



Published in final edited form as:

J Adolesc Health. 2004 June ; 34(6): 531–534.

Pilot Study of Abuse of Asthma Inhalers by Middle and High School Students

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Abstract

During a school-based survey, middle and high school students ($n = 1536$) reported on their nonprescribed, lifetime use of asthma inhalers. Approximately 15% of 8th and 9th graders reported using nonprescribed asthma inhalers; the odds for this behavior were significantly higher for these students (2.25 and 2.30, respectively) and the nonprescribed use of asthma inhalers was significantly associated with higher rates of other drug use.

Keywords

Adolescent substance abuse; Asthma inhaler abuse

There are multiple reports of asthma inhaler misuse, by both asthmatic and nonasthmatic individuals [1-4]. To date, however, the nonprescribed use, particularly by children, remains under-investigated. Potential reasons for this misuse may be related to the perceived benefits of sympathetic stimulation (e.g., racing heart, increased alertness, expanded lung capacity, etc.) or alternatively, the effect of the fluorocarbon propellants (e.g., mild stimulation, euphoria, and intoxication) [2,4]. These descriptions are consistent with other research demonstrating the antidepressant effects of infused salbutamol as well as hyperactivity and manic moods that have been reported to occur in young children after oral salbutamol [3].

Despite multiple case reports of asthma inhaler misuse, most well-known national studies of adolescent drug use and other risk behaviors fail to specifically assess the prevalence of nonprescribed asthma inhaler use in youth [5,6].

The purpose of this exploratory study was to examine the lifetime, nonprescribed use of asthma inhalers within a sample of middle and high school students in Michigan, a state with asthma rates consistent with other states in the nation (i.e., 7.3% with a lifetime rate of 10.3% [7]). The main objectives of this exploratory study were (a) to assess the prevalence of nonprescribed asthma inhaler use among subgroups of middle and high school students in a racially diverse community, and (b) to explore the relationship between the nonprescribed use of asthma inhalers and other drug use.

Methods

The present study occurred during a 1-week period in May 2002 and drew on a population of 1723 students in 6th through 11th grades from one public school district in the Detroit, Michigan metropolitan area. All students and their parents or guardians were sent letters explaining that participation in the study was voluntary, describing its relevance and assuring that all responses would be kept confidential. Parental informed consent was obtained and the survey was conducted over the Internet from computer laboratories in the students' schools. Students were given sheets with a unique preassigned PIN (personal identification number) that allowed them to access the Web survey and these sheets were destroyed immediately after administration. Students took the survey at private computer terminals and at least two research staff supervised each computer laboratory to monitor students' conduct. School officials and staff were unable to access any personally identifiable information connected with the respondents' data. The Web survey was maintained on a hosted secure Internet site running under the secure sockets layer (SSL) protocol to insure respondent data were safely transmitted between the respondent's browser and the server. An 89% response rate was achieved and this rate compares favorably with national school-based alcohol and other drug studies [5]. The University of Michigan's Human Subject Review Board approved this study.

Instruments

The survey took approximately 20 minutes to complete and included questions about lifetime, nonprescribed use of asthma inhalers (among other medications) as well as use of alcohol, cigarettes, marijuana, ecstasy, and cocaine. The substance use questions were adapted from national studies [5,8].

Sample

Our sample included 1536 middle and high school students in grades 6 through 11 from a Detroit-area public school district; 57% were white, 40% were African-American, and 3% were from other racial and ethnic groups. Gender and school level were approximately equally distributed in the student sample and 72% of students had plans to attend college.

Results

Overall, 155 students reported the nonprescribed use of asthma inhalers. As illustrated in Table 1, females and African-Americans were more likely than males or Whites to use nonprescribed asthma inhalers but these differences were not statistically significant. Bivariate and multivariate analyses indicated that 8th graders (OR = 2.25, $p < .01$) and 9th graders (OR = 2.30, $p < .01$) were significantly more likely to use asthma inhalers not prescribed to them when compared with older students.

As illustrated in Table 2, there were statistically significant differences in drug use between the two student groups. Students who reported the nonprescribed use of asthma inhalers were significantly more likely to smoke cigarettes, binge drink, smoke marijuana, and use ecstasy and cocaine, compared with other students.

Discussion

We discovered that 10.7% of the students in our sample had used someone else's asthma inhaler. This form of use was particularly evident for the 8th and 9th graders. One study showed higher asthma rates in Michigan among women (9.6%) as compared with men (4.9%) [7], which may partially explain the slightly higher, although not statistically different, rates of nonprescribed use among women in our study. The nonprescribed use of asthma inhalers was

significantly associated with higher rates of other drug use; thus, it is possible that using other people's asthma inhalers is part of a cluster of risky behaviors.

Although we believe that the findings from this exploratory study are interesting and warrant further attention, this study was limited by several factors. The sample was relatively small and we did not assess the quantity and frequency of prescribed asthma inhaler use nor the prevalence of asthma. Furthermore, we did not collect information regarding the pharmacological substances available in the asthma inhalers (i.e., it was not determined whether the inhalers being used by the students were short-acting beta agonists with adrenergic effects or longer-acting inhalers being used for the effects produced by propellants in the inhalers). However, in all likelihood, most students were prescribed and thus, used, short-acting inhalers. Support for this assumption comes from a recent study of 19,000 children, in the Michigan Medicaid population; 84% were prescribed short-acting bronchodilator medications of some kind during 2001 [9]. Additionally, albuterol was the 11th most dispensed prescription medication in the United States in 2002 and the leading medication dispensed for asthma [10].

This pilot study relied on self-reports of nonprescribed use of asthma inhalers, which may have resulted in underestimates, given that previous research has shown that students who are absent or drop out of school tend to report higher rates of illicit substance use [11]. Further, because this study represents an analysis of survey data collected for a larger study, the items in the original questionnaire presented some limitations. For instance, the authors recognize that the present study would have benefited from having self-reported asthma diagnosis or prescribed asthma medication use; these types of data should be included in future research.

Although the abuse of prescription asthma inhalers may represent a problem behavior, using another's asthma inhaler could be a form a self-medication. Indeed, there is some evidence that girls, particularly between the ages of 9 and 18 years, are willing to share commonly prescribed medications [12]. It is certainly plausible that students experiencing shortness of breath may simply "borrow" their friends' inhalers. It is also possible that friends share their asthma inhalers when another friend has forgotten a prescribed one. All of these hypothesized motivations need to be further explored although clearly, using prescription asthma inhalers for nonmedicinal purposes is a potentially risky health behavior.

Acknowledgements

This study was supported by the University of Michigan and development of this manuscript was supported by a National Research Service Award T32 DA 07267 from the National Institute on Drug Abuse, National Institutes of Health.

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Table 1
Demographic Characteristics of Sample Who Reported Lifetime, Nonprescribed Asthma Inhaler Use

	Sample Size (n)	Nonprescribed Use (%)	χ^2 (df) <i>p</i> value	Adjusted Odds Ratio (n = 1435)
Total	1450	10.7		
Gender				
Male	745	9.5	2.0 (1) .155	1.00
Female	705	11.8		1.34
Race				
White	821	9.7	2.3 (2) .314	1.00
Black	583	12.2		1.34
Other	46	8.7		0.73
School level				
6th grade	252	7.5	16.8 (5) .005 ^{***}	1.00
7th grade	280	9.6		1.27 ^{**}
8th grade	229	14.4		2.25 ^{**}
9th grade	267	15.4		2.30 ^{**}
10th grade	221	9.5		1.39
11th grade	193	6.2		0.90
College plans				
Yes	1204	10.8	0.1 (2) .769	1.00
No	246	10.2		0.92
Participation in sports				
Yes	516	11.8	1.1 (1) .300	1.24
No	934	10.1		1.00
Parental education				
Less than high school	72	11.1	6.5 (5) .265	1.00
High school	261	13.0		1.05
Some college	346	8.7		0.61
College	412	9.0		0.61
Graduate school	234	13.7		0.98
No information	118	11.0		0.91

* $p < .05$,

** $p < .01$,

*** $p < .001$.

Table 2
 Substance Use Behaviors by Use of Asthma Inhalers

	No Asthma Inhaler Use (<i>n</i> = 1283)	Asthma Inhaler Use (Nonprescribed, Lifetime) (<i>n</i> = 153)	χ^2 (df) <i>p</i> value
Smoking in past month	9.6%	28.8%	48.9 (1) < .001
Binge drinking	13.1	34.0	45.8 (1) < .001
Alcohol use in past month	17.9	41.6	47.1 (1) < .001
Alcohol use in past year	34.9	63.0	45.9 (1) < .001
Marijuana use in past year	13.1	31.8	37.6 (1) < .001
Ecstasy use in past year	1.2	7.8	32.0 (1) < .001
Cocaine use in past year	1.0	7.1	32.9 (1) < .001
Rode with someone who had five or more drinks	14.0	32.2	32.7 (1) < .001