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REDUCING ADOLESCENT USE OF HARMFUL LEGAL PRODUCTS: INTERMEDIATE EFFECTS OF A COMMUNITY PREVENTION INTERVENTION

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Abstract

Purpose—This study describes preliminary results from a preventive intervention to reduce the use of Harmful Legal Products (HLPs such as inhalants and over the counter drugs) among 5th through 7th grade students in three Alaskan rural communities. The intervention had two primary components, an environmental strategy (ES) to reduce access to HLPs at home, in schools, and from retail outlets and a school-based curriculum intended to enhance knowledge about HLP use and problems and improve refusal skills and assertiveness (*ThinkSmart*).

Methods—Two waves of survey data were collected from 5th, 6th and 7th grade students in all schools in all three communities assessing knowledge of HLP risks, use of refusal skills, assertiveness, peer attitudes and use of HLPs, perceived availability of HLPs, and intent to use and avoid use of HLPs in the future. Scales for the measurement of each dimension of risk and protective factors for HLP use were developed and tested. All were demonstrated to have good internal reliability ($\alpha > 0.70$). Pretest surveys were given in classrooms in each school, the ES and *ThinkSmart* interventions fielded, then a pretest given one year later.

Results—A simple pretest – post-test design enabled preliminary tests of program effects on these intermediate variables related to HLP use. Evidence was found for significant increases in knowledge about HLP use and risks and decreases in perceived availability of HLP products in the home and at school. These effects were differentiated across grade groups, reflecting differential exposure to the *ThinkSmart* program.

Discussion—The results of this preliminary study provide encouragement to pursue mixed environmental and school-based strategies for the reduction of HLP use among young people in these Alaskan rural communities. As a preliminary feasibility study, the absence of a control group by which to assess preliminary effects on intermediate variables should lend some skepticism to these observed program effects.

In addition to ethanol and other common illegal drugs such as marijuana young people use a variety of other harmful legal products (HLPs) in order to achieve intoxication or become “high.” Volatile household and industrial products may be inhaled (e.g., glue and gasoline),

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non-volatile household products (e.g., mouthwash) and over-the-counter drugs (e.g., cough medicine) may be ingested in amounts beyond prescribed limits, and prescription drugs may be obtained and used illegally. Among all the different kinds of HLP abuse that may be engaged in by young people inhalant use has received the most attention (Johnston, et al. 2005; Volkow, 2005). While the use of illicit drugs continued a gradual decline in 2004, the prevalence of inhalant use the U.S. showed an upward turn from the prior year (Johnston, et al. 2005). The lifetime prevalence rate for inhalant use among 8th graders exceeded the prevalence rate for marijuana; making inhalants the third most commonly used substance behind alcohol and cigarettes for this population (Johnston, et al. 2005). However, beyond the use of inhalants, it has also been documented that ingesting prescription drugs (McCabe, Teter, & Boyd, 2004; McCabe & Boyd, 2005), nonprescription or over the counter drugs (Crouch, Caravati, & Booth, 2004), and everyday household products like aftershave (Egbert, et al. 1986) and Lysol (Vinje & Hewitt, 1992) are a problem among youth.

The harmful legal products consumed by children and adolescents are not comprised of any single predominant substance or group of substances but instead consist of many different types of substances found in many different products that are readily available to children and adolescents. Most are volatile solvents, comprising liquids that can dissolve a number of other substances (Alberta Alcohol and Drug Abuse Commission, 2004). Examples of solvents are paint thinners, gasoline, and model airplane glue. Other types of inhalants include a variety of aerosols, nitrites (or “poppers”), and anesthetics (Alberta Alcohol and Drug Abuse Commission, 2004; Center for Substance Abuse Treatment, 2003; Wu, Schlenger & Ringwalt, 2005). This broad variety of inhalable HLPs is complemented by a similar broad variety of ingestible legal prescription, non-prescription, over the counter, and household products. It appears that the use of one or another HLP is primarily determined by the physical and social access to these products in adolescents' environments and that access to and use of HLPs in rural environments is unusually high. Among rural Alaskan communities the prevalence of adolescent use of HLPs is 18 percent (Saylor, et al., in review). This use is predominated by inhalants (e.g., gasoline and aerosol containers), and ingestible household products like mouthwash, over-the-counter medication like cough syrup, and prescription drugs.

Combating the Problem

The great variety of different sources of HLPs in the social and physical environments of adolescents presents a unique challenge to prevention efforts. HLPs are available from many different sources including those quite commonly encountered in adolescents' everyday lives, such as local drug and convenience stores (e.g., over the counter medications), garages and tool bins around residences (e.g., volatile glues and gasoline products), most stores from which any food is sold (e.g., mouthwash), and parents' purses and drug cabinets (e.g., prescription drugs). Unlike drugs for which access is legally regulated (e.g., alcohol, cigarettes) or prohibited (e.g., marijuana), legal restrictions on adolescent access to HLPs may be negligible (e.g., for over the counter drugs) to non-existent (e.g., for mouthwash). Access to HLPs may be through formal sources which might, in principle, be regulated (e.g., over the counter sales in drug stores), informal sources which could be regulated but are not at this time (e.g., volatile substances stored in residential garages), and informal sources which may be beyond the reach of regulation (e.g., social availability of prescription drugs). For this reason, a multi-component approach to community prevention is essential to reducing HLP use; an approach that (a) mobilizes communities to limit access to HLPs in adolescents' environments, (2) reduces access to these substances in specific environments, and (3) educates adolescents to reduce or refuse use of these substances. Such an approach would limit (1) social availability, (2) restrict formal availability through retail establishments, and (3) reduce demand for HLPs.

In order to begin the development of effective approaches to preventing HLP use among young people, a feasibility study focusing on implementing and evaluating a community prevention model (CPM) was funded in 2004 by the National Institute on Drug Abuse, the HLP Prevention Project. This study targeted four frontier communities in Northwest and Southeast Alaska. One major goal of the HLP Prevention project was to adapt a set of three complementary evidence-based substance abuse preventive interventions to reduce use of HLPs in frontier Alaskan communities (Johnson, et al., in press). The three intervention models were (1) community mobilization to increase community readiness and engage communities in prevention activities and actions to reduce alcohol and drug use (Wagenaar, et al., 1999), (2) environmental strategies to alter the social, physical, and economic access to alcohol and drugs (Gruenewald, Holder, & Treno, 2003; Holder et al., 2000; Wagenaar, Murray, & Gehan, 2000), and (3) a problem-solving, life skills curriculum for pre-adolescents to increase cognitive-behavioral skills, decrease the motivations to use drugs, and decrease vulnerability to social influences that promote drug use (Botvin, Griffin, Diaz, & Ifill-Williams, 2001; Griffin, Botvin, Nichols, & Doyle, 2003).

Figure 1 presents a conceptual diagram outlining the anticipated influences of the components of the intervention model on mediating and outcome variables related to the primary project outcome, the reduction of youth HLP use. Community mobilization enables the implementation of the two other intervention components, labeled “Environmental Strategies” and an educational preventive intervention, the “ThinkSmart Curriculum,” in the figure. The latter two components are expected to affect important mediating factors to reduce HLP use through changes in intent to use HLPs. The two sets of mediators that are identified in the figure, changes in environmental and youth cognitive and behavioral risk factors central to HLP use, are supported by community mobilization (described in Ogilvie, et al., in review). However, the focus of this paper is on the impact upon mediating variables of the two core prevention strategies.

Environmental Strategies

Figure 1 shows that community mobilization efforts are expected to support environmental strategies that affect access to HLPs in the home, through retail outlets, and at schools and, in turn, affect the perceived availability of and future intent to use HLPs. Environmental approaches for controlling underage tobacco and alcohol use among youth provide appropriate foundations for designing community prevention efforts for reducing the use of HLPs. Gruenewald, Holder, & Treno (2003) and Holder and Treno (2005) present strong evidence of the effectiveness of environmental strategies on substance use, excluding the use of HLPs. Increasing taxes to increase price (Zimring & Nelson, 1995) and stepping up enforcement of laws against sales to minors and/or rewarding clerks for not selling to minors (Biglan et al., 1995) have proven effective with other substances. Moderate increases in enforcement can reduce sales of alcohol to minors by as much as 35% to 40%, especially when combined with media and other community activities (Grube, 1997).

With regard specifically to inhalants, there is some evidence that environmental strategies can be used to reduce inhalant use and abuse (Esmail et al., 1992; d'Abbs and MacLean, 2000). Substitution of one product for another has been implemented as an environmental strategy in some communities. For example, substituting aviation gasoline for petrol was successful in combating inhalant abuse among Aboriginal youth in one Australian community (Burns et al., 1995; Burns, 1996; Shaw, 1999). Community-based sanctions against inhalant abusers have also been reported in Aboriginal communities in the form of shaming, cursing, ceremonial instructions, and the imposition of compensation payments, corporal punishment, and banishment (Brady, 1992, ¹⁹⁹⁷; Morice, Swift, & Brady, 1981). With the exception of the

preliminary work completed for this study, the home and school environments have not been targeted as part of community environmental approaches.

Three different environmental strategies were implemented to restrict access to HLPs (see Johnston, et al, in press). The retail environmental strategy focused upon identifying and inventorying high risk products, developing written store policies about sales of HLPs, posting warnings or implementing sales restrictions, controlling the display and availability of HLPs, substituting other products for HLPs, and restricting HLP sales to youth purchasers. The home environmental strategy focused upon parents communications with children about harms related to HLP use, identifying and inventorying high risk products within the home, controlling the availability of HLPs within the home, and advocacy for HLP restrictions within the community. The school environmental strategy focused upon identifying and inventorying high risk products, establishing guidelines for the appropriate and safe use of potentially harmful products, placing limits on the availability of HLPs within schools, and substitution of safer alternative products whenever possible.

The ThinkSmart Curriculum

Figure 1 also shows that community mobilization efforts are expected to support the implementation of school-based programs that affect cognitive and behavior skills found to be important in reducing the use of alcohol and other drugs among adolescents. Strong evidence from an increasing number of studies and reviews shows that specific school-based approaches, those that focus upon the development of life skills that prevent youth from engaging in drug use, can affect the developmental time course of drug use among adolescents (Botvin, Botvin, & Ruchlin, 1998; Tobler & Stratton, 1997; Gottfredson, 1997,²⁰⁰¹; Hawkins, Arthur, & Catalano, 1995). So-called “life skills training” programs have been demonstrated to affect inhalant use among young adolescents (eighth-graders in 29 New York City schools, Griffin, Botvin, Nichols, & Doyle, 2003). In addition, these programs appear to affect important mediating variables that would also affect HLP use, intentions to use inhalants and peer normative expectations for inhalant use. In a recent exploratory study based upon a large-scale cross-sectional survey of Alaskan students we found that normative expectations and social influence factors significantly correlate with inhalant use (Collins et al., in review). Among sixth-grade students, youth attitudes favorable toward drug use, perceived risk of drug use, and friends' use of drugs were associated with both lifetime and past-30-day inhalant use. Schinke, Tepavac, & Cole (2000) and Raghupathy and Peterson (2002) found that bicultural competence skills led to the reduction of substance use among American-Indian adolescents.

The *ThinkSmart* curriculum (Ogilvie, et al. 2006) that was implemented in this feasibility study is a modified form of the *Personal Intervention Curriculum*, an effective research-based drug prevention curriculum developed by Stephen Schinke and adapted from Gilbert Botvin's *Life Skills Training* for rural populations in the Pacific Northwest. Schinke's curriculum addresses risk factors associated with youth substance abuse and builds protective factors in pre-adolescents noted above. The *Think Smart* curriculum consisted of 15 sessions taught as weekly one hour sessions or bi-weekly 30 minute sessions in fifth and sixth grade health classes. The curriculum was offered in the fall in three communities and spring in one community. Community Prevention Organizers were trained to teach the curriculum in each of the targeted communities.

Summary

The evidence presented here suggests that an effective community prevention model for the reduction of HLP use should incorporate environmental strategies that reduce the supply of HLPs in combination with a cognitive-behavioral life skills curriculum that focuses upon demand reduction, i.e., the reduction of youth demand for and use of HLPs. The environmental

strategy should focus upon access through retail outlets, the home, and schools. Given the extensive access to HLPs that young people currently have in many rural communities in Alaska, substantial reductions in access may be achieved with relatively little community effort. The recommended environmental strategies were taken up by all the Alaskan communities in this feasibility study. Based on recommendations in the research literature, and the observation that HLP use is particularly extensive and harmful among younger adolescents, the *ThinkSmart* curriculum was directed toward younger students in schools within the target communities who might be at risk for the use of HLPs (e.g., 5th and 6th graders; Mohai, 1991).

The current feasibility study was intended to assess the degree to which the community prevention model presented in Figure 1 could be effectively implemented in rural communities in Alaska. It was also intended to enable a preliminary examination of the degree to which the interventions implemented in these communities affected variables intermediate to program outcomes (e.g., perceived availability of HLPs). Since a subset of the communities implemented both the proposed environmental and school-based strategies, we focused upon data from these communities and examined changes in mediating variables measured in baseline and follow-up surveys among students from these communities.

METHODS

Survey data were collected from samples of fifth, sixth and seventh grade students at baseline (wave 1) and sixth, seventh, and eighth grade students one year later (wave 2). Across the four target communities all students enrolled in the fifth through seventh grades in all regular public schools during the 2005–2006 school year were asked to be in the survey. One school district was unsuccessful in obtaining sufficient participation rates, refused to distribute some parental consent forms, and had a mid-year involuntary change of superintendents. Consequently, this community did not participate in the wave 2 survey and was dropped from further analyses.

The three rural communities represented in the analysis are located in Northwest and Southeast Alaska. The communities are hubs that provide services to a network of 5–12 Alaska Native villages around each hub community. The population of these three hub communities ranges from 3,082 to 8,835 (U.S. Census Bureau, 2000). Each community has a separate school district, and seven public schools (three elementary, three middle, and one public charter) across these districts provide classroom education to the fifth through eighth grades. Each of the schools, with the exception of the one charter school, serves between 300 and 400 students. All of the schools have high percentages of Alaska Native students (29%, 62%, and 90% in the schools of the three respective communities; Alaska Department of Education & Early Development, 2007).

A significant challenge to conducting the student survey was obtaining parental consent. Federal regulations (45CFR46) require informed consent be obtained from parents of minors participating in federally funded research. 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, consent in which parents need only 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 (e.g., Fendrich & Johnson 2001; White, Hill, & Effendi, 2004). Active consent, consent in which parents must return a signed form approving participation of their children in school-based surveys, has been shown to reduce participation rates (Ellickson and Hawes, 1989; Esbensen et. al., 1999; Johnson et. al., 1999). Active consent procedures also appear to increase nonresponse errors (Dent et. al. 1993; Baker, Yardley, & McCaul 2001) and potentially result in lower estimates of alcohol, tobacco, and other drug use (Dent et. al., 1993; Esbensen et. al.,

1999; Pokorny, 2001). The state statute, in particular, has significantly limited the ability of Alaskan schools to obtain adequate student response rates on important surveys regarding the health and well-being of Alaskan students. The Alaska law requires a minimum of two weeks notice to parents prior to survey administration, and limits consent to one school year. In the case of a longitudinal study with more than an 8-month follow-up, this means that researchers must conduct the active parental consent procedures twice.

Consent forms were disseminated up to three times in the communities at each wave either in the initial registration packet, sent home with children, or mailed directly to parents at their home addresses. Consent form return rates, refusals rates, and response rates are based on the official Alaska Department of Education & Early Development October 1 enrollment numbers for the 2005–2006 school year for wave 1 and 2006–2007 school year for wave 2 for the participating grades. Across the three communities, the overall consent form return rate achieved was 72% for the baseline survey and 58% for the post survey. However, there were also 14% and 10% refusal rates in the two waves, dropping the total response rates across all three communities to 58% and 48% at wave 1 and 2.

Survey Administration and Response Rates

In the months preceding each survey, 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. One piece of these confidentiality procedures involved asking the students 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 the research team in Anchorage where they were processed and analyzed.

After training by local project staff and using project protocols, teachers administered the survey in a classroom setting of seven schools (three middle, three elementary, and one multi-grade charter) in Fall 2005 and five schools (three middle, one elementary, and one multi-grade charter) in Fall 2006. (Sixth graders in two of the communities attend middle school resulting in the smaller number of elementary schools in wave 2.) Ultimately, the student survey was administered to 336 students in wave 1 and 286 students in wave 2. Of those students who had parental consent to participate in the survey, approximately 90% completed the survey at each wave. Absenteeism and youth dissent account for the other 10%. Thus, the survey response rate in the three communities ranged from 45 to 65% at baseline and 35 to 61% at post-test for the total survey population (all enrolled students in the selected grades). The overall response rate was 51% and 43% of the entire study population for the respective waves.

For both waves, there were more students surveyed in the Northwest schools (54% in wave 1, and 57% in wave 2) than in Southeast schools (46% and 43%, respectively). The proportion of males and females in the sample was about the same with a slightly greater proportion of females in wave one and males in wave 2. However, for wave one, there were differences in the grade distributions of students, with a greater proportion of seventh graders in Northwest schools (35%) compared to Southeast schools (25%). Wave 2 had less differences in the grade distribution of the students in both regions with a higher proportion of seventh graders in both the Southeast (40%) and Northwest (38%) than sixth (32 and 29%) and eighth graders (28 and 33%). There were also differences in the ethnic distribution of the students in the two regions for both waves, with a greater proportion of Caucasians in Southeastern schools (63% in wave 1, 64% in wave 2) and more Alaska Native students in Northwestern schools (73 and 77%, respectively).

Measures and Analyses

The primary goal of the study was to assess the degree to which exposure to the preventive intervention affected intermediary variables representing (a) cognitive and social-behavioral characteristics of students related to HLP use and (b) perceived availability of HLPs from several environmental sources. Ancillary information was also collected on (c) intent to use and actual use of HLPs. During the time between waves 1 and 2 environmental and school-based preventive interventions were put in place in all communities. Consequently, there was no comparison group for the study and the statistical analyses of these data focused upon determining whether observed changes in measures were descriptively consistent with program impacts, a statistical approach suitable for this feasibility study.

The cognitive and social-behavioral measures consisted of six scales reflecting knowledge of HLPs use and consequences (α reliability of .760, wave 1), refusal skills ($\alpha = .986$), assertiveness ($\alpha = .833$), Native Alaskan cultural identity ($\alpha = .809$), peer normative beliefs ($\alpha = .925$), and peer use ($\alpha = .742$). Perceived availability of HLPs was assessed using four additional scales reflecting access to HLPs through all sources ($\alpha = .897$), the home ($\alpha = .811$), the school ($\alpha = .693$), and through retail outlets ($\alpha = .866$). Finally, intent to use and use of HLPs were assessed using scales that reflect intent to use ($\alpha = .646$) and intent to avoid use ($\alpha = .754$). Note that the general predictions from the conceptual model were that knowledge of HLPs, refusal skills, assertiveness, and cultural identity should improve or increase from wave 1 to wave 2. Friends' approval of use should decrease, as should the number of friends perceived as using HLPs. Measures of perceived availability should decrease as environmental constraints on access increase from wave 1 to wave 2. Finally, it was expected that intent to use would decline and intent to avoid use increase from wave 1 to wave 2.

We tested these predictions using Hierarchical Generalized Linear Models (HGLMs) for dichotomous outcomes (logit link function), and Hierarchical Linear Models (HLM) for continuous outcomes. Whereas conventional statistical methods (e.g., ANOVA) would have required that data be available for all students for both time one and time two, H(G)LMs provide a robust procedure that is more tolerant of missing data and maximizes use of complete cases within waves and over time (Raudenbush & Bryk, 2002). As some of the students provided data at both times one and two, we assumed a first-order autoregressive covariance structure. These analyses involved 622 total observations, where 471 students provided data at both times one and two.

Noting that the environmental preventive interventions affected all students regardless of grade level, but the school-based interventions were directed only to fifth and sixth, not seventh, graders, program effects were likely to be differentiated both across time by grade level (using as the reference grade level at wave 1). Consequently we tested for changes in mediating and outcome measures using a hierarchical model specified at the individual level (level 1) as:

$$\text{Outcome} = \pi_0 + \pi_1 (\text{Time}) = \pi_2 (\text{Lifetime ATOD Use}) + \pi_3 (\text{AN/AI}) + \pi_4 (\text{Caucasian}) + \pi_5 (\text{Male}) + \pi_6 (\text{Red. Lunch}) + e$$

with the following specifications for level two effects:

$$\begin{aligned}\pi_0 &= \beta_{00} + \beta_{01} (\text{Grade Contrast}) + r \\ \pi_1 &= \beta_{10} + \beta_{11} (\text{Grade Contrast})\end{aligned}$$

Thus, we used a coded vector representing time ($-1 = \text{time one}$ and $+1 = \text{time two}$) and a dichotomous indicator of lifetime ATOD use (tobacco, alcohol, or marijuana) as predictors of

the outcomes of interest taking prior comorbid other drug use into account at the individual level. We also included as individual level predictors whether a student was an Alaska Native or American Indian (AN/AI), Caucasian, male, or received free/reduced price lunches (Red. Lunch). At level two, dichotomous indicators represented the contrast between grades which were exposed to both the environmental strategies and the *ThinkSmart* curriculum (5th and 6th grades) or were only exposed to the environmental strategies alone (7th grade) affecting the intercept term π_0 . We also examined the cross-level interaction between the grade contrast and time, as we also suspected that changes over time would be different as a function of differential exposures across grades to the different intervention strategies. All dichotomous predictors were orthogonally coded, such that possession of the named attribute was coded as a +1 and the absence of the attribute was coded as -1. Finally, as indicated by the error term in the first level two equation, we assumed that non-independence in the outcomes would arise from the multiple observations that were nested within each student (autocorrelated error).

RESULTS

Table 1 presents the statistical relationships observed between components of the analysis model and the cognitive and social-behavioral characteristics of students and their peer networks. Each labeled intermediate outcome includes a model specific estimate of the intraclass correlation coefficient, ICC, the effect of each independent measure, b , an asymptotic t-test of that effect, t , and an estimate of effect size, r . The significance level of each effect is given by a one-tailed t-test since directional expectations for each component of the analysis model was suggested by the analysis model (Figure 1) and could be clearly stated (e.g., greater knowledge of HLPs was expected among older students in higher grades). Since there was no control group with which to compare program effects, it was generally expected that (a) the intervention programs would increase knowledge, refusal skills, and assertiveness, and increase cultural identity, from wave 1 to wave 2 and (b) this increase would be greatest among the 5th and 6th grade students exposed to the *ThinkSmart* program.

As shown in the table, only knowledge of HLPs significantly increased from wave 1 to wave 2. Refusal skills and the measure of assertiveness significantly decreased from wave 1 to wave 2 and the measure of cultural identity remained the same across waves. Importantly, the negative time-by-grade interaction for the knowledge variable suggests that 5th and 6th grade students came to know more about HLPs use and problems than 7th grade students as a function of the *ThinkSmart* program (program administered only to the lower two grades). This effect was also significant for the measure of assertiveness, showing that declines in levels of assertiveness over time were less among 5th and 6th grade students (presumably a beneficial effect of the program). A similar pattern of relationships was observed for the measure of refusal skills, but with this effect not significant.

The measures of friends approval of HLP use and number of friends who used HLPs were unaffected over time, indifferent over grades, and not selectively effected by the school-based intervention (as revealed in the non-significant time-by-grade interactions). Comorbid lifetime ATOD use, not surprisingly, was significantly positively related to these measures of peer group approval and use.

Table 2 presents the statistical relationships observed between components of the analysis model and the self-report measures of perceived availability from different sources. Examining the summary measure of perceived availability across all sources first, there were significant decreases from wave 1 to wave 2 of the study. In addition, students in grade 7 showed greater declines in perceived availability than those in lower grades. Those older students most likely to access HLPs also showed greater decrements in perceived availability. This pattern of effects is repeated for the measures of availability at home and at school, significantly so in both cases.

The same pattern of effects is repeated for availability through retailers, but not significantly so.

Table 3 presents the statistical relationships observed between components of the analysis model and the self-report measures of intent to use. A significant increase over time in reports of intent to avoid use was observed. Again, for these measures comorbid lifetime ATOD use was important, positively related to intent to use and negatively related to intent to avoid use.

DISCUSSION

The general findings from the current study indicate that the combined environmental and *ThinkSmart* interventions may have affected knowledge of HLP use and problems and perceived availability of HLPs through the home and at school. Over time, knowledge of HLP use and problems increased while perceived availability from environmental sources decreased, suggesting combined impacts of both the *ThinkSmart* curriculum and the environmental strategies implemented in this project. These findings are quite encouraging since this preliminary intervention program was fielded only to test the feasibility of the program implementation itself. That is, the goal of the current implementation was to determine whether the program could be effectively fielded within small rural Alaskan communities, not whether the program would have demonstrable effects in this implementation. As such, the observed intermediate program effects are suggestive that a fully implemented community intervention program, one that has learned the lessons of this work, could make a substantial difference in HLP use in these communities. However, without a fully developed case-comparison community study these program effects can only be treated as suggestive. Some skepticism should remain for this reason and for the reason that the program appeared to have some iatrogenic effects; refusal skills and assertiveness declined from wave 1 to wave 2 of the study (although less so in the latter case among grade groups exposed to the *ThinkSmart* program).

The observed reductions in perceived availability suggest that the implementation of the environmental strategies made a difference in access to HLP products through the home and school. Informational training programs for parents provided them with guidelines by which to reduce HLP access in the home, and these appear to have been successfully implemented. However, the parent training did not appear to enable didactic interactions on specific issues with regard to specific products (e.g., access to glues when used in school work) and could be expanded. Changes in access to HLPs in school settings, facilitated through interactions with school administrators and teachers, also appeared to have successfully reduced access to HLPs in these environments. However, teachers and administrators appeared to require much more lead time to adopt new strategies to restrict access to HLPs. Finally, there may be many reasons for the absence of effects related to access through retail outlets. Among others the most important appeared to be the fact that most retailers are too busy to implement new sales rules or restrictions without substantial lead time to train their staff, reorganize shelves, or without some public reward for accomplishing these changes in business practice.

The observed increases in knowledge about HLPs encourage us to observe that the *ThinkSmart* curriculum can have an impact on children's lives. However, it is clear that comorbid substance use, if not attacked broadly, is difficult to separate from risks related HLP use (see Tables 1 and 3). In addition, the apparent iatrogenic effects related to changes in refusal skills and assertiveness suggest that a number of steps should be taken to sharpen and intensify the implementation of this program. Observers of the program implementation noted in this regard that, since management issues are of such paramount importance in classrooms, teachers are best responsible for administering the curriculum. They also noted that the lessons may have contained too much information and enabled too little interaction and role playing about

important topics (e.g., methods for refusing offers of HLPs) and that the reading level of the materials was higher than that of many students in the target grade group. Readability of the materials became a big issue in these rural communities.

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Figure 1.
Community Prevention Model (CPM) effects on youth use of harmful legal products (HLPs).

Table 1
Models examining program and environmental strategy effects on intermediate outcomes.

	Knowledge (ICC=.263)			Refusal Skills (ICC=.000)			Assertiveness (ICC=.191)			Cultural Identity (ICC=.201)			Friends Approve Use (ICC=.000)			# of Friends Who Used (ICC=.483)		
	b	t	r	b	t	r	b	t	r	b	t	r	b	T	r	b	t	r
Intercept	5.15	49.26*	.92	2.47	25.83*	.77	1.29	33.08*	.84	2.10	71.51*	.96	.36	11.35*	.46	.17	7.13*	.31
Time	.28	3.61*	.29	-.17	-2.22*	-.18	-.06	-2.06*	-.17	.00	-.12	-.01	.00	.05	.00	-.01	-.43	-.04
Grade Contrast	.24	2.80*	.23	-.01	-.16	-.01	-.04	-1.27	-.11	-.06	-2.34*	-.19	-.02	-.73	-.06	-.02	-1.09	-.09
Time * Grade Contrast	-.09	-1.21	-.10	-.10	-1.30	-.11	-.05	-1.72+	-.14	.03	1.51	.13	-.01	-.58	-.05	-.01	-.84	-.07
Time * Grade Contrast * Native Amer. Indian	-.08	-.92	-.08	.14	1.69+	.14	.00	-.09	-.01	-.06	-2.37*	-.19	.16	5.69*	.43	.12	5.98*	.45
Time * Grade Contrast * Caucasian	-.19	-2.10*	-.17	.24	2.77*	.23	.08	2.37*	.19	.07	2.59*	.21	-.01	-.26	-.02	.00	-.03	.00
Time * Grade Contrast * Male	.17	1.73+	.14	.06	.72	.06	-.01	-.40	-.03	-.01	-.55	-.05	-.02	-.70	-.06	-.01	-.65	-.05
Time * Grade Contrast * Female	-.20	-2.63*	-.21	.13	1.92+	.16	.02	.57	.05	-.04	-2.01*	-.17	.03	1.48	.12	.02	1.04	.09
Time * Grade Contrast * Ethnicity	-.10	-1.19	-.10	.14	1.87+	.15	.05	1.53	.13	.05	2.14*	.18	.00	.15	.01	-.03	-1.85+	-.15

Note: Analyses based on 622 total observations and 471 unique participants; SE can be calculated by taking the product of the t and B

* p < .025,

+ p < .050

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Table 2

Models examining program and environmental strategy effects on intermediate on perceived availability.

	Availability (ICC=.173)			Availability at Home (ICC=.067)			Availability at School (ICC=.078)			Availability at Retailers (ICC=.178)		
	b	t	r	b	t	r	b	t	r	b	t	r
Intercept	1.81	48.55*	.91	1.61	34.23*	.84	2.14	60.87*	.94	1.69	33.83*	.84
Time	-.09	-3.07*	-.25	-.14	-3.65*	-.29	-.08	-2.80*	-.23	-.05	-1.29	-.11
Grade Contrast	-.08	-2.52*	-.21	-.09	-2.23*	-.18	-.03	-1.20	-.10	-.11	-2.74*	-.22
Time*Grade Contrast	-.06	-2.21*	-.18	-.08	-2.04*	-.17	-.06	-2.21*	-.18	-.05	-1.33	-.11
Lifetime ATOD Use	-.16	-5.00*	-.39	-.19	-4.66*	-.36	-.15	-4.71*	-.37	-.15	-3.39*	-.27
AK Native/Amer. Indian	.13	3.94*	.31	.18	4.32*	.34	.08	2.62*	.21	.13	2.97*	.24
Caucasian	-.07	-1.97+	-.16	-.09	-2.11*	-.17	-.03	-.99	-.08	-.08	-1.78+	-.15
Male	-.01	-.51	-.04	-.02	-.69	-.06	-.02	-.79	-.07	.00	.12	.01
Red. Lunch	.02	.79	.07	.03	.92	.08	.03	1.21	.10	.01	.17	.01

Note: Analyses based on 622 total observations and 471 unique participants; SE can be calculated by taking the product of the t and B

*
p < .025,

+
p < .050

Models examining program and environmental strategy effects on intermediate on HLP substance consumption.

Table 3

	Intent to Use-Risk (ICC=.195)		Intent to Avoid Use-Protective (ICC=.191)	
	b	t	b	t
Intercept	.30	9.46*	2.04	34.58*
Time	.00	.10	.10	2.17*
Grade Contrast	.02	.72	.07	1.53
Time*Grade Contrast	-.02	-.98	.02	.47
Lifetime ATOD Use	.14	5.25*	-.14	-2.80*
AK Native/Amer. Indian	-.07	-2.57*	-.05	-.92
Caucasian	-.06	-1.98*	.15	2.72*
Male	.03	1.20	-.15	-3.52*
Red. Lunch	.01	.25	.02	.47

Note: Analyses based on 622 total observations and 471 unique participants; SE can be calculated by taking the product of the t and B

* p < .025, + p < .050