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Original article

Adolescents' Nonmedical Use of Prescription Medications and Other Problem Behaviors

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Purpose: This study examines adolescent nonmedical use of prescription medications (NUPM) and its relationship to other problem behaviors.

Methods: A secondary analysis was conducted with data gathered from 912 adolescents in 2007. Four mutually exclusive groups were created from the data. Adolescents who: 1) did not use controlled prescription medications (nonusers); 2) used their own controlled medications *as prescribed* (medical-users); 3) engaged in nonmedical use for self-treatment motivations (self-treaters), and 4) engaged in nonmedical use for sensation-seeking motivations (sensation-seekers). These four groups were compared on problem behaviors as well as depression and impulsivity.

Results: Approximately 10.9% of the sample engaged in NUPM and 36.8% had a legal prescription for a controlled medication. Sensation-seekers were more likely to engage in most problem behaviors when compared with all other groups; impulsivity and depression was variable among groups.

Conclusions: The findings suggest there are different subtypes of nonmedical users of prescription medications.

Keywords: Nonmedical use prescription medications (NUPM); Adolescents' prescription drug abuse; Problem behaviors

Nonmedical use of prescription medications (NUPM) is an emerging problem behavior that is associated with diversion and poly-drug abuse [1–12]. Given that NUPM prevalence rates are high in populations under 25 years and that NUPM is associated with other forms of drug abuse [1–3,6–10], it is critical that this form of substance use be studied.

Two national surveys provide epidemiological data on nonmedical use of prescription medications (NUPM) among adolescents in the United States. These studies –the *National Survey on Drug Use and Health* (NSDUH) and *Monitoring the Future* (MTF)—include measures of NUPM in annual population surveys of substance use behaviors.

In the NSDUH [13], ''prescription-type'' medications are separated into four classes: pain relievers, stimulants, sedatives, and tranquilizers. Twelve percent (12%) of youth aged 12-17 report the nonmedical use of prescription-type medications in their lifetimes, while 8.3% report past-year use and 3.3% report past-month use. *Monitoring the Future* [14,15] assesses NUPM among 8th, 10th, and 12th grade students in the U.S and reveals that since the early 1990s, the nonmedical use of narcotics has increased with 9% of 12th graders reporting NUPM within the past year [14].

Legitimate medical use of controlled prescription medication (particularly opioids) has also increased in the past decade [16]. Data from the ARCOS system indicate a substantial rise in the distribution of some controlled medications to youth between 2000 and 2005 [17]; however, the relationship between the rise in NUPM and increased medical use remains unclear, although youth data from

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Canada reveals a robust relationship between medical and nonmedical use of a controlled stimulants [18,19].

Jessor et al developed the Problem Behavior Theory [20–24] in part to explain the co-occurrence of problem behaviors during adolescence. Problem Behavior Theory stipulates that a problem behavior is ''behavior that departs from the norms of the larger society,'' a behavior that is either disapproved of by social institutions and/or elicits some form of social response (e.g. reproof, probation, incarceration). Problem behaviors that co-occur are considered part of problem behavior syndrome, which includes substance use, early sexual activity, delinquency, school truancy, and other socially deviant behaviors. Impulsiveness is a factor that has been found to influence problem behaviors such as substance abuse [25] and there appears to be a connection between sensation-seeking and substance use [26].

Problem Behavior Theory provides a useful model for understanding the strong association among various adolescent behaviors that are viewed by society as ''deviant.'' A question remains, however, about adolescents' nonmedical use of prescription medications. Does it represent an isolated—albeit risky—behavior, or is it part of a larger set of problem behaviors? The answer may lie in an adolescent's motivation to engage in nonmedical use.

This current study builds on our earlier work [2,7]. Four mutually exclusive groups were compared: those adolescents who 1) never used controlled prescription medications (nonusers); 2) used their own controlled medications prescribed to them (medical users); 3) engaged in nonmedical use for self-treatment motivations (self-treaters); and 4) engaged in nonmedical use for experimental or sensation-seeking motivations (sensation-seekers). Given that impulsivity and depression often occur as precursors to problem behaviors, we assessed the relationship of group membership with impulsivity and depression.

We conducted this research with the following hypotheses: 1) Adolescents who engage in NUPM for sensation-seeking motivations will be significantly more likely to report additional problem behaviors when compared with adolescents who are self-treaters, medical users, or nonusers; and 2) adolescents who engage in NUPM for self-treatment or sensation-seeking motivations will be significantly more likely to have higher impulsivity and depression scores compared with adolescents who are characterized as nonusers.

Methods

This secondary analysis used 2007 cross-sectional data from one school district in southeastern Michigan. All students (1514) in grades 7–12 attending the district's middle and high schools were recruited; 968 students returned their consent forms and thus, participated in the study (64% response rate). University IRB approval and a NIH Certificate of Confidentiality were obtained.

The Secondary Student Life Survey, a Web-based survey, involves a procedure described in earlier studies [1–6], and relies on the use of hooded computers in classrooms. For classes with lower reading levels, research assistants read with students. The web-based survey method was selected because they have been shown to increase the reporting of highly sensitive behaviors compared with pencil-and-paper surveys [27,28].

Study sample

The final 2007 sample consisted of 912 respondents in grades 7–12. To create our four mutually exclusive groups, we selected those who answered questions about prescription medications, including never having used. If respondents checked ''rather not say'' to any of the prescription medication questions they were excluded (n = 41). Furthermore, 15 respondents reported NUPM for reasons other than sensation-seeking or self-treatment with pain medications (e.g., ''it helps me sleep'' or ''for other reasons.'') These 15 cases were dropped given the ambiguity surrounding their motives.

Approximately half of respondents were female (52.6%) with 53.8% being African-American and 43.5% being white. At the time of the survey, respondents' average age was 15 (SD = 1.74). Fifteen percent of the sample was in the 7th grade, 17.4% in 8th grade, 21.4% in 9th grade, 18.9% in 10th grade, 14.8% in 11th grade and 12.1% was in 12th grade.

Measurement

Demographic information was collected (Table 1). Parental education was a nominal variable with the following categories: ''less than high school'' (1), ''completed high school'' (2), ''some college'' (3), ''completed college'' (4), ''graduate or professional school'' (5), or ''don't know/not applicable'' or ''rather not say.'' Both mother's and father's education were entered when used as covariates; hereafter, these variables are referred to as parental education.

For the questions related to problem behavior variables respondents were given an option to endorse ''rather not say.'' If a student endorsed ''rather not say,'' the data were coded as missing.

Binge drinking was assessed with a question adapted from MTF [15] and the College Alcohol Study [29]: ''Over the past two weeks, on how many occasions have you had four (five for males) or more drinks in a row…''? Response options were: ''none'' (0), ''once'' (1), ''twice'' (2), ''3-5 times'' (3), ''6-9 times'' (4), ''10 or more times'' (5).

Illicit drug use was assessed with 10 items adapted from the MTF study (marijuana, cocaine, LSD, other psychedelics, crystal methamphetamine, heroin, inhalants, ecstasy, GHB, and Rohypnol®). A count of the number of drugs reported for the past year was used to create an index of illicit drug use.

Gambling was measured with a single item: ''On how many occasions have you gambled for money in the past 12 months?'' The response options were: ''never'' (0), ''1-2'' (1), ''3-5'' (2), ''6-9'' (3), and ''10+'' (4).

School discipline was measured with three items that asked about past year detention, suspension, and other forms of school-based discipline. Response options included: ''never'' (0), ''1-3 times'' (1), ''4-6 times'' (2),''7-9 times'' (3), and ''10 or more times'' (4). The three items were summed to create an ordinal index of school discipline.

Sexual activity included four frequency items summed to create a measure of consensual sexual activity involving physical contact [30]. It was assessed with, ''Please indicate how often you have engaged in the following activities: kissing someone you were interested in, making out, touching private parts, and having sexual intercourse.'' Response options were: ''never'' (0), ''once'' (1), ''two or three times'' (2), and ''four or more times'' (3).

Depression was measured by the Center for Epidemiological Studies Depression Scale [31]. The scale is a sum of how often each of 20 symptoms is reported in the past two weeks, with response options ranging from rarely (or none of the time) to most or all of the time, with a possible scale range from 0 to 60. The alpha coefficient for these 20 items was .84.

Impulsivity was measured with the Impulsivity subscale, part of the Impulsivity/Sensation-Seeking scale (Imp-SS) of the Zuckerman-Kuhlman Personality Questionnaire [32,33]. The seven-item scale assesses lack of planning and impulsivity and has a true-false format with score ranging from 0 to 7. The Imp/SS has a reported alpha coefficient of .72 [32].

Medical and nonmedical use of prescription medication were assessed as in previous studies [1,2,3,6]. Medical use was measured with the question: ''Based on a health professional's prescription, on how many occasions in your lifetime [also asked in the past 12 months] have you used the following types of drugs…'' Nonmedical use was measured with the question: ''On how many occasions in your lifetime [also in the past 12 months] have you used the following types of drugs not prescribed to you?''… The drug classes (with trade and generic names included for examples) for both questions were: (a) sleeping medication; (b) sedative/anxiety medication; (c) stimulant medication; and (d) pain medication. Response options ranged from ''no occasions'' to ''40+ occasions'' (and ''rather not say''). Respondents' answers to each question were dichotomized to create a variable that indicated whether they used each medication in the past year.

Motivations to engage in NUPM were adapted from the MTF and possible motives used in previous research [2,7,11,34]. Respondents who reported any lifetime NUPM were asked to provide the reasons why they used each of the four drug classes nonmedically. Respondents were given a list of motivations and asked to check all that apply. Five motivations were listed for all four drug classes: 1) ''because it gives me a high''; 2) ''counteracts effects of other drugs''; 3) ''is safer than street drugs''; 4) ''experimentation''; and 5) ''because I'm addicted.'' In addition, for the anxiety/sedative and sleeping drug classes, two other motivations were provided: ''because it helps me sleep'' and ''because it helps decrease anxiety.'' For stimulant medications, these additional motivations were provided: ''to help with concentration,'' ''to help with alertness,'' ''to help me study,'' and ''to lose weight.'' For pain medications, the motivation ''to relieve pain'' was also provided.

Data analyses

Data analyses included 912 respondents and all statistical analyses were carried out using SPSS 14.0. Prior to hypothesis testing, univariate and bivariate analyses were conducted. A four-level group variable was created with the aforementioned medical use, nonmedical use, and motivations to engage in NUPM items.

1. Respondents were characterized as *nonusers* if they reported no prescription medication use, either medical or nonmedical, in the past year.
2. Respondents were characterized as *medical users* if they reported having a prescription for a controlled medication during the past year but reported never engaging in NUPM.
3. Respondents were characterized as *self-treaters* if they reported past year nonmedical use for therapeutic reasons only. Self-treaters reported using pain medication because ''it relieves pain''; sedative/anxiety medication because ''it helps decrease anxiety'' or ''it helps me sleep''; sleep medications because ''it helps me sleep,'' or stimulants because ''it helps me concentrate,'' ''it helps increase my alertness,'' or ''it helps me study.''
4. Respondents were characterized as *sensation-seekers* if they reported past year nonmedical use for motivations such as: ''it gives me a high'' and ''it is safer than street drugs and ''experimentation.'' Any endorsement of sensation-seeking motives resulted in the respondent being classified as a sensation-seeker even if self-treatment motives were also endorsed.

Finally, 15 respondents reported NUPM for reasons other than sensation-seeking or self-treatment. The two reasons offered were ''it helps me sleep'' or for ''other'' reasons. These cases were dropped from the analyses given the ambiguity surrounding their motives to use pain medications.

To better understand how respondent characteristics related to group membership (i.e., nonusers, medical users, sensation-seekers, self-treaters), chi-square tests were used to examine group membership by gender, race, and parental education, and a one-way ANOVA was used to examine group membership by age. These analyses were followed by MANOVA to test the hypotheses. MANOVA was used to determine whether group membership (sensation-seekers, self-treaters, medical users, nonusers) predicted higher scores on problem behaviors, impulsivity, and depression. Age, race, gender, and parental education were entered as covariates to control for any effect on problem behaviors; in turn, the covariance matrices generated by MANOVA took into account possible correlations

among the various problem behaviors. Given that the school discipline variable was skewed, this variable was corrected with a log transformation prior to its inclusion in the hypothesis testing. The MANOVA test was followed by post-hoc comparison tests to determine which of the groups were different from each other; post hoc tests were adjusted for all pairwise comparisons using the Bonferroni correction.

Results

Over one-third of the sample (36.8%) reported having a legal prescription for at least one of the four controlled drug classes within the previous 12 months (Table 2); however, 546 (59.9%) respondents reported ''no annual use'' of prescription medications. A total of 71 respondents (7.8%) reported nonmedical use for self-treatment motivations in the past year and 28 (3.1%) reported motivations related to sensation-seeking. Pain medication was the most frequently reported controlled medication used in the past year, both medically (32.5%) and nonmedically (10%). There were other forms of substance use as well: 148 respondents (16.2%) had used at least one illicit drug in their lifetimes, with approximately 8.7% of the sample reporting at least one binge drinking episode in the preceding two weeks (Table 3).

Analyses revealed demographic differences in both medical and nonmedical use by gender, race, and age. A greater percentage of males reported no use of any prescription medications (males = 67%, females = 54%), and female respondents (10.7%) reported greater nonmedical use for self-treating motives than males (4.4%, χ^2 (3) = 22.72, $P < .001$). A larger percentage of white respondents (5.8%) reported sensation-seeking motives when compared with African-American/nonwhite respondents (1%, χ^2 (3) = 22.69, $P < .001$). Finally, sensation-seekers (*mean* = 15.96 *SD* = 1.35) tended to be older than nonusers (*mean* = 14.84 *SD* = 1.76), F (3,911) = 4.85, $P = .002$. There were no differences in parental education between users and nonusers of prescription medication.

We found significant associations of age, race, gender, and father's education for several of the problem behaviors (Table 4). For instance, males scored higher than females in gambling, amount disciplined, sexual activity, and impulsivity (gambling: males mean = 2.33, SD = 1.78, females mean = 1.32, SD = .81), F (1, 887) = 124.17, $p < .001$; amount disciplined: males mean = 4.03, SD = 1.60, females mean = 3.65, SD = 1.17), F (1, 907) = 16.71, $p < .001$; sexual activity: males mean = 6.56, SD = 4.26, females mean = 5.78, SD = 3.47), F (1, 870) = 8.86, $p = .003$); impulsivity: males mean = 14.77, SD = 3.89, females mean = 14.26, SD = 3.63), F (1, 910) = 4.17, $p = .04$). Father's education, but not mother's, had a significant association with depression F (3, 904) = 6.96, $p = .04$); those who did not know or would rather not say (mean = 14.62 SD = 8.29) and those whose fathers had less than or completed high school (mean = 14.04 SD = 8.92) reported greater depression than those with fathers who had some or completed college (mean = 12.28 SD = 8.50) and completed graduate education (mean = 10.18 SD = 6.35).

Table 5 provides a summary of the MANOVA analyses used to test the study hypotheses. The first hypothesis, which

Table 1
Sample characteristics

Characteristic		Sample		Non-respondent Population		
		% (n)	Mean (SD)	% (n)	χ^2	*p* Value
Sex	Female	52.6% (480)		45.5% (274)	7.35	.007
	Male	47.4% (432)		54.5% (328)		
	Total	100% (912)		100% (602)		
Age			14.97 (1.74)			
Race	Black	53.8% (490)		65.6% (395)	25.36	< .001
	White	43.5% (396)		31.9% (192)		
	Asian American	1.4% (13)		1.0% (6)		
	Hispanic or Latino/a	.7% (6)		1.3% (8)		
	American Indian or Alaskan Native	.7% (6)		0.2% (1)		
	Total	100% (911)				
Mother's/female guardian's highest level of education	Less than high school	5.6% (45)				
	Completed high school	26.7% (216)				
	Some college	27.9% (226)				
	Completed college	25.7% (208)				
	Graduate school	14.2% (115)				
	Total	100% (810)				
Father's/male guardian's highest level of education	Less than high school	10.6% (77)				
	Completed high school	33.2% (242)				
	Some college	22.8% (166)				
	Completed college	24.1% (176)				
	Graduate school	9.3% (68)				
	Total	100% (729)				

Table 2
Prevalence of annual and lifetime medical and nonmedical use and motives

		Annual % (n)	Lifetime % (n)
Medical Use	Anxiety/Sedatives (n = 906)	2.5% (23)	4.7% (43)
	Stimulants (n = 907)	3.1% (28)	5.7% (52)
	Pain (n = 904)	32.5% (294)	43.3% (392)
	Sleep (n = 909)	7.4% (67)	15.0% (136)
	At least one (n = 912)	36.8% (336)	49.6% (452)
Nonmedical Use	Anxiety/Sedatives (n = 910)	1.3% (12)	2.0% (18)
	Stimulants (n = 907)	1.2% (11)	1.5% (14)
	Pain (n = 907)	10.0% (91)	14.6% (132)
	Sleep (n = 908)	2.5% (23)	4.5% (41)
	At least one (n = 912)	10.9% (99)	16.2% (148)
Groups* (n = 912)	No prescription use	59.9% (546)	N/A
	Medical use only	29.3% (267)	N/A
	Self-treaters	7.8% (71)	N/A
	Sensation-seekers	3.1% (28)	N/A

*Groups were created using annual report.

predicted that the sensation seekers would be significantly more likely to report problem behaviors than the three other groups, was supported. Specifically, sensation-seekers were more likely than self-treaters, medical-users, and nonusers to report using illicit drugs, gambling, binge drinking, and sexual activity. All of these group comparisons were significant at the $p < .05$ level, with the exception of the comparison between the sensation-seekers and self-treaters on sexual activity, which was significant at a trend level ($p = .07$). Although not predicted, medical-users were found to be significantly lower than the nonusers on number of times disciplined; however, this difference occurred only at a trend level ($p < .08$). No other group differences were found.

Results provided partial support for the second hypothesis, which predicted that the sensation-seekers would be significantly higher than the other groups on depression and impulsivity. The sensation-seekers were significantly higher than the nonusers and medical users on impulsivity, but there were no significant differences on impulsivity between the sensation-seekers and the self-treaters. Thus, all nonmedical users (whether self-treaters or sensation-seekers) had greater impulsivity than nonusers. In terms of depression, no significant differences were found among the four groups.

Discussion

Arguably, Problem Behavior Theory [PBT] is one of the most widely used and empirically validated frameworks to understand the co-occurrence of adolescent behaviors. Our results lend support to PBT and support to the proposition that motivations to engage in NUPM appear to be associated with adolescent problem behaviors. As hypothesized, this study demonstrated that sensation-seekers were statistically more likely to engage in a host of problem behaviors. While future research is necessary to better describe the nature of the relationship between NUPM and problem behaviors, it may well be that NUPM should be considered a type of adolescent problem behavior that has come into prominence among youth of today.

There were no differences among the groups relative to depressive symptoms and this surprised us. Although sensation-seekers had higher depression mean scores than nonusers, medical-users or self-treaters (16.89 vs. 13.12, 13.51, and 13.06), the differences were not significant and thus, the hypothesis remains unsupported. There are several possible

Table 3
Frequencies and means of problem behaviors, depression, and impulsivity

		Sample % (n)
No. of illicit drugs used past year	0	83.8% (759)
	1	12.6% (114)
	2	2.1% (19)
	3 or more	1.5% (14)
	Total	100% (906)
No. of occasions gambled past year	Never	65.4% (581)
	1-2 occasions	16.5% (147)
	3-5 occasions	7.5% (67)
	6-9 occasions	3.5% (31)
	10 + occasions	7.1% (63)
	Total	100% (889)
No. occasions binge drank past 2 weeks	0	91.4% (787)
	1	4.2% (36)
	2	2.1% (18)
	3 or more	2.4% (20)
	Total	100% (861)
	Mean (SD)	
No. of times disciplined (past year) (*possible range 0 to 12)*	.84 (1.39)	
Sexual activity (*possible range 0 to 12)*	3.75 (3.43)	
Depression (CES-D) (*possible range 0 to 60)*	13.20 (8.54)	
Impulsivity (*possible range 0 to 19)*	10.60 (3.59)	

Table 4
Respondent characteristics and four mutually exclusive prescription medication groups

Respondent Characteristic	Non-users % (n)	Medical-users % (n)	Self-treaters % (n)	Sensation-seekers % (n)	df	χ^2	p Value
Sex					3	22.72	< .001
Female	53.6% (260)	32.8% (159)	10.7% (52)	2.9% (14)			
Male	67.0% (286)	25.3% (108)	4.4% (19)	3.3% (14)			
Race					3	22.69	< .001
White	56.3% (223)	31.8% (126)	6.1% (24)	5.8% (23)			
Black and other	62.5% (322)	27.4% (141)	9.1% (47)	1.0% (5)			
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	df	F statistic	p Value
Age	14.84 (1.76)**	15.11 (1.73)	15.11 (1.64)	15.96 (1.35)**	3, 911	4.85	.002

** post hoc comparisons significant $p < .01$.

explanations for this unexpected finding regarding depression; measurement error, small cell sizes, and sample characteristics may all be factors.

Simoni-Wastila [35] observed that greater availability may be associated with an increase in NUPM. In support of Simoni-Wastila's observation, we found that girls were statistically more likely to be medical users (32.8% vs. 25.3%) and self-treaters (10.7% vs. 4.4%). However there were no statistical differences between girls and boys relative to sensation-seeking NUPM. We are not sure how to interpret these gendered findings, other than to note that girls are more likely to be prescribed medications and thus, the drugs may be more available for diversion. Further research is needed to examine gender differences and the differences between those who engage in nonmedical use for self-treatment vs. those who engage in it for sensation-seeking motivations.

The National Survey of Health and Drug Use [13] indicates that about 8.3% of 12–17-year-olds reported NUPM, this annual prevalence estimate is a bit lower that our finding of 11%. However, the differences between the NSDUH and our data may be related to several factors: 1) the NSDUH data were collected in the adolescents' homes while our survey was self-administered on hooded computers; 2) the NSDUH question to assess nonmedical use is a complex one that not only asks about nonprescribed use but also stipulates a broad motivation (i.e., ''…or took only for the experience or feeling it caused''), whereas our question is more straightforward; 3) our sample was limited to one geographic region that generally has higher rates of nonmedical use of prescription opioids (5.6%) when compared with the national average (4.9%) and thus, adolescent NUPM may reflect the higher use in their general environment [36]. Our higher prevalence estimates and the fact that our sample was disproportionately African-American somewhat constrains our ability to generalize. However, our data remind us that national drug studies may not adequately account for community differences in nonmedical use.

Nonmedical use of prescription medications, whether by a self-treater or sensation-seeker, represents an unacceptable health risk. Health providers should communicate with their adolescent patients about the health and safety risks associated with diverted medications and the legal risk associated with diverting their own medications. In a paper on prescription medication abuse in school settings, Apa-Hall [37] noted that ''talking'' to adolescents is not enough; rather, the message about nonmedical use should be reinforced with illustration and repetition, having patients paraphrase back what they have heard. In addition, all health providers – pediatricians, dentists, nurses, and pharmacists – should alert parents about the importance of ''controlling and counting'' their children's pills; most certainly, parents should restrict availability and not leave medicines on countertops or in unlocked medicine cabinets.

Generalizations should be made cautiously; the sample was drawn from one school district and relied on self-report. Respondents completed the survey in school; thus, problem

Table 5
Problem behaviors, depression, and impulsivity among past-year medical and nonmedical users

	Non-users (n = 484)		Medical-users (n = 237)		Self-treaters (n = 65)		Sensation-seekers (n = 26)			
	M (SD)	B(SE)	M (SD)	B (SE)	M (SD)	B (SE)	M (SD)	B (SE)	F (3, 335)	p Value
Illicit drugs	0.24 (0.08)^{a}	0	0.33 (0.10)^{b}	0.10 (0.11)	0.41 (0.17)^{c}	0.17 (0.17)	3.07 (.23)^{abc}	2.84 (0.24)	47.73	< .001
Gambling	1.81(0.133)^{a}	0	2.09 (0.17)^{b}	0.27 (0.18)	2.23 (0.29)^{c}	0.42 (0.29)	3.33 (0.39)^{abc}	1.52 (0.40)	5.23	< .01
Binge drinking	0.20 (0.07)^{a}	0	0.25 (0.09)^{b}	0.05 (0.10)	0.40 (0.17)^{c}	0.20 (0.17)	1.16 (.23)^{abc}	0.89 (0.13)	8.61	< .001
Disciplined	.49 (0.05)^{ad}	0	0.37 (0.06)^{bd}	0.12 (0.07)	0.49 (0.11)^{c}	0.02 (0.12)	0.98 (0.15)^{abc}	0.49 (0.27)	5.23	< .01
Sexual activity	3.67 (0.24)^{a}	0	4.00 (0.30)^{b}	0.31 (0.33)	4.20 (0.54)	0.53 (0.55)	5.84 (0.74)^{ab}	2.16 (0.76)	2.87	< .05
Depression	13.12 (0.75)	0	13.51 (0.93)	0.39 (1.05)	13.06 (1.70)	0.06 (1.17)	16.89(2.32)	3.77 (2.38)	.86	NS
Impulsivity	4.02 (0.12)^{ad}	0	4.20 (0.14)^{b}	0.18 (0.16)	4.50 (0.26)^{cd}	0.49 (0.27)	5.00 (0.36)^{abc}	0.98 (0.37)	3.19	<.05

Non-users were the reference group and set to ''0'' to avoid over-parameterization. Multivariate, $F(21,945) = 17.05$, $p < .001$: MANOVA only uses cases that have data for all variables, including control variables and dependent variables statistically controlling for age, race, gender and parental education.

Estimates with the same superscripts in a given row are significantly different from each other.

behaviors are likely underestimated since youth with problems are less likely to be in school [38]. We never assessed the quantity of the prescribed medications and this information would have provided an important context for understanding the extent to which NUPM occurs. Finally, the index to create our illicit drug measure did not take into account the frequency of consumption so all illicit drug use were weighted the same.

Despite the noted limitations, we believe this study reflects a reality; the use of controlled medications is an increasing behavior among adolescents [39]. However, our comments should not be construed as ''anti-medication''; rather, we are concerned with the number of adolescents who self-treat. How is it that so many teens perceive themselves in need of potentially addictive medicines? An answer to this question may rest on determining: 1) the number of adolescents who do not have access to adequate medical care; 2) the number of self-treaters that if seen by a provider would receive a prescription for a controlled medication; and 3) the extent to which direct-to-consumer marketing contributes to adolescents' attitudes about self-treatment.

To the best of our knowledge we are the first to examine subgroup differences among adolescents who engage in nonmedical use. In a recent commentary, Boyd and McCabe [40] argued that national representative data have treated all nonmedical users as a homogeneous group, failing to distinguish between those nonmedical users who use to self-treat versus to ''get high.'' We believe that studies such as this will help researchers to design better questions, thereby producing data that ultimately assist prevention experts in crafting more targeted messages.

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