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University students' self-reported reasons for abstinence from prescription and non-prescription stimulants and depressants

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ABSTRACT

Background: No previous publication has evaluated whether the importance of university students' reasons for abstinence differs across prescription stimulants, prescription opioids, and two illicit forms of those medications (cocaine and heroin).

Methods: In response to a recruitment email sent to all enrolled undergraduates at a large public university, 768 students who reported no prior recreational use of these four substances rated the importance of 17 reasons for lifelong abstinence from each of the four drugs.

Results: Based on factor analyses, 16 of the 17 reasons comprised four subscales (*Negative Consequences, Difficult to Acquire, Not Enjoyable, Social Disapproval*). With few exceptions, importance ratings for each of the four subscales and the single non-loading reason (Against My Beliefs) were highest for heroin, followed in descending order by cocaine and the two prescription medications. Female students rated three types of reasons as more important than did males, but previous use of other illicit drugs and past medical use of prescription stimulants or prescription opioids were not typically associated with importance of reasons for abstaining.

Conclusion: Each type of reason was rated a more important influence on abstinence from street drugs than from comparable prescription drugs. Reasons reflecting harmful consequences were rated most important and reasons reflecting acquisition difficulties were rated least important for each drug. To the degree that importance ratings are associated with continued abstinence, education and prevention messages could emphasize negative consequences as one means to reinforce continued abstinence from these drugs.

1. Introduction

Most published research on young people's attributions for abstinence has targeted illicit street drugs, but two investigations have assessed American university students' reasons for abstaining from prescription medications such as stimulants or opioids. In the first of these studies, Brandt et al. (2014) found the most commonly endorsed reason for abstaining from the non-medical use of prescription medications was "lack of interest" (82.6%), followed by fear of damaging one's physical health (61.8%), fear of damaging one's mental health (60.1%), and not doing drugs per se (56.7%). However, Brandt et al. did not ask participants what specific prescription medication(s) they had in mind or evaluate whether their participants' reasons for abstaining differed between specific types of prescription drugs (e.g., prescription stimulants versus prescription pain relievers). In the other study, Bavarian et al. (2017) asked students who abstained from and disagreed with non-medical prescription stimulant use an open-ended question to assess their reasons for abstinence. Categorization of participants'

responses revealed that 47% reported health-related reasons, 20% reported "ethical" reasons (e.g., legality, academic integrity), 8% reported wanting to follow prescribed medical directions, and 15% provided multiple reasons.

Researchers have also assessed young people's reasons for abstaining from non-prescription stimulants, such as cocaine. In a study of over 2000 Columbian university students (Marin et al., 1974), 54% mentioned lack of interest or curiosity as one of their reasons for abstinence from cocaine. In two more recent studies (Rosenberg et al., 2008, 2012), American university students rated reasons such as undesirable somatic effects, impaired performance, peer and parental disapproval, loss of control over psychological functions, personal values, and not anticipating enjoyment of cocaine as having a medium or large influence on their abstinence. Although many of their 14-to-22-year old participants were not college students, Fountain et al. (1999) reported that "fear of addiction" was the most frequently mentioned reason for abstaining from cocaine and from crack. College students appear to endorse some of the same reasons for abstaining from

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prescription stimulants and cocaine, but no study has tested whether students' importance ratings vary between these two types of stimulants.

In addition to having assessed reasons for abstinence from cocaine, Fountain et al. (1999) assessed reasons for abstinence from heroin and prescription opioid pain relievers. To our knowledge, this is the only study to have assessed explicitly young people's reasons for abstaining from these two types of drugs. In a result that suggests young people differentiate between different types of opioids, Fountain et al. found that larger proportions of their participants cited reasons reflecting "fear of physical harm" and seeing "the effects on others" as reasons they abstained from heroin than from prescription opioids.

Reasons for abstinence appear to differ not only by drug type, but several studies suggest they sometimes differ by gender. For example, Lauritsen et al. (2018) found that female undergraduates rated reasons reflecting psychological and behavioral impairment, social approval and self-image, insufficient knowledge, and limited access as more influential than males did when considering both synthetic cathinones and synthetic cannabinoids. In a sample of over 30,000 high school seniors recruited over several decades, Terry-McElrath et al. (2008) found that larger proportions of females than males endorsed 12 of the 17 reasons for abstaining from marijuana listed in the Monitoring the Future survey. The five reasons endorsed by lower proportions of females than males reflected lack of enjoyment, loss of energy or ambition, expense, lack of availability, and concern about getting arrested.

The research reviewed above provides some information about college students' reasons for abstaining from prescription medications and cocaine. However, no study has explicitly assessed college students' reasons for abstaining from heroin and prescription opioids. Nor has any study evaluated whether the importance of reasons for abstaining from diverted prescription stimulants and diverted opioid pain relievers differ from each other and from street versions of a stimulant (cocaine) and an opioid (heroin). Furthermore, previous research has not evaluated whether past experience of having or not having used other, more commonly used illicit drugs (e.g., marijuana, ecstasy, hallucinogens) is associated with the importance of reasons for abstaining from either prescription or other non-prescription drugs. We speculated that students who have used other illicit drugs might view the use of prescription and non-prescription stimulants and opioids as more acceptable, and rate reasons for abstinence as less important, than those with no such experience.

An increased understanding of the reasons why many university students abstain from these four types of drugs might improve educators' efforts to prevent or delay the initiation of their use. Furthermore, studying reasons for abstinence reported by university students is valuable because over two-thirds of American high school graduates attend college (Bureau of Labor Statistics, 2017). Therefore, we designed this exploratory study to assess whether university students' ratings of reasons for abstaining from prescription stimulants, prescription opioids, cocaine, and heroin varied by drug, gender, and past use of other illicit drugs.

2. Material and methods

2.1. Recruitment procedure

After receiving approval from our university's institutional review board, we sent an initial recruitment email and follow up reminder email during October, 2017, to the 16,562 undergraduate email addresses provided by the registrar of a large public Midwestern university. The recruitment email explained the study to potential participants and provided a link directing them to an online data collection website. Only those at least 18 years of age were eligible to participate in the survey and only those who had not used any of the four target drugs recreationally were included in the final sample. Upon completion of the survey, each participant had the option to submit his/her

name into a drawing for one of two \$100 gift cards to an online retailer. Those participants who agreed to the informed consent completed a series of questions (described below) hosted by Qualtrics (www.qualtrics.com).

While the link was active, 1263 students clicked the link to the materials and 1114 potential participants completed the survey. Of these, 173 were excluded because they reported having used prescription stimulants recreationally at least once; another 61 were excluded because they reported having used prescription opioid pain relievers recreationally at least once; and 12 were excluded for past use of cocaine. None of the remaining 868 reported previous use of heroin. We excluded an additional 100 because the respondents did not pass one or more of the four attention checks interspersed among the materials (e.g., "Please select 'slightly important' from the choices below"), yielding a final sample of 768 participants (69% of the original 1114 who completed the survey materials).

2.2. Measures

2.2.1. Demographic questions

Participants were asked to report various background characteristics, including age, gender, current year of undergraduate education, and ethnicity (see Table 1).

2.2.2. Drug use history

Participants were asked a series of questions (yes/no) regarding their past recreational and medical use of prescription stimulants and prescription opioids. They were also asked to select from a provided list of drugs those that they had used at least once in the past. If a participant selected any of four specific listed drugs (see Table 1), they were coded as having ever used an illicit drug.

2.2.3. Reasons for abstinence questionnaire

This 17-item list of reasons (see Table 2) has been used in several previous studies of this topic (e.g., Globetti et al., 1992; Terry-McElrath et al., 2008). We modified three of the 17 reasons to make them more applicable to drugs besides marijuana (New phrasing: "Concerned

Table 1
Sample demographics and drug use history.

		Male (n = 202)	Female (n = 566)
Age	18–19	43%	54%
	20–21	41%	34%
	22–24	12%	8%
	25 +	4%	4%
Current year at university	Freshman	29%	33%
	Sophomore	21%	27%
	Junior	25%	20%
	Senior	4%	20%
Ethnicity	Caucasian	87%	90%
	African-American	6%	4%
	Asian	< 1%	1%
	Hispanic	4%	2%
	Other	1%	2%
Ever used stimulant prescribed for medical/psychological reason		20%	19%
Ever used opioid pain reliever prescribed for medical reason ^a		40%	52%
Ever consumed alcohol		72%	73%
Past recreational drug use	MDMA/Ecstasy	1%	1%
	Marijuana	33%	35%
	Inhalants	2%	2%
	Hallucinogens	1%	2%
	Any of above	36%	36%

Note. Unless otherwise marked, the associations of gender with these background characteristics were not statistically significant.

^a $\chi^2(1) = 8.82, p = .003$.

Table 2
Factor loadings for each of the 17 reasons for each drug for the subscale on which they had the highest loading.

	Rx stim (n = 768)	Rx opioids (n = 768)	Cocaine (n = 768)	Heroin (n = 768)
<i>Factor 1: Negative Consequences</i>				
Concerned about possible psychological damage	.802	.816	.838	.828
Concerned about possible physical damage	.776	.804	.769	.777
Concerned about possible loss of control of myself	.782	.793	.748	.757
Concerned about becoming addicted	.758	.725	.746	.755
Concerned about negative impact on school or work performance	.724	.713	.714	.638
It might lead to stronger drugs	.705	.689	.684	.569
Concerned about getting arrested	.644	.593	.588	.531
<i>Factor 2: Difficult to Acquire</i>				
Too expensive	.791	.826	.768	.806
Not available to me	.683	.641	.695	.662
<i>Factor 3: Not Enjoyable</i>				
Not enjoyable, I wouldn't like it	.828	.762	.773	.741
Don't feel like getting high	.667	.677	.706	.611
I don't like being with the people who use it	.638	.612	.589	.480
I might have a bad experience	.468	.513	.470	.485
<i>Factor 4: Social Disapproval</i>				
My friends would disapprove	.813	.785	.782	.784
My family would disapprove	.720	.702	.759	.727
My romantic partner/significant other would disapprove	.574	.614	.561	.534
<i>Non-Loading Item</i>				
It's against my beliefs	–	–	–	–

Note. For ease of interpretation, table shows absolute values for factor loadings. There were no mixtures of positive and negative loadings within any of the subscales for any of the four drugs.

about becoming addicted;” “I might have a bad experience;” and “Concerned about negative impact on school or work performance”), modified one to assess peer disapproval instead of peer use (New phrasing: “My friends would disapprove”), and modified one to remove words reflecting marital status (New phrasing: “My romantic partner/significant other would disapprove”). The remaining 12 reasons were the same as stated by Terry-McElrath et al. (2008). Participants were asked to rate the level of importance (later coded as 0=not at all important; 1=a little important; 2=somewhat important; 3=very important) that each of the 17 reasons had in their decision to abstain from each of the four drugs. The order in which the reasons were presented was counterbalanced across participants.

2.3. Data analysis

To evaluate whether the 17 reasons for abstinence comprised subscales, we conducted separate exploratory factor analyses (principal axis factoring using a direct oblimin rotation) using the importance ratings for each of the four target substances (prescription stimulants, prescription opioids, cocaine, and heroin). To evaluate the key hypotheses, we conducted five three-way repeated measures ANOVAs to test the effects of four drug types x gender x past illicit drug use status (used/never used) on the mean importance ratings for the four resulting subscales and the single, non-loading item. For each interaction and main effect, we also calculated and interpreted effect sizes (η_p^2). To correct for multiple comparisons, we employed a Bonferroni-adjusted alpha of .0014 (.05/35). Using post-hoc comparisons, we examined whether there were differences in the reported influence of reasons for abstaining based on drug source (diverted prescription versus street drug) and drug class (stimulant versus opioid). As a third analysis, we wanted to evaluate whether previous medical use of prescription stimulants (yes/no) or prescription opioids (yes/no) was associated with importance of reasons for abstinence from recreational use of the same drug. To answer this question, and to account for potential effects of gender and past illicit drug use, we conducted five three-way ANOVAs (previous medical use of target prescription drug x gender x past illicit drug use) for mean ratings of each subscale and the single, non-loading item for each of the two prescription drugs.

3. Results

3.1. Background characteristics and drug use history of the sample

To evaluate the representativeness of our sample, we compared the sample to the entire undergraduate student body enrolled at the recruitment institution in the fall, 2017, on the four overlapping variables provided by the university (Bowling Green State University Office of Institutional Research, 2018). Our sample comprised significantly more women, $\chi^2(1) = 10.31, p = .001$, Caucasians, $\chi^2(4) = 37.44, p < .001$, and younger students, $\chi^2(3) = 26.87, p < .001$, than the population of students at the university. Despite the age difference, our sample was distributed fairly evenly across undergraduate enrollment years and the proportions of freshmen, sophomores, juniors and seniors in the sample were within 5% of the university's enrollment numbers for each of those years.

As Table 1 shows, within our sample, there were no significant associations between gender and age band, between gender and year of enrollment, or between gender and ethnicity. In addition, equal proportions of males and females (36%) endorsed past use of common illicit drugs (see Table 1 for prevalence by specific drugs). However, chi-square analyses revealed a significant association between gender and past medical use of opioid pain relievers, $\chi^2(1) = 8.82, p = .003$, with 40% of males having used opioids for medical purposes versus 52% of females.

3.2. Subscale construction

We interpreted the scree plots and Kaiser eigenvalues as indicating that four factors best summarized the 17 items for each of the four substances. As examination of Table 2 reveals, despite cross-loadings for two items, 16 of the 17 reasons for abstinence loaded onto one of four factors for each drug and the four clusters of reasons were consistent across all four drugs. The 17th item, “It's against my beliefs,” cross-loaded on multiple factors across drugs, and was retained as a separate dependent variable in subsequent analyses. We labeled the four subscales: *Negative Consequences*, *Not Enjoyable*, *Social Disapproval*, and *Difficult to Acquire*, and calculated each participant's score on each subscale by computing the means of the importance ratings for the

Table 3
F (df), p value, and effect size for main effects and interaction effects by subscale/item (sample n = 768).

Subscale/Item	Drug Type	Gender	Past illicit drug use	Interaction: Drug type x Gender	Interaction: Drug type x Past illicit drug use	Interaction: Gender x Past illicit drug use	Interaction: Drug type x Gender x Past illicit drug use
Negative Consequences	F(3,764) = 59.66 p < .001 $\eta_p^2 = .072$	F(1,764) = 19.88 p < .001 $\eta_p^2 = .025$	F(1,764) = 2.23 p = .136 $\eta_p^2 = .003$	F(3,764) = 2.41 p = .065 $\eta_p^2 = .003$	F(3,764) = 5.29 p = .001 $\eta_p^2 = .007$	F(1,764) = 0.60 p = .437 $\eta_p^2 = .001$	F(3,764) = 2.90 p = .034 $\eta_p^2 = .004$
Social Disapproval	F(3,764) = 76.34 p < .001 $\eta_p^2 = .091$	F(1,764) = 3.28 p = .071 $\eta_p^2 = .004$	F(1,764) = 0.21 p = .644 $\eta_p^2 < .001$	F(3,764) = 4.09 p = .007 $\eta_p^2 = .005$	F(3,764) = 4.77 p = .003 $\eta_p^2 = .006$	F(1,764) = 1.10 p = .296 $\eta_p^2 = .001$	F(3,764) = 1.96 p = .118 $\eta_p^2 = .003$
Not Enjoyable	F(3,764) = 65.53 p < .001 $\eta_p^2 = .079$	F(1,764) = 14.48 p < .001 $\eta_p^2 = .019$	F(1,764) = 7.63 p = .006 $\eta_p^2 = .010$	F(3,764) = 1.81 p = .143 $\eta_p^2 = .002$	F(3,764) = 5.26 p = .001 $\eta_p^2 = .007$	F(1,764) = 0.44 p = .506 $\eta_p^2 = .001$	F(3,764) = 0.75 p = .525 $\eta_p^2 = .001$
Difficult to Acquire	F(3,764) = 6.95 p < .001 $\eta_p^2 = .009$	F(1,764) = 0.01 p = .929 $\eta_p^2 < .001$	F(1,764) = 0.53 p = .467 $\eta_p^2 = .001$	F(3,764) = 0.69 p = .559 $\eta_p^2 = .001$	F(3,764) = 2.12 p = .096 $\eta_p^2 = .003$	F(1,764) = 0.05 p = .817 $\eta_p^2 < .001$	F(3,764) = 1.01 p = .386 $\eta_p^2 = .001$
Against beliefs	F(3,764) = 52.36 p < .001 $\eta_p^2 = .064$	F(1,764) = 11.70 p = .001 $\eta_p^2 = .015$	F(1,764) = 30.69 p < .001 $\eta_p^2 = .039$	F(3,764) = 1.07 p = .362 $\eta_p^2 = .001$	F(3,764) = 3.23 p = .022 $\eta_p^2 = .004$	F(1,764) = 0.00 p = .949 $\eta_p^2 < .001$	F(3,764) = 3.42 p = .017 $\eta_p^2 = .004$

Note. Bonferroni corrected alpha = .0014.

items that loaded on each factor. For the four drugs, the internal consistency reliability coefficients for *Negative Consequences* were very good (range = .85–.89), for *Not Enjoyable* were adequate (range = .68–.75), for *Social Disapproval* were adequate (range = .71–.74), and for *Difficult to Acquire* were adequate (range = .70–.71). Although the subscale scores within each drug were statistically significantly inter-correlated (mean r among subscales: prescription stimulants = .43; prescription opioids = .40; cocaine = .41; heroin = .38), we interpreted the coefficients as indicating the subscales were sufficiently independent to warrant separate analyses of variance.

3.3. Association of type of drug, gender, and past illicit drug use with importance ratings

As examination of Table 3 reveals, based on the Bonferroni corrected alpha, there were no statistically significant three-way interaction effects and the effect sizes were trivial (η_p^2 ranged from .001 to .004). Furthermore, there were only two significant two-way interactions; specifically, the interactions of drug type x past illicit drug use were significant for the *Negative Consequences* and *Not Enjoyable* subscales, but the effect sizes were trivial (both $\eta_p^2 = .007$).

Examination of main effects for drug type revealed this variable had a significant effect of moderate size on ratings of three subscales (*Negative Consequences*, *Social Disapproval*, *Not Enjoyable*) and the single item (Against My Beliefs); the effect of drug type was also significant for the *Difficult to Acquire* subscale, but the effect size was trivial, $\eta_p^2 = .009$. Examination of the means in Table 4 (collapsed across gender and past illicit drug use) shows that importance ratings were highest for heroin followed in descending order by cocaine and the two prescription medications. With the exception of the *Negative Consequences* subscale, post-hoc tests revealed no significant differences between importance ratings for the two prescription drugs on any of the

Table 4
Mean (SD), F (df), p value, and effect size for each subscale/item in descending order within each drug type collapsed across gender and past illicit drug use (sample n = 768).

Type of Drug	Negative Consequences	Not Enjoyable	Social Disapproval	Against Beliefs	Difficult to Acquire	F (df); p value; η_p^2
Prescription Stimulants	2.55 (.65)	2.09 (.81)	2.03 (.88)	1.98 (1.18)	1.33 (1.05)	F(4,767) = 258.40; p < .001; $\eta_p^2 = .252$
Prescription Opioids	2.60 (.60)	2.10 (.80)	2.07 (.87)	2.03 (1.15)	1.37 (1.05)	F(4,767) = 258.47; p < .001; $\eta_p^2 = .252$
Cocaine	2.67 (.56)	2.24 (.77)	2.16 (.86)	2.17 (1.11)	1.42 (1.08)	F(4,767) = 277.74; p < .001; $\eta_p^2 = .266$
Heroin	2.74 (.49)	2.35 (.71)	2.29 (.82)	2.33 (1.05)	1.43 (1.11)	F(4,767) = 325.07; p < .001; $\eta_p^2 = .298$

other three subscales or the single item, Against My Beliefs.

Examination of main effects for gender revealed a significant effect on ratings of *Negative Consequences*, *Not Enjoyable*, and Against My Beliefs, but males and females rated reasons reflecting *Difficult to Acquire* and *Social Disapproval* equivalently. The effect sizes for the three significant comparisons were small (η_p^2 ranged from .015 to .025) and examination of the means suggested that females rated these subscales of reasons and the non-loading item as more important than males did across the four drugs.

Finally, there was a significant main effect with a small effect size, $\eta_p^2 = .039$, for past illicit drug use on rating of the Against My Beliefs item. Those who had previously used illicit drugs rated this reason less important than those who had never used illicit drugs.

3.4. Association of importance ratings with previous medical use of prescription stimulants or prescription opioids

Based on the Bonferroni corrected alpha, there were no significant interaction effects of previous medical use of prescription stimulants with the other two independent variables (gender and past illicit drug use). In addition, there were no significant main effects for previous medical use of prescription stimulants on importance ratings for any of the five types of reasons for abstaining from such stimulants.

Examining analyses of reasons for abstaining from prescription opioids, we found a significant interaction between previous medical use of prescription opioids x past illicit drug use for the *Negative Consequences* subscale, F(1,768) = 12.07, p = .001, but the effect size was small, $\eta_p^2 = .016$. There were no other significant interaction effects, nor were there any significant main effects for previous medical use of prescription opioids, on importance ratings for any of the five types of reasons for abstaining from such opioids.

3.5. Levels of importance by type of reason within each drug

As a follow-up analysis, we also wanted to evaluate whether there were differences in importance ratings of types of reasons *within* each type of drug. For ease of interpretation, and because the effects of the independent variables other than drug type were small, we collapsed mean importance ratings across gender, past use of illicit drugs, and previous medical drug use for these analyses. Table 4 shows that ANOVAs yielded significant F ratios with large effect sizes (all $ps < .001$; η_p^2 ranged from .252 to .298) for type of reason within each of the four drugs. Specifically, post-hoc tests indicated that mean importance ratings of the *Negative Consequences* subscale were higher than those of the other subscales and the single item for each of the four drugs ($ps < .001$). Post-hoc tests also indicated that there were no significant differences between the mean ratings of the *Not Enjoyable* subscale, the *Social Disapproval* subscale, and the *Against My Beliefs* item, all of which were rated as significantly less important than *Negative Consequences*. The mean importance ratings of the *Difficult to Acquire* subscale were significantly lower than those of each of the other subscales and the single item ($ps < .001$).

4. Discussion

Analyses revealed that importance ratings for each type of reason for abstinence differed significantly by type of drug (although the effect size for acquisition difficulties was small). Importance ratings for all four types of reasons and the non-loading item were typically highest for heroin, followed by ratings for cocaine, and the two prescription medications. Reasons reflecting negative consequences were rated as the most important type of reason for abstaining from all four drugs, and reasons reflecting acquisition difficulties were rated as the least important type of reason participants abstained from each drug.

Based on post-hoc tests, importance ratings of these reasons appear to have been higher when the drug in question was a “street” drug (i.e., cocaine and heroin) than when it was a pharmaceutical stimulant or a pharmaceutical pain reliever. In addition, although the two types of prescription drugs have notably different medical uses, psychoactive effects, and representations in the news media, the mean importance ratings did not differ for these two types of substances, except for negative consequences. In contrast, post hoc tests suggested that participants’ importance ratings for the street opioid (heroin) were higher than ratings for the street stimulant (cocaine) for every type of reason except those reflecting acquisition difficulties.

Gender was also associated with the importance ratings of many reasons (except for acquisition difficulties and social disapproval), and female students rated these types of reasons as more important than did males. This finding is consistent with studies by both Lauritsen et al. (2018), who studied university students’ reasons for abstinence from synthetic cannabinoids and synthetic cathinones, and Terry-McElrath et al. (2008), who studied high school students’ reasons for abstinence from marijuana. However, in all three studies, gender differences were generally quite small and both males and females were similar in their endorsements and ratings of various types of reasons for abstinence.

Participants’ ratings of most types of reasons did not differ significantly based on their past use of other illicit drugs such as marijuana, ecstasy, and hallucinogens. In addition, the ratings of reasons for abstinence from prescription stimulants and prescription opioids given by students who had used those drugs for medical purposes almost never differed from those given by students without medical experience with those drugs. Therefore, contrary to our expectations, past drug experience – whether with illicit drugs or with prescription medications – does not appear to be associated with the importance of most reasons for abstinence.

Several methodological factors could limit the generalizability of these findings. First, the participants in this study were undergraduates from a single, state-supported institution located in the rural Midwest.

If prescription drugs, cocaine, and heroin are more accessible and their use more acceptable at institutions located in urban areas, students at those schools may have different reasons for abstaining than those attending a school in a rural area. Second, these findings may be limited to students enrolled in higher education, and those who do not attend college after high school may report different reasons for abstaining, such as passing a drug test to find and maintain employment, as more important. The social acceptability of using certain drugs – and therefore, the importance of social approval as a reason to abstain – may also differ between students and non-students. For example, given the neurocognitive enhancing properties of prescription stimulants, use of those drugs may be a more acceptable and less important reason for abstinence for college students than those who do not attend college.

The value of the present findings could also be influenced by the content validity of the 17 reasons provided to participants. Other investigations (e.g. Lauritsen et al., 2018; Rosenberg et al., 2008, 2012) have provided participants with lists that included twice as many reasons, many of which are not listed in or represented by the 17 reasons in the Monitoring the Future list. In addition, the validity of these findings is dependent on the self-awareness participants had regarding the reasons they abstained and their willingness to disclose the importance of those reasons. Furthermore, even if accurately reported, these reasons likely reflect only some of the many intrapersonal, interpersonal, and cultural influences on one’s abstinence from drugs (Petratis et al., 1995).

These limitations notwithstanding, the findings presented in this study could be of value in the development and revision of drug use education and prevention programs. The empirical support for the efficacy of prevention programs is mixed (Faggiano et al., 2008; Onrust et al., 2016; West and O’Neal, 2004). However, because most prevention programs have targeted students younger than those enrolled in college and many students begin experimenting with both prescription and non-prescription drugs during their college years (Schulenberg et al., 2017), such programs may be of value with this target population. The college students in this study reported that reasons reflecting negative consequences were the most important for their abstention from four different substances. One implication of this finding is that ongoing abstention could be an outcome of anticipating and wanting to avoid harmful consequences associated with consumption. This implication is supported by Vervaeke et al. (2008), who found that significantly larger proportions of young adults who remained abstinent during a six-month follow up endorsed reasons reflecting psychological and physiological harm and not wanting to alter their consciousness compared to that subset of the sample that began using ecstasy during the follow up period.

As noted above, undergraduate students rated negative consequences as the most important type of reason for abstaining from each of the four drugs investigated, but they appear to view these reasons as less important for prescription drugs than for non-prescription drugs. One possible explanation for this finding is that college students are more cognizant of the negative consequences associated with the non-prescription drugs and less aware of the potential negative consequences associated with prescription drug use, perhaps because those drugs are legally manufactured and prescribed by physicians. In addition, young people may assume that prescription stimulants and prescription opioids have few negative consequences because these substances are used more frequently by young people than the non-prescription counterparts of these drugs (Schulenberg et al., 2017). Therefore, interventions that emphasize the potential negative consequences associated with prescription drug use may help reinforce student abstinence from these medications.

Because this exploratory investigation is the first comparing the reported importance of reasons for abstinence between prescription and non-prescription drugs, future investigations in this area are warranted to confirm the reported findings. In addition, individuals who live in different communities, have differing values or beliefs, or have differing

cultural or ethnic identities may abstain for different reasons, and investigators could assess whether the reasons are associated with relevant demographic characteristics. The perceived importance of reasons for abstaining revealed in this investigation may also vary over the course of an individual's life. Longitudinal studies could reveal whether the importance of certain reasons changes concurrently with changes in educational status, type of post-graduate employment, development of health problems, and alterations of social network. Although some portion of the initial sample in a longitudinal investigation is likely to start consuming one or more of the target drugs over the course of a study, this phenomenon would allow investigators to evaluate whether certain reasons predict continued abstinence and others are associated with later initiation of consumption.

Contributors' statement

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