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## THE USE OF HARMFUL LEGAL PRODUCTS AMONG PRE-ADOLESCENT ALASKAN STUDENTS

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### Abstract

**Objectives**—This study examined pre-adolescent use of harmful but legally obtainable products (HLPs) “in order to get high” in 4 communities in northwest and southeast Alaska. These products include inhalants, over-the-counter medications, prescription medications taken without a doctor’s prescription and common household products.

**Study design**—Cross-sectional survey.

**Methods**—A student, survey was administered to the 447 students whose parents consented and who agreed to participate. A descriptive analysis with frequencies, percentages, bivariate associations and appropriate statistical tests produced the study results.

**Results**—The lifetime overall use of HLPs among fifth, sixth and seventh grade students in 4 Alaskan communities was 17.4%. The lifetime use of inhalants (6.8%) and prescription medications taken without a doctor’s prescription (8.0%) appear to be comparable to use rates from other studies. The use of over-the-counter medications (5.7%) appears to be slightly higher than in other U.S. surveys. The use of common household products was 6.1%. No significant, differences in the lifetime or 30-day use were found correlated to region, gender, ethnicity or student grade. There was a strong association between 30-day or lifetime use of some HLPs and the (30-day or life time) use of alcohol, cigarettes and smokeless tobacco.

**Conclusions**—The use of harmful everyday legal products by fifth, sixth and seventh graders in Alaska appears to be similar to data collected in other parts of the country. The possibility that there may be a link between the use of available legal substances and alcohol, tobacco and marijuana deserves additional attention.

### Keywords

pre-adolescent drug use; inhalants abuse; over-the-counter medication use; prescription medications abuse; common household product abuse; Alaska

## INTRODUCTION

The use of legal products to get high continues to be a serious problem among youth in the U.S. For example, while use of illicit drugs continued a gradual decline in 2004, the prevalence of inhalant use in the U.S. showed an upward turn from the prior year (1). The lifetime prevalence rate for inhalant use among eighth graders exceeded the prevalence rate for marijuana, making inhalants the third most commonly used substance behind alcohol and

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cigarettes for this population (1). In 2005, nearly 1 in 10 students abused a habit-forming painkiller (Vicodin), and 1 in 15 students reported using cough or cold medicines to get high in the past year. Inhalant use remained stable (1). The Partnership for a Drug Free America Partnership Attitude Tracking Study (PATS) from 2005 showed that nearly 1 in 5 teens (19%) reported abusing prescription medications to get high, and 1 in 10 (10%) reported abusing cough medicine to get high (2).

Unlike specific substances, such as marijuana, HLPs that can be inhaled or ingested include a variety of chemical substances found in many products that are readily available to children and adolescents. Most are volatile solvents, comprising liquids that can dissolve a number of other substances (3). Examples of solvents are paint thinners, gasoline and model airplane glue. Other types of inhalants include aerosols, nitrites (or “poppers”) and anesthetics (3–5). Legal products that can be ingested include prescription drugs (e.g., OxyContin), over-the-counter medicines (e.g., cough syrup) and everyday household products (e.g., Lysol, aftershave). Although the research is very limited, there have been discussions in the literature about the abuse of prescription drugs (6,7), non-prescription or over-the-counter drugs (8) and everyday household products like aftershave, mouthwash (9,10) and Lysol (11) to achieve a high.

Studies indicate that HLPs, like inhalants, are often the first category of substances to be abused by adolescents and thus constitute a gateway drug. For example, Young, Longstaffe and Tenenbein (12) note that while substance use tends to follow a predictable progression in which alcohol and cigarette use is followed by marijuana then cocaine, hallucinogens and opiates, their study of adolescents incarcerated in a juvenile detention facility showed that for those with an inhalant abuse history, inhalants were the first substance of abuse, preceding even cigarettes by 1.5 years.

This paper documents the extent to which pre-adolescents (fifth to seventh graders) in rural Alaska use HLPs. Youth living in rural Alaska are especially vulnerable because of the harsh winters and remoteness of their communities. There is also an intergenerational history of inhalant use, especially gasoline, which is believed to contribute to the use of these products by pre-adolescents. Comparative data are also collected on the use of illegal drugs, including tobacco and alcohol, which adolescents cannot legally purchase.

## MATERIAL AND METHODS

In 2004, a 3-year study funded by the National Institute of Drug Abuse was initiated to examine the feasibility of implementing an integrated community prevention program that addressed the use of HLPs. As part of this study, a student survey was conducted to capture data on substance use among fifth and sixth grade youth.

Three questions guided this study:

1. What is the extent of the use of HLPs, including inhalants and other ingestible legal products, among pre-adolescents in rural Alaskan communities?
2. To what extent does the use of HLPs vary by demographic characteristics?
3. What is the association between lifetime and 30-day use of HLPs and lifetime and 30-day use of alcohol and tobacco in rural Alaskan communities?

### Measures

The objective of this study was to assess the use of HLPs, including inhalants and other ingestible legal products, and the association of the use of those substances to other commonly used substances among Alaskan pre-adolescents. Measures used in this study included the

overall and specific use of 4 types of HLPs (inhalants, over-the-counter medications, prescriptions taken without a prescription and common household products), the use of other substances and student demographic characteristics. The use of harmful legal products was measured using the following questions:

1. On how many occasions (times) if any have you sniffed glue, breathed the contents of an aerosol spray can or inhaled other gases or sprays in order to get high?
2. On how many occasions (times) if any have you used common products (like mouthwash or cooking products) in order to get high?
3. On how many occasions (times) if any have you used common medicines (like stay awake pills or cough syrup) in order to get high?
4. On how many occasions (times) if any have you taken medicines that require a doctor's prescription (like OxyContin or pain pills) without a doctor telling you to take them?

An additional index variable was created to show the extent of the use of any of the HLPs by respondents over the past 30 days or during their lifetime.

The use of "other drugs" was measured using the following questions:

1. On how many occasions (times) if any have you had alcoholic beverages (beer, wine or hard liquor) to drink - more than just a few sips?
2. On how many occasions (times) if any have you smoked cigarettes?
3. On how many occasions (times) if any have you used smokeless tobacco (chew, snuff, plug, dipping tobacco, chewing tobacco)?
4. On how many occasions (times) if any have you used marijuana (grass, pot) or hashish (hash, hash oil)?

For each of these substances, respondents chose the number of occasions of use over the last 30 days and during their lifetime from the following alternatives:

Never, 1 or 2 times, 3 to 5 times, 6 to 9 times, 10 to 19 times, 20 to 39 times, 40+ times.

**Demographics—Grade:** Respondents were asked "What grade are you in?" They were given choices of Grades 5 through 8.

**Gender:** Respondents were given choices of Male or Female.

**Ethnicity:** Respondents were given the choices of Alaska Native, American Indian (collapsed into Alaska Native for the analysis), White, Asian American, Hispanic, Black/African American, Native Hawaiian/Pacific Islander and Other. The last five categories were collapsed into the "Other" category for this analysis.

**Community:** Students were asked "Do you live in ...?" and given the option of each of the 4 communities studied – 2 in southeast Alaska and 2 in northwest Alaska.

### Student survey construction

A student survey that contained these measures, as well as additional measures of risk and protective factors not reported here, was developed as a self-administered questionnaire that could be scanned electronically to produce a data file. Survey items were modified as needed to make them the appropriate reading level for the grades included, but without changing the items' meanings.

The survey instrument was pre-tested using the cognitive interviewing techniques (13). Four pre-adolescents of the same age group but from a community outside the study communities were asked to take the survey. The “think aloud” approach allowed the researchers to identify problems with comprehension, question ambiguity and understanding of the range of response. Survey administration times were also recorded to prepare class time requirements for survey administrators in the field. Minor changes were made in the instrument in light of the results of the pretest.

### Data collection

**Active parental consent**—A significant challenge to conducting the student survey was obtaining parental consent. Federal regulations (45CFR46) require that informed consent be obtained from parents of minors participating in federally funded research. Furthermore, Alaska State Statute 14.03.110 requires written active parental consent for any survey or questionnaire that is administered in the public schools, regardless of whether or not the questionnaire or survey is anonymous. Passive consent, in which parents only need to return a signed form if they object to their children’s participation in a school-based survey, has been shown to result in high response rates with little cost (14–21). In contrast, active consent, in which parents must return a signed consent form for their children to participate in a school-based survey, has been shown to reduce participation rates (17–19), possibly producing non-response error (16–18,22,23) and potentially resulting in lower estimates of alcohol, tobacco and other drug use (18,23,24,25). The state statute has significantly limited the ability of Alaskan schools to obtain high student response rates on surveys. For instance, since the law went into effect in late 1999, only 1 of 3 administrations of the Centers for Disease Control and Prevention-sponsored Youth Risk Behavioral Survey (YRBS) has resulted in weighted results (26–28).

All students enrolled in the fifth, sixth and seventh grades in regular public schools were asked to be included in the survey. In one community, the seventh graders were excluded because the middle school lacked a building due to construction delays. Consent forms were disseminated no fewer than three times in the communities either in the initial registration packet, sent home with children or mailed directly to parents at their home addresses. Consent form return rates, refusal rates and participation rates are based on the official Alaska Department of Education and Early Development enrolment numbers as of 1 October for the 2005–2006 school year for the participating grades (29). Across the 4 communities, the overall consent form return rate achieved was 69%. However, there was a consistent 14% refusal rate, dropping the actual total consent rate across all 4 communities to 55%.

**Survey administration**—In the months preceding the student survey administration, the research team worked in collaboration with locally hired community data coordinators and school districts to obtain parental consent and train teachers to administer the survey. Data coordinators were trained on parental consent procedures and survey administration with particular attention paid to assuring survey confidentiality and ethical standards.

The student survey was administered to 447 students in a classroom setting of 7 schools in 3 communities in fall 2005, and 3 schools in the final community in spring 2006. Students were asked to seal their surveys in envelopes and deposit them in a box in the classroom. The data coordinators collected the boxes and returned the unopened survey envelopes to a research team in Anchorage, where they were processed and analysed.

**Response rate**—Of the 55% of the study population who had parental consent to participate in the survey, 90% completed the survey. This response rate is considered acceptable by the National Center for Education Statistics (30). Absenteeism and youth dissent account for the

other 10%. The survey response rate for the study population ranged from 45–65% in the 4 communities. The overall response rate was 50% of the entire study population.

### Respondent characteristics

Table 1 shows the demographic characteristics of the study population. There were more adolescents surveyed in the southeast Alaska schools than in the northwest schools. Visual inspection of the data shows minimal differences in the proportion of males and females in the 2 regions. However, there appear to be substantial differences in the grade distribution of students, with a greater proportion of seventh graders in the northwest schools and slightly more sixth graders in the southeast, schools. This distribution reflects the somewhat older average age of students in the northwest schools. There were also differences in the ethnic distribution of the students in the 2 regions, with a greater proportion of Caucasians in the southeastern schools and more Alaska Native students in the northwestern schools.

### Weighting of data

Table I also compares the sample population with the 2005 demographic data and actual school enrolments and ethnic distributions (29). Overall, the observed ethnic frequencies were less than expected based on the school enrolment data. Alaska Native representation for every community on average was two to three times less than expected, and Caucasian representation was about, half the expected proportion. Similarly, the African American, Asian/Pacific Islander and Hispanic representation was also low. Consistently, there was greater representation from students who said their ethnicity was mixed. All subsequent tables are based on adjusted data.

Original data were retained if there was an observation but no children were shown as enrolled. However, if the number of observations was different than the number of actual enrolment shown in state enrolment data statistics, proportional adjustments were calculated and applied to the raw data. Post-stratification weights (31) were calculated by dividing the ratio of the proportion of the students in the Alaska School District data by the proportion of the students in the sample for each category of ethnicity, grade and classroom.

### Statistical analysis

The aim of this study was to describe the use of HLPs by Alaskan pre-adolescents. Therefore, most of the analysis uses descriptive statistics. Statistical differences between subgroups and bivariate associations between variables were tested using measures of association, including the  $\chi^2$  and Phi statistic.

## RESULTS

The first research question addressed the extent of use of HLPs among pre-adolescents in 4 rural Alaskan communities. Table II shows the percent of respondents who used HLPs within the last 30 days and over their lifetime. The overall use measure shows the use of any harmful legal product.

Almost 1 out of 5 (17.4%) pre-adolescent Alaskan students surveyed reported using some harmful legal product during their lifetime, and 5.6% reported some use in the past 30 days. The 2 substances most commonly used within the past 30 days were over-the-counter medications such as stay-awake pills and cough syrup (2.6% use) and common household products such as Lysol and cooking spray (2.5% use). Eight percent (8%) of students reported using prescription medications without a doctor's prescription during their lifetimes. The least used harmful legal substance was inhalants (gasoline, glues and solvents) with a 30-day use rate of 1.7%.

The second research question was concerned with the extent to which the use of HLPs varies by demographic characteristics. Tables III and IV present 30-day and lifetime use rates of these products. These tables show that the only significant gender difference in use was among female pre-adolescents, who had significantly higher 30-day use of common over-the-counter medicines (6.4%) than their male counterparts (4.3%) ( $\chi^2=4.70$ ,  $p<0.01$ ).

There were few differences in the use of HLPs among pre-adolescents in different grades. Total use, which measures use of any of the HLPs studied, shows a consistent lifetime use across all three grades (fifth, sixth and seventh) of 17% or more. The 30-day and lifetime use of over-the-counter medication decreases with grade, from 8.2% lifetime use in the fifth grade to 4.8% in the seventh grade, and 30-day use decreasing from 5.4% in the fifth grade to 1% in the seventh grade. The lifetime use of common household products follows the same pattern, decreasing from 8.2% among fifth graders to 2.9% among seventh graders. However, these trends are not statistically significant.

The use of HLPs showed no significant differences among ethnic groups. The data revealed a higher 30-day and lifetime use of over-the-counter medication among white adolescents, but the differences were not significant. There is also a slightly higher use of common household products and prescription drugs among African American, Hispanic, Asian Pacific Islander and mixed-race students, but the differences are not statistically significant. Alaska Native students have higher 30-day and lifetime use rates for inhalants.

The third research question addressed the association between 30-day and lifetime use of HLPs and lifetime and 30-day use of alcohol, tobacco and marijuana in Alaskan communities. Tables V and VI present this data. There are statistically significant associations between the use of any of the 4 HLPs and both the lifetime and 30-day use of alcohol, tobacco and marijuana. The single category of HLPs associated with alcohol, tobacco and marijuana use among pre-adolescents is inhalants. The tables present 30-day and lifetime use data on respondents who reported using both an HLP and an “other drug.” The Phi statistic ( $\Phi$ ) is often used to measure the strength of the relationship among cells of a 2x2 table. The  $\Phi$  takes on a value of 0 when no relationship exists and a value of 1 when all variables are perfectly related. In Tables V and VI, the total number of respondents who answered the question is shown, as well as the number of respondents who responded that they used both HLP and “other drugs” within the last 30 days or over their lifetime. The number of students who reported using both types of substances is small. Thus, the significance of the association must be viewed with caution.

Survey questions asked students about their 30-day and lifetime use of substances and did not collect temporal data. As a cross-sectional study, the data do not allow the development of temporal cause and effect relationships. However, the data suggest that there is a relationship between the use of HLPs and “other drugs” This association has implications for the extent of poly drug use among pre-adolescents.

## DISCUSSION

This study examined the use of harmful but legally obtainable products by adolescents in 4 Alaskan communities. Surveys were administered to fifth, sixth and seventh graders in 2 communities in northwest Alaska and 2 communities in southeast Alaska. Surveys focused on the use of these products “in order to get high.”

The data show that almost 1 in 5 (17%) pre-adolescent Alaskan student surveyed used some kind of harmful legal product during his or her lifetime. The lifetime use of each of the 4 categories of substances (inhalants, over-the-counter medications, common household products and prescription drugs without a prescription) ranges between 6% and 8% of all

students. Thirty-day use rates range between 1.5% and 2.6%, with common household products being the most frequently used substance.

Use of inhalants, such as glue or paint, and prescription medications taken without a doctor's prescription, such as OxyContin and pain pills, appears to be comparable to use rates from other studies. Wu et al. (5) reported that 6.3% of adolescents aged 12 and 13 had a lifetime prevalence of inhalant use. This number is very similar to the 6.8% in the 2 Alaskan regions.

The overall use of over-the-counter drugs among Alaskan pre-adolescents is about the same as data from a British study which examined factors associated with the use of prescribed drugs, over-the-counter pain killers and cough and cold treatments. Steinman (33) found that 4.7% of high school students occasionally misuse over-the-counter drugs to get high. The Alaskan data shows female lifetime use at 6.9% and male use at, 4.1%. There was no comparable data on the use of common household products with which to compare the lifetime prevalence rate among adolescents. However, the use of common household products in southeast Alaskan communities was more than double the use in the northwest communities.

There were no statistically significant demographic differences in the lifetime or 30-day use rates for HLPs. First, there were no significant gender differences in the use of HLPs, although the use of over-the-counter medications was slightly higher for females. The lack of significant gender differences echoes results of other studies. Boyd (34) found an overall use of 22% among girls and 10% among boys. This is slightly higher than the lifetime use (15% and 20.1%, respectively) shown in this study. However, it is consistent with the 8% use of prescription medications. Other researchers have found no gender differences among American Indian and Alaska Native youth (35), or in the use of inhalants (36). A national study of inhalant abuse and dependence among adolescents in the United States (5) also failed to detect gender differences in the prevalence of inhalant use. The non-medical use of prescription medications appears to be higher than in a study of the medical and non-medical use of prescription pain medication by youth in Detroit area public schools (34). Crouch et al. (8) found that exposures to non-prescription drugs were slightly more common in males than females, a finding that is consistent with this study.

This study showed no significant difference in the use of HLPs among ethnic groups. The pattern of our data is consistent with findings in national data (5) that showed higher rates by American Indian and Alaska Native students (11.5% lifetime prevalence) than white students (6.1% lifetime prevalence). The lack of significant differences between ethnic groups is also reflected in the comparison between the 2 regions studied. One region is predominantly Alaska Native, the other, predominantly white. There were no significant regional differences. This finding may suggest that the Alaskan adolescent population residing in larger Alaskan communities shares the same basic peer group and value structure, clouding any differences between ethnic groups.

The survey showed increased use of inhalants from Grades 5 through 7, but not for 30-day use. However, the trend is reversed for the use of over-the-counter medications and common household products, where use among students in lower grades is higher than in upper grades. This suggests that younger students may "graduate" to using potentially more dangerous substances as they age.

There has been some concern that common everyday legal products could lead to the use of other substances which are considered to be "gateway" drugs (12). The data from this study suggest that the lifetime use of most HLPs may be associated with the use of other drugs (alcohol, cigarettes, smokeless tobacco and marijuana) often available to adolescents. The strong association between the lifetime use of inhalants and the use of common household products and other common drugs are of special concern. The strong association between the

30-day use of marijuana and the use of HLPs suggests that there may be intense periods of experimentation in using substances of all kinds among pre-adolescents.

The data collected in this study suggest a strong association between both the 30-day and lifetime use of inhalants, over-the-counter medications and some common household products with alcohol tobacco and marijuana use. However, these associations are not statements of cause and effect. It cannot be concluded from this data that the use of inhalants causes children to use marijuana or other substances, although the associations suggest the possible extent of poly drug use.

## Conclusions

In conclusion, this is a cross-sectional study of the pre-adolescent use of harmful legal substances. While many of the instruments have been used extensively by others, none have been applied to Alaskan pre-adolescents. Consistent with principles of research in the Arctic, communities were intimately involved in the structure and implementation of this study. Responding to the desires of participating communities resulted in changes in survey questions and survey implementation. These changes, while perhaps compromising the academic integrity of the study, made the results more acceptable and credible to participating communities. Finally, the cross-sectional nature of the survey did not support any temporal cause-and-effect relationship between the use of HLPs and other drugs. This did not permit a determination of the extent to which these substances are “gateway drugs.”

The use of harmful, everyday legal products by Alaskan fifth, sixth and seventh grade students appears to be similar to data collected in other parts of the country. There appear to be few demographic differences in lifetime or 30-day use of these products. The possibility that there may be a link between the use of available legal substances and alcohol, tobacco and marijuana deserves additional attention.

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**Table 1**  
Demographic characteristics of the study sample in comparison to community populations.

Characteristic	Southeast Alaskan schools (n=266)		Northwest Alaskan schools (n=181)		Total sample (n=447)		Total study population (2005* ) n=3,353 %
	n	%	n	%	n	%	
Gender:*							
Male	111	43.7	82	48.0	193	45.4	51.4
Female**	143	56.3	89	52.0	232	54.6	48.6
Grade:							
5	108	40.6	64	36.4	172	38.9	29.4
6	120	45.1	50	28.4	170	38.5	38.8
7	38	14.3	62	35.2	100	22.6	31.8
	n	%	n	%	n	%	%
Ethnicity:*							
Alaska Native	45	17.7	99	57.6	144	33.8	55.9
White	130	51.2	24	14.0	154	36.2	39.5
Other	79	31.1	49	28.5	128	30.0	7.7
Average age:	11.17+/- .056		11.49 +/- .08		11.30+/- .047		Not Available.

\* Alaska Department of Labor, Borough and Census Area Estimates, July 2005.

\*\* District Enrollment as of 1 October 2005, Alaska State Department of Education and Early Development, 2006.

**Table II**

Summary of the use of harmful legal products (weighted data).

Product	Percent of pre-adolescents using harmful legal substances			
	30-day use n	%	Lifetime use n	%
Overall use (Use of any product)	396	5.6	396	17.4
Inhalants	353	1.7	383	6.8
Over-the-counter medications	357	2.5	383	5.7
Common household products	355	2.6	383	6.1
Prescription drugs without a prescription	357	1.5	383	8.0





30-day to 30-day association between harmful legal products and other drugs (weighted data).

Table V

Other drugs used	Overall use		Inhalants		Over-the-counter medications		Common household products		Prescription drugs without a prescription						
	N	$\Phi$	$\chi^2$	n	$\Phi$	$\chi^2$	n	$\Phi$	$\chi^2$	N	$\Phi$	$\chi^2$			
Alcohol	370	.23 <sup>****</sup>	19.72 <sup>****</sup>	.49	.44 <sup>****</sup>	67.44 <sup>****</sup>	354	.06	1.24	352	.15 <sup>****</sup>	8.05 <sup>****</sup>	353	.10 <sup>*</sup>	3.42 <sup>*</sup>
Cigarettes	359	.05	.92	341	.17 <sup>****</sup>	9.77 <sup>****</sup>	345	.10 <sup>**</sup>	3.83 <sup>**</sup>	342	.13 <sup>****</sup>	5.49 <sup>**</sup>	343	.17 <sup>****</sup>	9.83 <sup>****</sup>
Smokeless Tobacco	369	.05	.89	349	-.02	.11	354	0-.02	.19	350	.11 <sup>**</sup>	3.91 <sup>**</sup>	351	-.02	.10
Marijuana	366	.07	1.76	347	.23 <sup>****</sup>	17.78 <sup>****</sup>	352	1.15 <sup>****</sup>	8.18 <sup>****</sup>	349	.18 <sup>****</sup>	11.39 <sup>****</sup>	349	.25 <sup>****</sup>	21.81 <sup>****</sup>

\* Note: p<0.1.0,

\*\* p<.05.

\*\*\* p<.01

Lifetime to lifetime association between harmful legal products and other drugs (weighted data).

Table VI

Other drugs used	Over all use		Inhalants		Over-the-counter medications		Common household products		Prescription drugs without a prescription				
	N	$\Phi$	$\chi^2$	$\Phi$	n	$\Phi$	$\chi^2$	n	$\Phi$	$\chi^2$			
Alcohol	391	.**** 19	14.58****	.**** 26	379	.**** 24.67****	.20	380	.13****	6.12**	379	.07	1.88
Cigarettes	385	.**** 16	9.81****	.**** 23	374	.**** 19.16****	.05	374	.14****	7.54**	374	.07	1.90
Smokeless Tobacco	387	.**** 17	11.46****	.**** 18	375	.**** 11.86****	2.86	375	.01	.04	375	.00	.00
Marijuana	388	.**** 19	14.27****	.**** 39	376	.**** 56.64****	1.8	377	.09*	3.13*	376	.****	6.09

\* Note: p<0.10,

\*\* p<.05.

\*\*\* p<.01