated with increased risk of abusing other substances and experiencing high rates of negative consequences from those substances. For example, college students abusing stimulant medication were more likely than students abusing other drugs to report drug-related problems and to experience nine out of ten drug-related problems as assessed by the Drug Abuse Screening Test-10 (DAST-10) (McCabe & Teter, 2007; Skinner, 1982). With respect to alcohol, in particular, co-ingestion with prescription medication has been documented in national samples (SAMHSA, 2003, 2004) and adverse consequences from this combination, such as drug-related ER visits, are even more likely. Specifically, students who reported co-ingesting alcohol and prescription medication were at greater risk to have missed class or work, driven a car while under the influence of alcohol, driven a car after drinking 5 or more drinks in 2 hours, and had blackouts than students who did not use these substances simultaneously (McCabe et al., 2006).

1.2 Normative perceptions of NMUPS

Much research has documented college students' misperceptions of peers' substance use, especially alcohol, and how those misperceptions relate to students own drinking and related problems (Larimer & Cronce, 2007; Perkins, 2002; Perkins, Meilman, Leichliter, Cashin, & Presley, 1999). Not only have such normative perceptions become among the best predictors of college student drinking (e.g., Neighbors, Lee, Lewis, Fossos, & Larimer, 2007), but such findings have led to the development and implementation of successful interventions to correct those misperceptions and thereby, reduce risky drinking (Marlatt, et al., 1998; Martens et al., 2005, 2007; Larimer et al., 2007; Neighbors, Larimer, & Lewis, 2004; Neighbors, Lee, Lewis, Fossos, & Walter, 2009; Neighbors, Lewis, Bergstrom, & Larimer, 2006). Because studies have also demonstrated misperceptions of the prevalence of other substances and the relationship of these perceptions to one's own use and consequences (e.g., marijuana; Kilmer et al., 2006, Neighbors, Geisner, & Lee, 2008), it is possible that similar misperceptions exist (and ultimately, that similar interventions might be useful) with respect to NMUPS. However, research on normative perceptions of NMUPS is in its early stages and studies are scarce. Initial research suggests that college students over-estimate the prevalence of NMUPS on their campuses (e.g., McCabe, 2008), but this finding needs to be replicated. Additionally, it is important to understand if and how such normative misperceptions relate to one's own NMUPS as well as to one's perceptions and self-reports of medical use of prescription stimulants (MUPS) and to drinking. Further, it will be critical to understand how normative perceptions vary among different groups.

1.2 College related risk factors for NMUPS

McCabe and colleagues (2007) suggested that college campuses in many ways provide an ideal environment for substance use, including increased access to substances on campus, cultural acceptability for substance use, and peer pressure. In addition, the academic and other pressures faced by college students may lead them to NMUPS in order to stay awake and alert to complete their work and study for exams. Further, McCabe and colleagues

(2006) have suggested that college students may be at higher risk for NMUPS compared to other groups, given the higher accessibility of different medications in the college/university setting, and the likelihood of students sharing their prescriptions with other students (Barrett, Darredeau, Bordy, & Pihl, 2005; McCabe et al., 2006; Rabiner et al., 2009a). Thus, it is important to study factors that may be related NMUPS.

Among those factors that may be important for college students are their gender and their living situation. For example, gender differences are beginning to be documented for NMUPS, with annual prevalence for Adderall use outside of medical supervision higher among male college students (13.2%) than female college students (7.7%) but research has also been mixed (Dluzen, & Liu, 2008; McCauley et al., 2011; SAMHSA, 2004). With respect to normative perceptions of NMUPS, specifically, to our knowledge no published studies have examined normative perceptions of NMUPS as a function of gender. Consistent with the pattern of findings observed in the college student drinking literature and the fact that several studies have found greater NMUPS among men, we would expect that men would have higher normative perceptions of NMUPS than women would. In a similar vein, we would expect that living in a fraternity or sorority house would be associated with higher normative perceptions of NMUPS than living in other types of residences. This hypothesis has not been tested to our knowledge, but it is consistent with McCabe and colleagues' (2006) notions that college environment may confer greater access to NMUPS as well as by their findings that fraternities and sororities have been associated with greater NMUPS, (McCabe, Knight, Teter, & Wechsler, 2005).

1.4 Study Overview

Given the increasing concern about NMUPS on college campuses and the potential importance of normative perceptions of NMUPS as predictors of NMUPS and other hazardous behaviors, we conducted the current study. Its purpose was to investigate college students' NMUPS, their normative perceptions of NMUPS, and to understand how those normative perceptions related to NMUPS as well as to drinking behaviors. Information about students' medical use of prescription stimulants (MUPS) and their normative perceptions of MUPS was also collected to provide additional context. Additionally, we examined how gender and residence were associated with normative perceptions of NMUPS.

Our hypotheses were as follows:

1. Students' NMUPS and MUPS will be relatively low (e.g., less than 20% of the college students surveyed will report any use at all, and most of those will report rarely using).

2. Students' normative perceptions of NMUPS and MUPS will be greater than self-reports of actual use, and men's perceptions will be higher than women's perceptions.

3. Place of residence will be associated with normative perceptions of NMUPS, with living in a fraternity or sorority being associated with the higher perceptions. No specific hypotheses are offered about other places of residence.

4. Greater normative perceptions of NMUPS will be associated with greater NMUPS and with higher drinking behaviors (e.g., alcohol consumption, problems, and risk of an alcohol use disorder), even after controlling for normative perceptions of drinking behaviors.

2. Method

2.1 Participants

Eleven hundred and six undergraduates at a large public university in the Pacific Northwest (656 women, 445 men, 5 chose not to identify their gender) between 18 and 25 years old ($M = 20.40$, $SD = 1.60$) participated in the study. Fifty-nine percent of participants identified themselves as White/Caucasian, 27% as Asian, and 8% as multiracial. The remaining 6% chose Native Hawaiian/Other Pacific Islander, Black/African American, American Indian/ Alaska Native, unknown, or did not answer. Participants were also asked about their current residence. Fifty-seven percent selected "Off-campus housing apartment/house," 17% "residence halls/dorm room," 13% in a "sorority/fraternity house," 13% "with parents," and 2% did not answer.

2.2 Measures

2.2.1 Prescription Stimulant Use Questionnaire—An adaptation of the prescription stimulants items from McCabe (2008) was used to assess participants' lifetime NMUPS and MUPS. For all questions, a list of possible stimulant medications was provided: Ritalin, Dexedrine, Adderall, Concerta, and methylphenidate. Two items were added to assess normative perceptions of a typical student's lifetime NMUPS and MUPS: "Based on a doctor's prescription, on how many occasions in his or her lifetime do you think the typical student has used stimulant medication?" and "Sometimes people use prescription drugs that were meant for other people, even when their own doctor has not prescribed it for them. On how many occasions in his or her lifetime do you think the typical student has used stimulant medications when they were not prescribed to him or her?" See Table 1 for the response options.

2.2.2 Alcohol Consumption—The Daily Drinking Questionnaire (DDQ; Collins, Parks, & Marlatt, 1985; Kivlahan, Marlatt, Fromme, Coppel, & Williams, 1990) assesses the typical number of standard (U.S.) drinks consumed on each day of a typical week over the last month. Participants were given definitions of standard drink volumes (12 oz. beer, 10 oz. microbrew beer, 4 oz. wine, 1.5 oz. 80-proof hard liquor). A weekly total drinking summary score was calculated by summing the quantities reported (Cronbach's alpha = .79).

2.2.3 Drinking Norms—Similar to the DDQ, the drinking norms measure (Neighbors, et al., 2007; Baer, Stacy & Larimer, 1991) asks participants to estimate the typical number of standard (U.S.) drinks per week, but for the typical student at the participants' university instead of for themselves. A drinking norm summary score was calculated by summing the quantities reported (Cronbach's alpha = .87).

2.2.4 Alcohol Use Disorders Identification Test (AUDIT)—The 10-item AUDIT (Babor, Higgins-Biddle, Saunders, & Monteiro, 2001) is a self report measure designed to help evaluate possible risk of alcohol abuse and the frequency of certain negative consequences, such as injury or feelings of guilt after drinking. A total score was computed by summing across all items, with higher scores indicating riskier drinking patterns (Cronbach's alpha = .84). Consistent with Babor et al., ascore of 8 or more was considered to be an indicator of hazardous and harmful alcohol use, as well as possible alcohol dependence.

2.2.5 Rutgers Alcohol Problem Index (RAPI)—The RAPI (White & Labouvie, 1989) measures the frequency over the past three months of 23 potential adverse consequences during or due to drinking on a scale ranging from "never" (0) to "more than 10 times" (4). Two additional items concerning driving shortly after drinking were added. A total score of severity was computed by summing all items (Cronbach's alpha = .93).

2. 3 Procedures

All procedures were approved by the university's Institutional Review Board. A randomly selected segment of full-time students from the university's registrar's list received emails inviting them to participate in a study on cognitive associations about alcohol. Prior alcohol consumption was not required to participate. Students who responded to the invitation email by going to the survey link/web site, first read an online informed consent statement and indicated their agreement if they chose to participate. All questionnaires were then completed via an online survey at the computer of their choice and were compensated $15. The survey was part of a larger study that included two subsequent laboratory-based sessions for a subset of participants.

3. Results

3.1 Descriptive Statistics

Please see Table 1 for descriptive statistics and correlations.

3.1.1 Lifetime NMUPS and MUPS—Consistent with hypotheses, the majority of participants did not endorse lifetime use of stimulant medication. Only 11% of participants reported lifetime MUPS, and 19% of participants reported life time NMUPS. Thus, the "correct" response for how often the typical student uses (i.e., normative perceptions of NMUPS and MUPS) would be never. However, also consistent with hypotheses, there was a discrepancy between participants' reports of their own use and their normative perceptions, with participants vastly overestimating typical student usage. Specifically, 89% of participants reported thinking that the typical student used stimulants either with or without a prescription on at least one to two occasions in his/her lifetime, and more than 50% reported thinking the typical student used stimulants either with or without a prescription on at least three to five occasions in his/her lifetime.

3.1.2 Zero-order correlations—As expected, NMUPS and normative perceptions of NMUPS were positively correlated. Moreover, all of the stimulant usage questions were

positively correlated with one another, with the strongest correlations observed among normative perceptions of NMUPS and normative perceptions of MUPS. The majority of correlations between the stimulant questions and the drinking variables were positive and significant, with the majority being small in magnitude. The strongest correlations were observed between NMUPS and one's self-reported alcohol consumption, alcohol problems, and risk for alcohol use disorders.

3.2 Demographic Differences in Stimulant Usage

Next, we investigated stimulant usage as a function of two demographic factors - gender and current residence. Analyses were conducted separately for each factor. First, independent samples t-tests were used to test for gender differences. Significant differences were observed for all questions with the exception of MUPS, $t(1089) = 1.61$, $p = .11$. As expected, men reported greater NMUPS ($M = .52$, $SD = 1.20$) compared to women (M= .36, $SD = 1.02$), $t(1091) = 2.47$, $p = .01$. Contrary to expectations, women reported higher normative perceptions of MUPS and NMUPS than men did [(MUPS: women, $M = 2.31$, $SD = 1.68$; men, $M = 2.08$, $SD = 1.57$) (NMUPS: women, $M = 2.13$, $SD = 1.44$; men, $M = 1.94$, $SD = 1.47$)], all ps <.05.

Second, a series of one-way analyses of variance (ANOVAs) were conducted to test for differences in stimulant usage as a function of current residence (living with one's parents, in residence halls/dorms, in off-campus housing, or in a sorority/fraternity house). Significant differences were observed for all questions with the exception of MUPS, $F(3, 1088) = .71$, $p = .54$. A similar pattern emerged for the other three items with those living in a sorority/fraternity house reporting (a) the greatest NMUPS (significantly higher than all other residential setting categories) and (b) the highest normative perceptions of NMUPS and MUPS (significantly higher than all residence categories other than those living with their parents), all ps < .001.

3.3 Normative Perceptions of NMUPS and MUPS as Predictors of Drinking Variables

Finally, a series of count regression models were run to investigate normative perceptions of MUPS and NUMPS items as predictors of drinking variables (drinks per week, alcohol-related problems, and risk for alcohol use disorders). Count regression models were used as none of the drinking variables approximated a normal distribution, and these models enable one to fit dependent variables with a range of distributions in addition to the normal distribution (see Atkins & Gallop, 2007; Cohen, Cohen, West, & Aiken, 2003). Models for each drinking variable were fit with a negative binomial log link. Three models were run, one for each outcome. In addition to the two stimulant questions, each model included gender as a control variable (coded 0 = men, 1 = women) and current residence (coded 0 = not living in sorority/fraternity house, 1 = living in sorority/fraternity). Note that the latter variable was recoded based on the results of the ANOVAs reported above. In addition, normative perceptions of drinking were also controlled for to provide a more conservative test of whether NMUPS/MUPS normative perceptions predicted unique variance in the drinking variables. Please see Table 2.

A similar pattern of results was found for all three drinking variables. Specifically, normative perceptions of NMUPS were positively and significantly associated with two of three of the drinking variables (alcohol-related problems and risk for alcohol use disorder) and were positively and marginally associated with the remaining drinking variable (drinks per week). Normative perceptions of MUPS were not significantly associated with any of the drinking variables.

4. Discussion

Study results were largely consistent with hypotheses. Similar to other research (e.g., McCabe, 2008), and consistent with our expectations, our findings indicated that most students did not report lifetime NMUPS or MUPS. Also consistent with research on normative perceptions and other drugs (e.g., Kilmer et al., 2006), study findings indicated that students overestimated the prevalence of others' lifetime NMUPS and MUPS. Further, living in a sorority or fraternity was related to higher reported NMUPS and normative perceptions of NMUPS. Finally, normative perceptions of NMUPS were positively associated with NMUPS, and both were positive predictors of drinking risks even when controlling for normative perceptions of drinking. Contrary to expectations, men did not report higher normative perceptions of NMUPS. In the current study, we found the opposite pattern, which was surprising and future research efforts should be directed toward replication.

4.1 Implications

Though the magnitude of the correlations and associations are low, study findings suggest potential links between perceptions of NMUPS and risky behaviors, including NMUPS and hazardous drinking. These links are cross-sectional, thus caution is necessary with respect to interpretations and prospective studies are of critical importance. However, our findings would suggest that NMUPS normative perceptions may represent important risk factors for NMUPS. For example, if students believe that "everyone" takes prescription stimulants at finals, they may make the choice to do so as well, whether because they are seeking an academic advantage, want to "keep up" with what everyone else is doing, or are affected by other factors associated with initiating or maintaining use. Similarly, findings also suggest the possibility that higher normative perceptions of NMUPS are associated with increased hazardous drinking behaviors.

Should prospective studies replicate these relationships, normative perceptions of NMUPS could also represent additional treatment targets for reducing NMUPS, and possibly even for reducing hazardous drinking. Research with normative perceptions of alcohol use and other drugs has revealed that misperceptions can be corrected by providing actual rates of use through personalized normative feedback (Larimer & Cronce, 2002, 2007). Correcting these misperceptions has been shown to lead to reduced alcohol use and/or related consequences (DeJong et al., 2009; National Institute on Alcohol Abuse and Alcoholism, 2007). Indicated prevention efforts could also be designed to target misperceptions among high risk groups, such as those living in sorority or fraternity houses.

4.2 Limitations

As noted above, these data are cross sectional and thus our conclusions as to causality are limited. Longitudinal studies will need to establish temporal stability and causality. In addition, NMUPS and MUPS as well as normative perceptions of NMUPS and MUPS were assessed on a lifetime basis. It is possible that a more current and/or limited time period of assessment (past week, past month, past year) would have yielded a different pattern of relationships. Similarly, our sample was limited to a single public university in the Pacific Northwest and findings may not generalize to other campuses. It is unclear why 7% of the sample reported 1–5 occasions for MUPS as these are typically prescribed for use on a daily basis. While it is possible that participants may have been prescribed a stimulant and quickly discontinued use, we did not assess that in this study. More information is needed to understand such a pattern of MUPS. Finally, it should be noted that the percent of habitual NMUPS is less than 1% of the sample, thus any conclusions from these data should be interpreted with caution. Replication, specifically replication targeted at users at higher levels of NMUPS, is necessary.

4.3 Future Directions and Conclusion

This study points to the importance of investigating NMUPS and normative perceptions of NMUPS in the college setting. Should these findings be replicated in a prospective study, the large discrepancy between actual use and students' perceptions, and the relationship of these perceptions to both NMUPS and alcohol suggests that interventions aimed at correcting norms for NMUPS may be important and useful.

Acknowledgments

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Highlights

- 19% of students reported lifetime non-medical use of prescription stimulants.

- Most overestimated other's use and that was associated with higher self use.

- Students living in Greek housing reported higher NMUPS use and perceived norms.

- Normative perceptions of NMUPS predicted alcohol-related problems and disorder risk.

Table 1

Descriptive Statistics for Stimulant Medication Lifetime Use with and Without a Prescription

Frequency	MUPS use	MUPS normative perceptions	NMUPS use	NMUPS normative perceptions
Never	89%	11%	81%	11%
1–2 occasions	5%	29%	9%	33%
3–5 occasions	2%	24%	4%	23%
6–9 occasions	<1%	14%	2%	16%
10–19 occasions	<1%	10%	2%	11%
20–39 occasions	<1%	4%	1%	4%
40+ occasions	3%	7%	<1%	2%
Zero-order Correlations				
MUPS	--	.21***	.23***	.14***
MUPS normative perceptions	--	--	.22***	.65***
NMUPS	--	--	--	.27***
NMUPS normative perceptions	--	--	--	--
Drinks per week	.12***	.16***	.32***	.17***
Drinking normative perceptions	.02	.17***	.04	.26***
RAPI scores	.12***	.14***	.32***	.18***
AUDIT scores	.15***	.16***	.39***	.19***

Note. N = 1106, individual n's vary slightly due to missing data. MUPS/NMUPS use = self-reported lifetime medical/non-medical use of prescription stimulant. MUPS/NMUPS normative perceptions = perceived typical student's lifetime medical/non-medical use of prescription stimulant. Drinking normative perceptions = perceptions of a typical student's weekly alcohol use. RAPI = Rutgers Alcohol Problem Index, AUDIT = Alcohol Use Identification Test.

***
$p < .001$.

Table 2

Negative Binomial Regression Models Predicting Alcohol Variables from Typical Student Stimulant Usage

	B	SE *B*	*t*	Cohen's *d*
Drinks per week				
Gender	−0.48	0.08	−5.79[***]	0.36
Current residence	0.93	0.12	8.04[***]	0.50
Drinking normative perceptions	0.04	0.00	7.35[***]	0.46
MUPS normative perceptions	0.03	0.03	1.07	0.07
NMUPS normative perceptions	0.07	0.04	1.92[†]	0.12
Alcohol-related Problems (RAPI)				
Gender	−0.10	0.09	−1.09	0.07
Current residence	0.86	0.13	6.52[***]	0.41
Drinking normative perceptions	0.02	0.01	4.34[***]	0.27
MUPS normative perceptions	0.01	0.04	0.22	0.01
NMUPS normative perceptions	0.14	0.04	3.11[**]	0.19
Risk for Alcohol Use Disorders (AUDIT)				
Gender	−0.27	0.06	−4.74[***]	0.29
Living situation	0.68	0.08	8.52[***]	0.53
Drinking normative perceptions	0.01	0.00	4.38[***]	0.27
MUPS normative perceptions	0.02	0.02	1.00	0.06
NMUPS normative perceptions	0.07	0.03	2.65[**]	0.16

Note. Gender was coded 0 = men, 1 = women; living situation was coded 0 = not living in sorority/fraternity house, 1 = living in sorority/fraternity house MUPS/NMUPS = lifetime medical/non-medical use of a prescription stimulant. Cohen's $d = 2t/\sqrt{df}$. The regression models used generalized linear models with a negative binomial log link. Alcohol Problems = score on the Rutgers Alcohol Problem Index; AUDIT = scores on the Alcohol Use Disorders Identification Test.

[†]$p < .055.$

[*]$p < .05.$

[**]$p < .01.$

[***]$p < .001.$