

*American Journal of Public Health* (in press)  
MS #94/1081

1. Title: **Outcomes of a Community-wide Alcohol Use Prevention Program during Early Adolescence: Project Northland**

2. Running Head: Outcomes of Project Northland

3. Authors:

Cheryl L. Perry, PhD<sup>1</sup>

Carolyn L. Williams, PhD<sup>1</sup>

Sara Veblen-Mortenson, MPH, MSW<sup>1</sup>

Traci L. Toomey, PhD<sup>1</sup>

Kelli A. Komro, PhD<sup>1</sup>

Pamela S. Anstine, MA<sup>2</sup>

Paul G. McGovern, PhD<sup>1</sup>

John R. Finnegan, PhD<sup>1</sup>

Jean L. Forster, PhD<sup>1</sup>

Alexander C. Wagenaar, PhD<sup>1</sup>

Mark Wolfson, PhD<sup>1</sup>

<sup>1</sup>Division of Epidemiology, School of Public Health,  
University of Minnesota, Minneapolis, Minnesota 55454

<sup>2</sup>Group Health Cooperative, Center for Health Studies  
Seattle, Washington, 98101

4. Correspondence and reprint requests:

Cheryl L. Perry, PhD

Professor, Division of Epidemiology

School of Public Health

University of Minnesota

1300 South Second St. Suite 300

Mpls. MN 55454

5. Number of words in text: 5800

6. Number of tables/figures: 3

7. Key Words: Adolescent, alcohol use, prevention, community, program, junior high school, middle school

Adolescent drinking and other drug use remain major public health problems in this country, despite some encouraging declines in the prevalence of use.<sup>1-7</sup> Alcohol use among adolescents is widespread (e.g., 88% of twelfth graders reported any lifetime use in 1992), even though drinking is illegal for essentially all high school students.<sup>3</sup> Motor vehicle crashes are the leading cause of death for adolescents,<sup>8</sup> with one-third to one-half involving alcohol.<sup>9</sup> Furthermore, early onset of alcohol and tobacco use is a risk factor for progression to more serious forms of drug use.<sup>10</sup>

The pervasiveness and promotion of alcohol use in our society,<sup>6</sup> contrasted with the needs and skills of youth, create a social environment that puts many adolescents at risk for alcohol-related problems. Public health strategies to prevent alcohol-related problems typically adopt either demand or supply reduction approaches.<sup>5,11</sup> School-based programs addressing individual characteristics and peer influence (i.e., demand reduction) are the most common approaches to preventing onset of alcohol and other drug use.<sup>6</sup> Early adolescence has been targeted for program implementation because this is the developmental period just prior to experimentation. School programs focusing on social influences, such as peer resistance training or attempts to change perceived norms, have shown considerable promise for changing alcohol use rates.<sup>5,6,12-20</sup> Several factors emerge from this literature as potentially critical to adolescent alcohol use prevention efforts: 1) the need for adequate number of hours of curricula over at least three years;<sup>19</sup> 2) fidelity of implementation to the intervention protocol;<sup>17</sup> 3) peer involvement in implementation;<sup>17,18,21</sup> 4) an intervention focus on social influences, life skills, and peer resistance skills;<sup>15,19,22</sup> 5) an intervention focus on changing perceived alcohol norms;<sup>23</sup> 6) the need for parent, peer, and community involvement in changing alcohol use norms.<sup>22,24</sup> 7) school-based demand reduction strategies as necessary but not sufficient, components of successful prevention efforts.<sup>11,15,24-27</sup> Unfortunately, multi-level interventions that include both individual behavior change (demand) and

environmental change strategies (supply) are far less common in alcohol use prevention programs,<sup>6</sup> despite their utility in reducing tobacco use during adolescence.<sup>28-30</sup>

Project Northland is a community-wide research program to prevent young adolescent alcohol use which was designed to test the efficacy of a multi-level, multi-year intervention program for youth.<sup>11</sup> It is the first such trial that has randomized school districts and adjoining communities to intervention condition, that specifically targeted young adolescent alcohol use, and that used a multi-level intervention program. It was anticipated that this multi-level program would change parent-child communication about alcohol use, the functional meanings of alcohol use for young people, the students' self-efficacy to resist alcohol, peer influences to drink, alcohol use norms, and ease of access to alcohol in their communities. This paper describes the initial outcomes of Project Northland after three years of intervention.

## Methods

### Subjects

Project Northland is located in northeast Minnesota in mostly rural, middle to lower-middle class communities. The population of the six participating counties is 235,000, of primarily European ethnic composition. This area of Minnesota rates at the top of alcohol-related problems in the state.<sup>31</sup> There are seven American Indian reservations in the area. The 24 school districts were recruited systematically;<sup>11</sup> four smaller school districts were combined with nearby school districts (so there was adequate sample size in each unit to be randomized) and these 20 combined districts were blocked by size (small, medium, large, very large) and randomized to intervention or reference conditions (N=10 intervention; N=10 reference). The primary study cohort is the Class of 1998 in these schools districts, who were sixth grade students at baseline in Fall, 1991 (N=2351). Ninety-four percent of these students are white. American Indian students constitute about 5.5% of the study's cohort. Because of their small number, analyses of intervention effects with this subgroup was not possible.

### Intervention Programs

The intervention programs were implemented with the Class of 1998 during their sixth, seventh, and eighth grades, and in the intervention communities as a whole, during the same period, from 1991-1994. These intervention programs include parent involvement/education programs, behavioral curricula, peer participation, and community task force activities.<sup>5,11</sup> Each intervention year had an overall theme that uniquely identified Project Northland's programs and was tailored to the cohort's developmental level and school organization, since most of the students moved from elementary to

junior high schools between sixth and seventh grades. The programs underwent extensive pilot tests in a different, but comparable, Minnesota community, and revisions prior to implementation.

**Sixth grade.** The Slick Tracy Home Team Program was implemented in 1991-92 and involved a “home team” approach,<sup>32</sup> consisting of four sessions of activity-story books (with characters Slick Tracy and Breathtest Mahoney as role models). The intervention students completed the activity books as homework with their parents during four consecutive weeks.<sup>33</sup> In addition, Northland Notes for Parents were included in each Slick Tracy activity book and contained information for parents on young adolescent alcohol use. The intervention also involved small group discussions around the themes of the books during school and the Slick Tracy Family Fun Night, an evening fair where students’ posters and projects from the program were displayed. Details of the content and implementation of the Slick Tracy Program are presented elsewhere.<sup>33</sup>

Project Northland Community-wide Task Forces were formed during 1992. Task force members were recruited by field staff based on their willingness to participate and roles in their communities. The first task force training session was held in April, 1992, for 25 representatives from 13 task forces across the intervention communities. The task forces include members from a cross-section of the community: government, law enforcement, school representatives, business representatives, health professionals, youth workers, parents, concerned citizens, clergy, and adolescents.

**Seventh grade.** The Amazing Alternatives! Program was implemented in 1992-93 and consisted of 1) a kick-off evening with parents (the Awesome Autumn Party), 2) an eight-week, peer-led classroom curriculum (Amazing Alternatives!), 3) a Peer Participation Program to create alternative alcohol-free activities (T.E.E.N.S.), 4) four Amazing Alternatives! Home Program booklets mailed

directly to parents, and 5) three new issues of Northland Notes for Parents. The overall theme of the seventh grade programs was to introduce the intervention cohort and their parents to ways to resist and counteract influences on teens to use alcohol.

The Amazing Alternatives! classroom program included eight sessions of peer- and teacher-led activities over eight weeks. This program is based on that used in the World Health Organization study<sup>18</sup> and the Saving Lives Program.<sup>34</sup> The program used audiotape vignettes, group discussions, class games, problem-solving, and role plays related to themes of why young people use alcohol and alternatives to use, the influences to drink, strategies for resisting those influences, normative expectations that most people their age don't drink, and intentions not to drink. Peer leaders for the classroom program were selected with an open election in which students chose individuals who they "liked and respected," without any admonishments from adults to restrict the leaders to non-users of alcohol.

The Peer Participation Program was named T.E.E.N.S. (The Exciting and Entertaining Northland Students) by the students involved.<sup>35</sup> The program was designed to provide peer leadership experience outside the classroom through participants' involvement in planning alcohol-free activities for seventh grade students. Adult volunteers were recruited from the middle and junior high schools to facilitate the T.E.E.N.S. groups. One-day leadership training sessions were held in fall, 1992, for 73 student representatives from 18 schools. The leadership training included learning methods to find out seventh graders' favorite activities, how to plan a budget for an activity, and how to publicize an activity. Planning booklets were given to the students. Sixteen percent of the intervention cohort (166 students) participated in planning at least one activity for their peers.

Parental involvement was obtained through the Amazing Alternatives! Home Program, patterned after the sixth grade program, but mailed directly to parents. The Home Program consisted of four booklets, which included direct behavioral prescriptions for parents and activities for parents to complete with their seventh graders.<sup>36</sup> In addition, the three new issues of Northland Notes for Parents provided an update of Project Northland events and another format for educational messages.

The Community-wide Task Force activities in 1992-93 involved the passage of five alcohol-related ordinances and three resolutions, including enactment of local ordinances requiring responsible beverage service training to prevent illegal alcohol sales to underage youth and intoxicated patrons in three of the communities. Other activities included the initiation of a Gold Card program to link community businesses and schools (in which businesses provided discounts to students who pledged to be alcohol- and drug-free).

**Eighth grade.** PowerLines was implemented in 1993-94 and consisted of an eight-session classroom curriculum (PowerLines); a theater production with eighth grade actors, entitled “It’s My Party,” performed at each school for classmates, parents, and community members; three new issues of Northland Notes for Parents; and the continuation of the T.E.E.N.S. groups and Community-wide Task Force activities.

The goals of the eighth grade interventions were to introduce students to the “power” groups (individuals and organizations) within their communities that influence adolescent alcohol use and availability and to teach community action/ citizen participation skills.<sup>37</sup> Students interviewed parents, local government, law enforcement, school teachers and administrators, and retail alcohol merchants about their beliefs and activities concerning adolescent alcohol use. Students conducted a “town

meeting” in which small groups of students represented various community groups and made recommendations for community action for alcohol use prevention.

Live theater was seen as a potentially useful prevention strategy with parents in the third year.<sup>38</sup> This idea led to a collaboration with the Child’s Play Theatre Company of Minneapolis. Development of a production of “It’s My Party” began with script writing by Child’s Play and Project Northland staff. Two teams of actor-educators were trained to conduct a half-day workshop with approximately 10 eighth grade students from each of the 20 intervention schools and then went on tour. Following the workshop, and on the same day, the students performed the play for their peers, parents, and members of the community.

T.E.E.N.S. continued during the eighth grade and alternative activities took place in all intervention school districts. In addition, three editions of TEENSpeak, a newsletter written by and for eighth grade students in the Project Northland cohort, were sent to parents and peers.

The Community-wide Task Forces continued their efforts throughout 1993-94, resulting in 28 task force meetings during the year. Increased emphasis was given to collaborating with existing organizations to make as many linkages as possible with local groups that directly influence underage drinking. Activities during this year included: 1) discussions with local alcohol merchants about their alcohol-related policies concerning young people; 2) distribution of materials that support policies concerning the sale of alcohol to minors, including ID checks and legal consequences for selling alcohol to minors; 3) ongoing meetings to initiate new Gold Card Programs to link community businesses and schools; and 4) the continued sponsorship of alcohol-free activities for young teens, including the establishment of a Teen Center in one community.



In summary, students in the intervention communities in the Class of 1998 have been exposed to three years of parental involvement, behavioral curricula, peer leadership opportunities, and community-wide task force activities. The students were educated with skills to communicate with their parents about alcohol (sixth grade), to deal with peer influence and normative expectations about alcohol (seventh grade), and to understand methods that bring about community-level changes in alcohol-related programs and policies (eighth grade). At the same time, changes were sought in how parents communicated with their children, how peers influenced each other, and how the communities responded to young adolescent alcohol use. Therefore, not only were students learning skills to affect their social environment, but changes in the social environment were also directly sought.

**Reference school districts.** The reference districts' usual alcohol and other drug education programs continued in these districts and adjoining communities from 1991-1994. A survey of these programs was undertaken in 1992. Nearly all of the students (over 90%) in the reference districts had taken part in Project DARE, compared with 40% in the intervention districts.<sup>33</sup> Also 21% of students in the reference districts had taken part in the Lion's Club-sponsored Project Quest, compared with 2% in the intervention districts. For the most part, the Slick Tracy program had replaced these programs in the intervention school districts during the 6th grade. During the 1994-95 school year, Project Northland school programs were offered to the reference school districts, beginning with the sixth grade program in 1994-95; 7 of the 10 reference school districts have chosen to adopt these programs.

### Evaluation Methods

**Subjects.** Students in the intervention and reference school districts were surveyed in their classrooms at baseline in fall, 1991, and at follow-up in spring 1992, 1993, and 1994. Of the 2351

students present at baseline, 93% (N=2191), 88% (N=2060), and 81% (N=1901) were surveyed at the end of the sixth, seventh, and eighth grades, respectively. Of the 450 (19%) lost to follow-up at the end of eighth grade in spring, 1994, 231 (51.3%) were in the intervention condition. There were no significant differences in baseline alcohol use between those who were lost to follow-up in the intervention versus reference conditions. Of the 450, 62% moved out of the area, 19% were parent or student refusals, 9% moved across treatment conditions, 7% were absent, and 3% were deleted because of inconsistent responding. No significant differences were found in baseline alcohol use between those who were lost to follow-up and those who remained.

**Measures.** The student questionnaire contains items related to Project Northland program exposure, psychosocial factors, and behavior.<sup>39</sup> The survey includes measures of alcohol use, tobacco use, other drug use, peer influences, self-efficacy (confidence in being able to refuse offers of alcohol), functional meanings of alcohol use (reasons not to use alcohol), communication with parents, normative expectations around alcohol use, perceptions of ease of access to alcohol, attendance at activities with/without alcohol, and demographic factors.

A scale was created that measures an adolescent's tendency to use alcohol (Tendency Scale), combining items about intentions to use alcohol and actual alcohol use. The measures of peer influence, self-efficacy, and perceptions of access to alcohol also formed scales with satisfactory psychometric properties.<sup>39</sup> These scales were scored by adding the points for each individual item. Because the distributions of many items in these scales were skewed and made of differing response options, Z-scores were used in the tests of significance.

Other measures were used to assess the social environment of the cohort at baseline and to examine intervention/reference group differences. These measures included a phone survey of parents

in half of the households of the Class of 1998 cohort, alcohol purchase attempts by young buyers,<sup>40</sup> alcohol merchant telephone surveys,<sup>41</sup> and interviews with community leaders.<sup>11,42</sup>

### Analysis Methods

Differences between intervention and reference conditions were tested at baseline and at each follow-up using mixed model regression methods (mixed model ANCOVA), which can accommodate fixed effects, random effects, and correlated observations within assignment units that are found in community trials research.<sup>43</sup> The unit of randomization, the combined school district, was specified as a nested random effect. The school district ICCs (Intraclass Correlation Coefficients) ranged from 0.002 (past week alcohol use, Spring 1994) to 0.03 (past year alcohol use, Spring 1993), with a median value of 0.015. (Other ICCs are available from the authors.) Because each year the students changed classrooms, and changed schools between sixth and seventh grades, classes and schools were not directly examined as nested effects.<sup>43,44</sup>

More students in the intervention districts reported alcohol use at baseline than did students in the reference districts.<sup>33</sup> Therefore, analyses were performed for the entire sample, and then separately for baseline users (any lifetime use at fall, 1991) and non-users. Baseline measures of alcohol use were used as covariates in the longitudinal analyses of the entire sample and the baseline users. Since there were no significant differences and no interaction effect between gender and intervention condition, data from boys and girls were pooled. Students in the intervention districts were slightly (0.1 years) older at baseline. However, baseline differences in alcohol use between conditions persisted, even when adjusted for age. There were fewer white students in the intervention districts than in the reference districts; race was controlled for in all outcome analyses. Baseline measures of the psychosocial variables, if available (some parent communication and functional meaning items were not assessed at

baseline), were used as covariates in analyses of those variables at follow-up. These analyses, then, incorporate within subjects factors in each analysis, by adjusting for baseline measures and race.

## **Results**

### Participation in the Intervention Programs

Project Northland was able to maintain widespread participation in the program, including three years of curricula implementation in all intervention schools, parent participation in alcohol education activities, and participation by nearly half of the students in peer-planned alcohol-free activities outside of school.<sup>33,35,36</sup> The sixth grade intervention was implemented primarily in students' homes and high rates of participation were demonstrated.<sup>33</sup> In seventh grade, all intervention schools implemented the program curriculum using elected, trained peer leaders (N=273) and held the fall evening party, with about 1700 people attending. Participation in the seventh grade parent education program is described elsewhere.<sup>36</sup> In the eighth grade, all intervention schools implemented the curriculum, as well as a theater production with approximately 2700 people attending 20 performances. Peer-planned alternative activities occurred in seventh and eighth grades.<sup>35</sup> Community-wide task force activities were ongoing in all of the communities from 1992 through 1994.

### Alcohol and Other Drug Use Outcomes

Alcohol use outcomes were measured by the Tendency to Use Alcohol Scale and its separate items from fall 1991 to spring 1994 (Table 1). Among all students (N=1901), those in the intervention districts had statistically significant lower scores on the Tendency Scale by the end of eighth grade, indicative of less likelihood of drinking, than did students in the reference districts. The Tendency Scale

score was also significantly lower among baseline non-users in the intervention districts. Although the Tendency Scale score was lower among baseline users in the intervention districts, the difference was not statistically significant.

The percent of past month and past week alcohol users is also shown in Table 1 for all four data points. For all students, the percent of students who reported alcohol use in the past month and past week was significantly lower in the intervention group at the end of eighth grade. For baseline non-users, students in the intervention districts consistently showed lower onset rates, significantly for past month and past week use at eighth grade. The percent of students who reported past-year alcohol use was also significantly lower among baseline non-users in the intervention districts at the end of the seventh [21.1% ( $\pm 2.6$ ) vs. 29.1% ( $\pm 2.6$ );  $p < .05$ ] and eighth grades [30.4% ( $\pm 2.6$ ) vs. 41.6% ( $\pm 2.5$ );  $p < .006$ ].

For baseline users, recent alcohol use substantially increased between the end of sixth grade and eighth grade, with rates of recent alcohol use among baseline users at the end of eighth grade more than double those of baseline non-users. There were more users in the intervention districts at baseline and at the end of the sixth grade; however, a cross-over occurred by the end of the seventh grade, with fewer students in the intervention districts reporting past month and past week alcohol use. This difference was more substantial, but not significant, at the end of the eighth grade.

The percent of cigarette users, smokeless tobacco users, and marijuana users are also shown in Table 1. Cigarette and smokeless tobacco use are defined as more than two or three occasions of use in their lifetime, and is indicated by “occasionally, but not regularly; regularly in the past; or regularly now.” Marijuana use is defined as any past year use. Among all students, there were no significant differences in the percent of cigarette users, smokeless users, or marijuana users between conditions.

However, the percent of cigarette users was 19% lower in the intervention districts, and the difference approaches significance ( $p < .08$ ) at the end of the eighth grade. For baseline non-users (of alcohol), the percentages of students reporting cigarette use and marijuana use were significantly lower in the intervention districts, and smokeless tobacco use approached significance ( $p < .06$ ) at the end of the eighth grade. There were no significant differences between conditions for baseline users.

Differences between conditions in poly-drug use among all students was examined by calculating the prevalence of combinations of alcohol use, cigarette use, and marijuana use. None of the combinations involving marijuana use were statistically significant. However, among all students, 14.3% ( $\pm 1.6$ ) of those in the intervention districts reported both using alcohol in the past month and having smoked cigarettes on more than one or two occasions, compared with 19.6% ( $\pm 1.6$ ) of those in the reference districts, a difference that was significant ( $p < .03$ ), and indicates a 27% reduction in “gateway” drug use.

### Psychosocial Factors

The three psychosocial scales, Peer Influence, Self-Efficacy, and Perceived Access were examined for differences between conditions at each of the four data points. These differences are shown for each of the three scales in Table 1. Among all students, those in the intervention districts had significantly lower scores on the Peer Influence scale by the end of eighth grade. There were no significant differences in the Self-Efficacy or Perceived Access Scales. However, the intervention students were significantly more likely to report that they could resist alcohol at a party or dance [ $3.94 (\pm .06)$  vs.  $3.74 (\pm .06)$ ;  $p < .03$ ] or when offered alcohol by a boyfriend or girlfriend [ $3.74 (\pm .04)$  vs.  $3.60 (\pm .05)$ ;  $p < .05$ ], even though the entire Self-Efficacy Scale showed no significant differences between groups. Among baseline non-users, students in the intervention districts had significantly lower

scores by eighth grade on the Peer Influence scale and higher scores on the Self-Efficacy scale, indicating less peer influence and greater self-efficacy to refuse alcohol than students in the reference districts. Scores on the Peer Influence, Self-Efficacy, and Perceived Access scales were not significantly different between groups of baseline users. However, the baseline users in the intervention districts were significantly more likely to report that it is difficult “to find a party that has alcohol” [1.77 ( $\pm$ .06) vs. 1.59 ( $\pm$ .06);  $p \leq .05$ ], even though the entire Perceived Access Scale showed no differences between groups.

Differences between conditions for the remaining psychosocial items were examined for all students. Table 2 presents data by condition for all students from sixth to eighth grade for the perceived norms, family communication, and functional meanings items. At baseline, students in the intervention districts were significantly less likely to perceive that “not many people my age drink alcohol.” By the end of the eighth grade students in the intervention districts were significantly more likely to perceive that peer drinking was not normative. They were also significantly less likely to report that people their age drink alcohol when they go out on a date [11.8% ( $\pm$ 1.9) vs. 17.8% ( $\pm$ 2.0);  $p < .04$ ].

There were four parent communication items. At baseline, students in the intervention districts were significantly less likely to report that their parents talked with them about problems drinking alcohol can cause young people, and marginally less likely ( $p < .06$ ) to report that their families had rules against young people drinking alcohol. By the end of the sixth grade, spring, 1992, students in the intervention districts were significantly more likely to report that their parents talked with them about the problems of drinking alcohol. By the end of the eighth grade, students in the intervention districts were marginally ( $p < .06$ ) more likely to report that their parents talked with them about the problems of drinking, marginally ( $p < .08$ ) more likely to report that their families have rules against young people drinking, and

significantly more likely to report that their parents have told them what would happen if they were caught drinking.

There were ten items measuring functional meanings of alcohol use, or the reasons for not using alcohol. These items were not measured at baseline. At the end of sixth grade, spring, 1992, students in the intervention districts were significantly less likely to view the following reasons for not using alcohol as important: parents have rules against alcohol use by people their age and fear of becoming an alcoholic. At the end of the eighth grade, students in the intervention districts were significantly more likely to view nine of the ten reasons as important for not using alcohol: parents have rules, hurts reputation, fear of becoming an alcoholic, sports eligibility, costs too much money, school rules, bad for health, hurts performance, and not give into peer pressure.

Among the remaining psychosocial variables,<sup>39</sup> for all students, there were no significant differences between conditions in the perception of their influence on their communities about alcohol-related issues. For the consequences of driving after drinking items, students in the intervention districts reported greater likelihood of being disciplined by the school [2.5 ( $\pm$ .05) vs. 2.2 ( $\pm$ .05);  $p < .001$ ]; there were no significant differences for the other six consequences. Finally, students in the intervention districts were marginally more likely to report never attending parties where people their age drink alcohol [63.2% ( $\pm$ 3.2) vs. 54.0% ( $\pm$ 3.2);  $p < .06$ ].

Among baseline non-users, significant differences between conditions for the perceived norms, parent communication, and functional meaning items paralleled those of all students. Additionally, baseline non-users in the intervention districts were more likely to report that they had significantly more influence in their communities about alcohol-related issues at the end of eighth grade [2.3 ( $\pm$ .05) vs. 2.1 ( $\pm$ .05);  $p < .01$ ] than baseline non-users in the reference condition.



Among baseline users at the end of eighth grade, students in the intervention districts were more likely than students in the reference districts to report that not many people their age drink alcohol [26.5% ( $\pm 3.9$ ) vs. 14.3% ( $\pm 4.1$ );  $p < .05$ ], that their parents have told them what would happen if they were caught drinking [63.5% ( $\pm 3.6$ ) vs. 51.9% ( $\pm 3.8$ );  $p < .04$ ], that there are two reasons (out of ten) not to use alcohol, that is, that their parents have rules against it [3.5 ( $\pm .1$ ) vs. 3.2 ( $\pm .1$ );  $p \leq .05$ ] and it would hurt their reputation [3.5 ( $\pm .1$ ) vs. 3.0 ( $\pm .1$ );  $p < .02$ ]; and that they are more likely to attend parties where no alcohol is present [3.61 ( $\pm .11$ ) vs. 3.26 ( $\pm .12$ );  $p < .05$ ].

## **Discussion**

The outcomes of Project Northland, after three years of intervention during early adolescence, provide additional evidence supporting community-wide, multi-component, multi-year approaches to alcohol use prevention. The project has demonstrated that a large number of school districts and communities can become involved in primary prevention efforts targeting adolescent alcohol use over a sustained period of time, and will fully participate in multiple levels of social-behavioral interventions. This commitment and fidelity appears to have yielded promising changes in self-reported adolescent behavior. Even with significantly greater reported alcohol use among students in the Class of 1998 in the intervention districts at baseline (despite randomization to condition), at the end of the eighth grade these students had significantly less reported tendency to use alcohol and there was significantly less reported past month and past week alcohol use among the intervention students, with past year use also non-significantly lower [44.1% ( $\pm 2.4$ ) vs. 50.6% ( $\pm 2.4$ );  $p < .08$ ]. Additionally, the poly-drug use of both cigarettes and alcohol was significantly lower among intervention students. At the end of the eighth grade, the intervention students also reported significantly less peer influence to use alcohol and drugs,

perceived fewer drinking peers, endorsed most of the listed reasons to not use alcohol, indicated greater self-efficacy to resist influences to drink at parties or with a boy/girlfriend, perceived greater likelihood of disciplinary action by the school for driving after drinking, and reported more communication with their parents about the consequences of their drinking. For intervention students as a group, then, Project Northland appears to have been successful in: 1) reducing alcohol use, 2) the tendency to use alcohol, 3) the combination of cigarette and alcohol use, 4) in changing the functional meanings of alcohol use, 5) reducing peer norms and peer influence to use, 6) introducing skills to resist peer influences, and 7) in increasing parent-child communication around the consequences of drinking. The larger social environment, including access to alcohol in the community, perceptions of social groups that influence teen alcohol use, and consequences of driving after drinking, was less likely to be affected.

Project Northland appears to have been more successful with students who had not used alcohol at the beginning of sixth grade than among students who had initiated use. Baseline non-users in the intervention districts were significantly less likely to drink at all levels of use, and to not use tobacco or marijuana at the end of three years. In addition to the psychosocial factors cited for all students, the baseline non-users also reported greater personal influence in their communities around alcohol-related issues than did students in the reference districts. Baseline non-users, then, were strongly influenced not to initiate drinking by their parents and peers, and reported greater efficacy to resist offers to drink, as well as to affect alcohol-related issues in their communities. Since these were the key themes of the Project Northland intervention programs -- parents (Slick Tracy), peers (Amazing Alternatives!), and community (PowerLines) -- the intervention goals appear to have been most realized with the baseline non-users.

Baseline users in the intervention districts, compared with baseline users in the reference districts, perceived that fewer people their age drink alcohol, were more likely to have been told by their parents what would happen if they were caught drinking, had attended more parties where no alcohol was present, had more reasons not to drink alcohol, and reported greater difficulty in finding a party that had alcohol. Despite these changes in the baseline users, the relative lack of significant differences in alcohol use at follow-up suggests that alcohol use may be difficult to reverse as early as the beginning of sixth grade. This resistance to change has also been noted for cigarette smoking, where prior behavior was shown to be the strongest predictor of future behavior.<sup>30,45,46</sup> Interventions for these students may need to be more acutely focused on the reasons for pre-adolescent alcohol use, and interventions designed around those reasons implemented prior to the sixth grade. Still, baseline users in the intervention districts, compared to users in the reference districts, went from significantly higher alcohol use at baseline to non-significantly less use at follow-up, with a cross-over occurring between the sixth and seventh grade surveys. Regression to the mean may explain the reduction in differences between groups from the beginning to the end of the sixth grade. However, after the sixth grade the slopes of onset appear to be consistently different for students in the two conditions, with an unexpected cross-over,<sup>47</sup> and with absolute differences in use rates for the two groups that are comparable to the baseline non-users. Because the baseline users comprise about a third of the entire cohort, this substantially reduces the power to detect significant differences between conditions for this sub-group. For example, among baseline users, we have 80% power to detect an absolute difference of 14% in past month alcohol use between conditions. We were able to detect differences among baseline non-users, where the sample size is almost double that of users, with an absolute difference of 6% (see Table 1). Importantly, there were no significant interactions between baseline use status and treatment condition

for past-month or past-week alcohol use at eighth grade. It is notable that the psychosocial factors that were different for the baseline users included parental communication about consequences and normative changes such as perceiving that not many people their age drink, having difficulty in finding a party with alcohol, and attending parties where no alcohol is present. For baseline users, these social barriers, in addition to enforced community regulations that reduce access to alcohol for underage youth,<sup>5</sup> may be as critical as changes in personal factors in preventing future alcohol use and alcohol-related problems. It may also be that the Slick Tracy Program, which encouraged parent-child communication during the sixth grade, may not have been powerful enough to change alcohol use behavior for the baseline users, a finding that has been noted elsewhere,<sup>48</sup> even though baseline users were just as likely to complete Slick Tracy booklets and attend Slick Tracy Nights as non-users.<sup>33</sup> Earlier attention to peer resistance and life skills training may have been more appropriate for this group.

The Project Northland design would have been strengthened by greater equivalence between intervention and reference districts at baseline. School districts and adjoining communities were recruited in the northeastern counties of Minnesota. Because adequate sample size was a concern, we blocked by size of school district, and then randomized to condition. Sample sizes between groups are equivalent and adequate to detect the differences sought.<sup>3</sup> However, there were more white students in the reference districts and greater alcohol use in the intervention districts. Had we also blocked by baseline alcohol use and/or race, or had we selected pairs of comparable communities and randomized among pairs, then baseline measures might have been more equivalent; these strategies should be considered in future community randomized trials.

An additional concern, the reliance on self-reported data, was examined by conducting an experiment using a pipeline technique,<sup>49</sup> by reviewing prior work with community interventions and self-

report measures of students,<sup>50</sup> and by tests of convergent validity.<sup>39</sup> The test of the pipeline technique revealed no significant differences in self-reports of alcohol use of 6th and 8th graders among those who also took part in a biochemical measure compared with those who did not.<sup>49</sup> It was concluded that self-report measures of alcohol use should be valid for this study, as well as being more cost-effective.<sup>39,49</sup> A related concern might be that students in the intervention communities became more sensitive to reporting alcohol use because they were part of the intervention, and, therefore, underreported their use. This would be more strongly supported had not the psychosocial factors, such as perceptions of how many people their age drink or reported peer influences, been so concordant with their alcohol use. Additionally, in a similar study on cigarette smoking, students in the intervention community were significantly less likely to underreport than were students in the reference community.<sup>50</sup>

Project Northland has initiated a primary prevention program with young adolescents in primarily rural communities in northeastern Minnesota. Many of the components of the Project Northland intervention, such as the use of the home team approach<sup>32,51</sup> and peer-led social influences curricula,<sup>18,19</sup> have been successful in urban communities, which suggests that these approaches may be generalizable to these settings. The initial outcomes of Project Northland, in delaying alcohol use onset and preventing alcohol use among sixth through eighth grade students, suggest the potential fruitfulness of sustained, multi-level efforts, particularly for behaviors that are normative in our society, and provide a model for intervening with other behaviors of young adolescents that are of considerable concern in the U.S. in the 1990s.

**TABLE 1**

**Alcohol and Other Drug Use, Peer Influence, Self-Efficacy, and Access to Alcohol Scales: Comparison of Class of 1998 Students in the Intervention and Reference School Districts in Fall 1991, Spring 1992, Spring 1993, Spring 1994<sup>1,2</sup>**

	ALL STUDENTS (Means or Percents, 95% CI)				BASELINE NON-USERS (Means or Percents, 95% CI)				BASELINE USERS (Means or Percents, 95% CI)			
	Intervention		Reference		Intervention		Reference		Intervention		Reference	
Tendency Scale <sup>3</sup>												
Fall 1991	<b>11.5</b>	(11.0-12.0)	<b>11.0</b>	(10.5-11.5)	<b>9.4</b>	(9.2-9.5)	<b>9.5</b>	(9.3-9.7)	<b>14.5</b>	(13.8-15.2)	<b>13.6</b>	(12.9-14.4)
Spring 1992	<b>11.7</b>	(11.2-12.2)	<b>11.6</b>	(11.1-12.1)	<b>10.1</b>	(9.6-10.6)	<b>10.2</b>	(9.7-10.7)	<b>14.3</b>	(13.5-15.1)	<b>14.1</b>	(13.2-14.9)
Spring 1993	<b>14.5</b>	(13.3-15.7)	<b>14.9</b>	(13.7-16.1)	<b>12.2</b>	(11.2-13.2)	<b>13.2</b>	(12.2-14.2)	<b>18.3</b>	(16.3-20.3)	<b>17.8</b>	(15.8-19.8)
Spring 1994	<b>16.0</b>	(15.1-16.8)*	<b>17.5</b>	(16.7-18.5)	<b>13.8</b>	(13.1-14.4)**	<b>15.3</b>	(14.6-15.9)	<b>19.7</b>	(18.0-21.6)	<b>21.1</b>	(19.3-22.9)
Past Month Alcohol Use <sup>4</sup>												
Fall 1991	<b>6.9</b>	(5.0-8.8)*	<b>3.9</b>	(2.0-5.9)	<b>0</b>		<b>0</b>		<b>16.6</b>	(12.7-20.5)*	<b>10.6</b>	(6.4-14.9)
Spring 1992	<b>7.6</b>	(4.9-10.4)	<b>6.3</b>	(3.5-9.0)	<b>2.4</b>	(1.0-3.7)	<b>3.1</b>	(1.7-4.4)	<b>15.6</b>	(10.1-21.1)	<b>11.6</b>	(5.9-17.3)
Spring 1993	<b>14.9</b>	(10.3-19.4)	<b>17.5</b>	(13.0-22.0)	<b>8.3</b>	(5.1-11.9)	<b>11.8</b>	(8.7-15.3)	<b>25.5</b>	(17.1-33.5)	<b>27.9</b>	(19.5-36.4)
Spring 1994	<b>23.6</b>	(20.1-27.1)*	<b>29.2</b>	(25.6-32.8)	<b>15.3</b>	(11.7-18.9)*	<b>21.2</b>	(17.7-24.8)	<b>36.9</b>	(29.5-44.2)	<b>43.1</b>	(35.2-51.0)
Past Week Alcohol Use <sup>4</sup>												
Fall 1991	<b>3.8</b>	(2.6-5.0)*	<b>2.0</b>	(1.0-3.2)	<b>0</b>		<b>0</b>		<b>9.1</b>	(6.3-11.9)	<b>5.3</b>	(2.2-8.4)
Spring 1992	<b>3.4</b>	(1.4-5.5)	<b>3.4</b>	(1.4-5.4)	<b>1.0</b>	(0-2.2)	<b>1.5</b>	(0.4-2.7)	<b>7.1</b>	(2.6-11.7)	<b>6.7</b>	(2.1-11.4)
Spring 1993	<b>7.4</b>	(4.0-10.8)	<b>8.4</b>	(5.1-11.8)	<b>5.0</b>	(2.5-8.1)	<b>6.1</b>	(3.6-9.0)	<b>11.1</b>	(5.4-16.7)	<b>13.2</b>	(7.2-19.0)
Spring 1994	<b>10.5</b>	(8.0-13.0)*	<b>14.8</b>	(12.2-17.4)	<b>5.3</b>	(3.0-7.6)**	<b>9.8</b>	(7.5-12.1)	<b>18.4</b>	(12.4-24.5)	<b>23.6</b>	(17.0-30.1)
Cigarette Use <sup>5</sup>												
Fall 1991	<b>6.9</b>	(4.9-8.9)*	<b>4.7</b>	(2.6-6.7)	<b>1.5</b>	(0.6-2.3)	<b>0.9</b>	(0-1.7)	<b>13.8</b>	(8.9-18.6)	<b>11.5</b>	(6.4-16.6)
Spring 1992	<b>8.4</b>	(6.1-10.6)	<b>8.8</b>	(6.5-11.0)	<b>3.1</b>	(1.5-4.7)	<b>2.8</b>	(1.2-4.4)	<b>15.9</b>	(12.0-19.8)	<b>18.5</b>	(14.3-22.7)
Spring 1993	<b>17.8</b>	(13.5-22.1)	<b>19.4</b>	(15.2-23.7)	<b>9.8</b>	(5.7-13.8)	<b>14.3</b>	(10.3-18.2)	<b>29.8</b>	(23.4-36.1)	<b>29.4</b>	(22.7-36.1)
Spring 1994	<b>24.8</b>	(20.2-29.5)	<b>30.7</b>	(26.0-35.4)	<b>15.5</b>	(10.3-20.7)*	<b>24.6</b>	(19.6-29.7)	<b>39.1</b>	(32.8-45.4)	<b>42.7</b>	(35.7-49.6)
Smokeless Use <sup>5</sup>												
Fall 1991	<b>1.5</b>	(0.4-2.5)	<b>1.5</b>	(0.5-2.6)	<b>0</b>		<b>0</b>		<b>3.1</b>	(0.8-5.3)	<b>4.0</b>	(1.6-6.4)
Spring 1992	<b>3.2</b>	(2.2-4.3)	<b>3.4</b>	(2.3-4.5)	<b>1.2</b>	(0-2.4)	<b>1.3</b>	(0-2.5)	<b>6.6</b>	(4.5-8.7)	<b>6.8</b>	(4.4-9.2)
Spring 1993	<b>7.8</b>	(4.7-11.0)	<b>9.4</b>	(6.2-12.5)	<b>4.0</b>	(1.7-6.4)	<b>6.8</b>	(4.5-9.1)	<b>14.1</b>	(8.3-19.9)	<b>14.2</b>	(8.2-20.3)
Spring 1994	<b>13.5</b>	(10.2-16.8)	<b>16.3</b>	(13.0-19.7)	<b>7.4</b>	(3.7-11.1)	<b>12.3</b>	(8.7-16.0)	<b>23.4</b>	(18.9-27.8)	<b>23.8</b>	(18.7-28.9)

95% CI)	ALL STUDENTS (Means or Percents, 95% CI)		BASELINE NON-USERS (Means or Percents, 95% CI)		BASELINE USERS (Means or Percents, 95% CI)	
	Intervention	Reference	Intervention	Reference	Intervention	Reference
Marijuana Use <sup>6</sup>						
Fall 1991	<b>0.7</b> (0-1.3)	<b>0.4</b> (0-1.0)	<b>0</b>	<b>0</b>	<b>1.7</b> (0-3.4)	<b>5.8</b> (0-2.3)
Spring 1992	<b>0.6</b> (0-1.2)	<b>1.2</b> (0-1.8)	<b>0</b>	<b>0</b>	<b>1.1</b> (0-2.4)	<b>2.2</b> (0.1-3.6)
Spring 1993	<b>3.5</b> (0.9-6.1)	<b>3.2</b> (0.6-5.8)	<b>1.7</b> (0.4-3.1)	<b>2.6</b> (1.3-3.9)	<b>4.4</b> (1.2-7.7)	<b>5.12</b> (1.7-8.6)
Spring 1994	<b>7.4</b> (4.4-10.4)	<b>8.6</b> (5.5-11.6)	<b>3.1</b> (1.3-4.9)*	<b>6.2</b> (4.4-8.0)	<b>14.3</b> (8.1-20.5)	<b>13.2</b> (6.6-19.8)
Peer Influence <sup>7</sup>						
Fall 1991	<b>19.4</b> (18.8-20.1)	<b>18.6</b> (18.0-19.3)	<b>18.2</b> (17.7-18.7)	<b>17.7</b> (17.2-18.2)	<b>21.0</b> (20.0-22.0)	<b>20.2</b> (19.2-21.3)
Spring 1992	<b>19.0</b> (18.5-19.5)	<b>19.1</b> (18.6-19.6)	<b>18.1</b> (17.6-18.5)	<b>18.0</b> (17.6-18.5)	<b>20.5</b> (20.0-21.0)	<b>20.6</b> (20.1-21.2)
Spring 1993	<b>21.9</b> (20.4-23.4)	<b>23.0</b> (21.5-24.5)	<b>20.5</b> (19.3-21.8)	<b>21.8</b> (20.6-23.1)	<b>23.9</b> (22.0-25.9)	<b>24.9</b> (23.0-26.9)
Spring 1994	<b>24.6</b> (23.3-26.0)*	<b>27.0</b> (25.7-28.4)	<b>22.8</b> (21.5-24.1)*	<b>25.4</b> (24.1-26.7)	<b>27.7</b> (25.83-29.6)	<b>29.9</b> (27.9-31.8)
Self-Efficacy <sup>8</sup>						
Fall 1991	<b>21.9</b> (21.5-22.2)	<b>22.0</b> (21.6-22.4)	<b>22.9</b> (22.4-23.3)	<b>22.8</b> (22.4-23.2)	<b>20.6</b> (20.1-21.1)	<b>20.5</b> (20.0-21.1)
Spring 1992	<b>21.9</b> (21.6-22.3)	<b>21.8</b> (21.4-22.1)	<b>22.9</b> (22.6-23.1)	<b>22.5</b> (22.2-22.8)	<b>20.4</b> (19.8-21.1)	<b>20.5</b> (19.8-21.2)
Spring 1993	<b>20.4</b> (19.4-21.4)	<b>20.4</b> (19.4-21.4)	<b>21.5</b> (20.7-22.3)	<b>21.2</b> (20.4-22.0)	<b>19.0</b> (17.7-20.2)	<b>19.0</b> (17.8-20.3)
Spring 1994	<b>20.2</b> (19.7-20.8)	<b>19.6</b> (19.0-20.2)	<b>21.6</b> (21.1-22.0)*	<b>20.4</b> (20.0-20.9)	<b>18.2</b> (17.2-19.1)	<b>18.4</b> (17.3-19.4)
Perceived Access <sup>9</sup>						
Fall 1991	<b>14.7</b> (14.2-15.2)	<b>14.7</b> (14.2-15.2)	<b>14.0</b> (13.4-14.6)	<b>14.3</b> (13.7-14.9)	<b>15.8</b> (15.4-16.2)	<b>15.6</b> (15.1-16.1)
Spring 1992	<b>15.3</b> (14.7-15.9)	<b>15.1</b> (14.5-15.7)	<b>14.5</b> (13.8-15.2)	<b>14.6</b> (13.9-15.3)	<b>16.5</b> (16.1-17.0)	<b>16.1</b> (15.6-16.6)
Spring 1993	<b>17.7</b> (17.0-18.5)	<b>18.1</b> (17.3-18.8)	<b>17.1</b> (16.3-18.0)	<b>17.7</b> (16.9-18.5)	<b>18.6</b> (17.8-19.4)	<b>18.7</b> (17.9-19.5)
Spring 1994	<b>19.2</b> (18.6-19.9)	<b>19.7</b> (19.1-20.4)	<b>18.8</b> (17.9-19.7)	<b>19.4</b> (18.5-20.2)	<b>20.0</b> (19.6-20.5)	<b>20.4</b> (19.9-20.9)

<sup>1</sup> Adjusted for race and baseline measures. Adjusted means or percents and confidence intervals shown. Means are presented for the scale variables (i.e., Tendency Scale, Peer Influence, Self-efficacy, and Perceived Access) and percentages are presented for the item variables (i.e., past month alcohol use, past week alcohol use, cigarette use, smokeless use, and marijuana use).

<sup>2</sup> Sample sizes for all analyses for All Students are: Fall 1991 (N=2351), Spring 1992 (N=2191), Spring 1993 (N=2060), Spring 1994 (N=1901); for Baseline Non-Users are: Fall 1991 (N=1443), Spring 1992 (N=1353), Spring 1993 (N=1273), Spring 1994 (N=1176); for Baseline Users are: Fall 1991 (N=881), Spring 1992 (N=816), Spring 1993 (N=766), Spring 1994 (N=712)

<sup>3</sup> The range in scores is from 8 (no tendency to use alcohol) to 48 (high levels of use and intentions).

<sup>4</sup> More than 0 occasions.

<sup>5</sup> More than 1-2 occasions; occasionally or regularly.

<sup>6</sup> More than 0 occasions in the past year.

<sup>7</sup> The range is 15 (no influence) to 71 (high peer influence).

<sup>8</sup> The range is 5 (not being able to refuse alcohol) to 25 (being able to refuse).

<sup>9</sup> The range is 6 (very difficult to obtain alcohol) to 30 (easy to obtain).

\* Differences between conditions, based on an F (1,18) statistic, p < .05.

\*\* Differences between conditions, based on an F (1,18) statistic, p < .01.

**TABLE 2**

**Norms, Family Communication, and Functional Meaning Items: Comparison of Class of 1998 Students in the Intervention and Reference School Districts in Fall 1991, Spring 1992, Spring 1993, Spring 1994**

	<u>ALL STUDENTS</u>					
	<u>Intervention</u> Percents or Means <sup>1</sup> (95% CI)	<u>Reference</u> Percents or Means <sup>1</sup>		<u>P-Value</u> <sup>2</sup> (95% CI)		
<b>NORMS</b>						
<b>Not many people my age drink alcohol (% True)</b>						
Fall 91 (N=2351)	41.4	(35.3 - 47.4)		55.1	(49.1 - 61.2)	0.003
Spring 92 (N=2191)	43.5	(35.3 - 51.7)		50.2	(42.0 - 58.9)	0.24
Spring 93 (N=2060)	35.7	(25.3 - 46.0)		28.6	(18.3 - 38.9)	0.32
Spring 94 (N=1901)	26.0	(19.3 - 32.6)		15.5	(8.8 - 22.2)	0.03
<b>Most people my age will drink alcohol by the time they are seniors in high school (% True)</b>						
Fall 91 (N=2351)	46.3	(40.9 - 51.6)		45.9	(40.6 - 51.2)	0.92
Spring 92 (N=2191)	49.4	(45.9 - 52.9)		44.8	(41.2 - 48.4)	0.07
Spring 93 (N=2060)	62.3	(55.0 - 70.0)		67.1	(59.8 - 74.4)	0.35
Spring 94 (N=1901)	72.7	(66.8 - 78.6)		78.4	(72.5 - 84.3)	0.17
<b>PARENT COMMUNICATION ITEMS</b>						
<b>My parents talk with me about problems drinking alcohol can cause young people (% True)</b>						
Fall 91 (N=2351)	63.5	(59.5 - 67.4)		70.6	(66.7 - 74.6)	0.01
Spring 92 (N=2191)	72.6	(69.0 - 76.1)		64.7	(61.1 - 68.3)	0.005
Spring 93 (N=2060)	62.9	(59.1 - 66.6)		58.7	(54.9 - 62.5)	0.12
Spring 94 (N=1901)	62.2	(57.1 - 67.3)		55.2	(50.0 - 60.4)	0.06
<b>My family has rules against young people drinking alcohol (% True)</b>						
Fall 91 (N=2351)	55.7	(52.0 - 59.5)		61.0	(57.2 - 64.8)	0.06
Spring 92 (N=2191)	64.3	(61.5 - 67.0)		62.9	(60.0 - 65.7)	0.46
Spring 93 (N=2060)	70.9	(65.0 - 76.9)		66.6	(60.7 - 72.6)	0.30
Spring 94 (N=1901)	74.0	(69.8 - 78.1)		68.7	(64.5 - 72.9)	0.08



**I think my parents will allow me to drink by the time I am a high school senior (% True)**

Fall 91 (N=2351)	7.5	(5.4 - 9.5)	6.9	(4.8 - 9.0)	0.69
Spring 92 (N=2191)	9.6	(6.8 - 12.3)	8.4	(5.7 - 11.1)	0.54
Spring 93 (N=2060)	12.8	(9.1 - 16.5)	11.8	(8.2 - 15.5)	0.70
Spring 94 (N=1901)	17.1	(13.3 - 20.9)	18.4	(14.6 - 22.3)	0.60

**My parents have told me what would happen if I were caught drinking alcohol (% True)<sup>3</sup>**

Spring 93 (N=2060)	67.5	(61.8 - 73.1)	56.1	(50.5 - 61.8)	0.01
Spring 94 (N=1901)	65.3	(59.8 - 70.9)	55.1	(49.5 - 60.7)	0.01

**FUNCTIONAL MEANING ITEMS<sup>3</sup>**

A young person can have many reasons **NOT** to use alcohol.

Please rate how important each of these reasons is to you.

( Mean of ratings, 1= Not too important to me to 5=Very important to me)

	<u>Intervention</u> Percents or Means <sup>1</sup> (95% CI)	<u>Reference</u> Percents or Means <sup>1</sup>	<u>P-Value</u> <sup>2</sup> (95% C I)
<b>There are many other ways to have fun besides drinking alcohol...</b>			
	Spring 92 (N=2191)	4.4 (4.3 - 4.5)	4.4 (4.3 - 4.5) 0.80
	Spring 93 (N=2060)	4.2 (4.0 - 4.4)	4.0 (3.8 - 4.2) 0.16
	Spring 94 (N=1901)	3.9 (3.8 - 4.1)	3.8 (3.6 - 3.9) 0.17
<b>My parents have rules against alcohol use by people my age...</b>			
	Spring 92 (N=2191)	4.1 (4.0 - 4.2)	4.2 (4.1 - 4.4) 0.04
	Spring 93 (N=2060)	3.9 (3.7 - 4.1)	3.7 (3.5 - 3.8) 0.09
	Spring 94 (N=1901)	3.8 (3.7 - 3.9)	3.5 (3.4 - 3.6) 0.002
<b>It would hurt my reputation...</b>			
	Spring 94 (N=1901)	3.8 (3.7 - 3.9)	3.3 (3.2 - 3.5) 0.0001
<b>I'm afraid I might become an alcoholic...</b>			
	Spring 92 (N=2191)	3.5 (3.3 - 3.6)	3.7 (3.6 - 3.8) 0.02

	Spring 93 (N=2060)	3.6	(3.4 - 3.7)	3.4	(3.3 - 3.6)	0.14
	Spring 94 (N=1901)	3.6	(3.5 - 3.7)	3.4	(3.2 - 3.5)	0.003
<b>Using alcohol could threaten my eligibility to participate in sports or other activities...</b>						
	Spring 94 (N=1901)	4.2	(4.1 - 4.3)	4.0	(3.9 - 4.1)	0.01
<b>Drinking alcohol costs too much money...</b>						
	Spring 92 (N=2191)	3.5	(3.4 - 3.7)	3.4	(3.3 - 3.6)	0.36
	Spring 93 (N=2060)	3.6	(3.4 - 3.7)	3.2	(3.1 - 3.4)	0.001
	Spring 94 (N=1901)	3.1	(3.0 - 3.2)	2.8	(2.7 - 3.0)	0.01
<b>I would breaking school policies and rules...</b>						
	Spring 94 (N=1901)	3.2	(3.0 - 3.3)	2.9	(2.7 - 3.0)	0.01
<b>Alcohol use can be bad for my health...</b>						
	Spring 92 (N=2191)	4.5	(4.4 - 4.6)	4.5	(4.4 - 4.6)	0.62
	Spring 93 (N=2060)	4.2	(4.1 - 4.4)	4.0	(3.9 - 4.2)	0.06
	Spring 94 (N=1901)	4.0	(3.8 - 4.1)	3.8	(3.6 - 3.9)	0.02
<b>Using alcohol could hurt my performance as a student or athlete...</b>						
	Spring 92 (N=2191)	4.6	(4.5 - 4.7)	4.6	(4.5 - 4.7)	0.93
	Spring 93 (N=2060)	4.4	(4.3 - 4.5)	4.3	(4.1 - 4.4)	0.10
	Spring 94 (N=1901)	4.2	(4.1 - 4.3)	4.1	(3.9 - 4.2)	0.02
<b>I want to be able to make my own decisions and not give in to peer pressure...</b>						
	Spring 92 (N=2191)	4.4	(4.3 - 4.5)	4.4	(4.3 - 4.6)	0.65
	Spring 93 (N=2060)	4.2	(4.1 - 4.4)	4.1	(3.9 - 4.3)	0.31
	Spring 94 (N=1901)	4.1	(4.0 - 4.2)	3.8	(3.7 - 3.9)	0.003

<sup>1</sup> Adjusted for race and baseline measure, if available. Each variable is labeled either a percentage or mean.

<sup>2</sup> Differences between conditions based on F(1,18) statistic.

<sup>3</sup> These questions were not available at baseline, Fall 1991.

## **Acknowledgements**

The Project Northland study would not have been possible without the cooperation and assistance of students, teachers, and administrators in the following Minnesota school districts: Aitkin, Babbitt-Embarrass, Biwabik, Carlton, Coleraine, Cook County, Deer River, Ely, Esko, Floodwood, Grand Rapids, Hermantown, Hibbing, Hill City, McGregor, Mtn. Iron-Buhl, Nashwauk-Keewatin, Nett Lake, Proctor, St. Louis County, South Koochiching, Toivola-Meadowlands, Tower-Soudan, Virginia, and Wrenshall. Special acknowledgements also go to Project Northland field coordinators for implementation of the interventions: Tom Burman, Lynette Eck, Kathy Lingren, Judy Lundquist, Russell Maki, Judie Maki, James Pavlek, Peter Pierson, and Sue Wetschka. We also appreciate the outstanding work of Bonnie Dudovitz, for creative curriculum writing, Kian Farbaksh, for data analysis, Rebecca Turner, for desk-top publishing and graphics design, and Bonnie Manning, for manuscript preparation. This research is funded by the National Institute on Alcohol Abuse and Alcoholism (RO1-AA08596).

## References

1. Adger H. Problems of alcohol and other drug use and abuse in adolescents. *J Adolesc Health*. 1991;12:606-613.
2. Dryfoos J. *Adolescents at Risk: Prevalence and Prevention*. New York, NY: Oxford University Press; 1990.
3. Johnston LD, O'Malley PM, Bachman JG. *National Survey Results on Drug Use from the Monitoring the Future Study, 1975–1992 (Vol. I: Secondary School Students)*. National Institute on Drug Abuse, Rockville, MD; 1993.
4. Trends in Drug and Alcohol Use by Youth in the USA. *Stat Bull*. 1993;74:19-27.
5. Wagenaar AC, Perry CL. Community strategies for the reduction of youth drinking: Theory and application. *J Research Adolesc*. 1994;4:319-345.
6. National Institute on Alcohol Abuse and Alcoholism. *Eighth Special Report to the US Congress on Alcohol and Health* (NIH Publ. No. 94-3699). U.S. Department of Health and Human Services, Washington, DC; 1994.
7. Oetting ER, Beauvais F. Adolescent drug use: Findings of national and local surveys. *J Consult Clin Psychol*. 1990;58:385-394.
8. Baker SP, O'Neill B, Ginsbur MJ, Li G. *The Injury Fact Book* (2nd ed.) New York, NY: Oxford University Press; 1992.
9. National Highway Traffic Safety Administration. *Alcohol and Highway Safety 1989: A Review of the State of Knowledge*. U.S. Department of Transportation, Washington, DC; 1990

10. Kandel D, Yamaguchi K. From beer to crack: Developmental patterns of drug involvement. *Am J Public Health*. 1993;83:851–855.
11. Perry CL, Williams CL, Forster JL, Wolfson M, Wagenaar AC, Finnegan JR, McGovern PG, Veblen-Mortenson S, Komro KA, Anstine PS. Background, conceptualization, and design of a community-wide research program on adolescent alcohol use: Project Northland. *Health Educ Res*. 1993;8:125–136.
12. Ellickson PL, Bell RM. Drug prevention in junior high: A multi-site longitudinal test. *Science*. 1990;247:1299-1305.
13. Hansen WB. School-based substance abuse prevention: A review of the state of the art in curriculum, 1980-1990. *Health Educ Res*. 1992;1:403-430.
14. Hansen WB, Johnson CA, Flay BR, Phil D, Graham JW, Sobel J. Affective and social influences approaches to the prevention of multiple substance abuse among seventh grade students: Results from Project SMART. *Prev Med*. 1988;17:135-154.
15. Pentz MA, Dwyer JH, MacKinnon DP, Flay BR, Hansen WB, Wang EY, Johnson CA. A multi-community trial for primary prevention of adolescent drug abuse. *JAMA*. 1989;261:3259-3266.
16. Klepp K-I, Kelder SH, Perry CL. Alcohol and marijuana use among adolescents: Long-term outcomes of the Class of 1989 Study. *Ann Behav Med*, 1995;17(1):19-24.
17. Botvin GJ, Baker E, Filazzola D, Botvin E. A cognitive-behavioral approach to substance abuse prevention: One-year follow-up. *Addict Behav*. 1990;15:47-63.

18. Perry C, Grant M, Ernberg G, Florenzano RU, Langdon MD, Blaze-Temple D, Cross D, Jacobs DR, Myeni AD, Waahlberg RB, Berg S, Andersson K, Fisher KJ, Saunders B, Schmid T. WHO collaborative study on alcohol education and young people: Outcomes of a four-country pilot study. *Int J Addict*. 1989;4:1145–1171.
19. Botvin GJ, Baker E, Dusenbury L, Botvin EM, Diaz T. Long-term follow-up results of a randomized drug abuse prevention trial in a white middle-class population. *JAMA*. 1995;273(4):1106-1112.
20. Ellickson PL, Bell RM, Harrison ER. Changing adolescent propensities to use drugs: Results from Project ALERT. *Health Educ Q*. 1993;20(2):227-242.
21. Bell RM, Ellickson PL, Harrison ER. Do drug prevention effects persist into high school? How Project ALERT did with ninth graders. *Prev Med*. 1993;22:463-483.
22. Dielman TE, Kloska DD, Leech SL, Schulenberg JE, Shope JT. Susceptibility to peer pressure as an explanatory variable for the differential effectiveness of an alcohol misuse prevention program in elementary schools. *J Sch Health*. 1992;62(6):233-237.
23. Donaldson SI, Graham JW, Hansen WB. Testing the generalizability of intervening mechanism theories: Understanding the effects of adolescent drug use prevention interventions. *J Behav Med*. 1994;17(2):195-215.
24. Dryfoos JG. Preventing substance use: Rethinking strategies. *Am J Public Health*. 1993;83:793–795.
25. Griffin T. Community-based chemical use problem prevention. *J Sch Health*. 1986;56:414–417.
26. Goodstadt MS. Prevention strategies for drug abuse. *Issues Sci Tech*. 1987:28–35.
27. Leventhal H, Keeshan P. Promoting healthy alternatives to substance abuse. In: Millstein SG, Petersen AC, Nightingale EO, eds. *Promoting the Health of Adolescents*. 1993; New York: Oxford University Press; 260-284.

28. Perry CL, Klepp K-I Sillers C. Community-wide strategies for cardiovascular health: The Minnesota Heart Health Program youth program. *Health Educ Res.* 1989;4:87-101.
29. Perry CL, Kelder SH, Murray DM, Klepp K-I. Community-wide smoking prevention: Long-term outcomes of the Minnesota Heart Health Program and the Class of 1989 Study. *Am J Public Health.* 1992;82:1210-1216.
30. U.S. Department of Health and Human Services. *Preventing Tobacco Use Among Young People: A report of the Surgeon General.* Atlanta, Georgia: U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 1994.
31. National Institute on Alcohol Abuse and Alcoholism. (1991). County alcohol problem indicators, 1979–1985. *U.S. Alcohol Epidemiologic Data Reference Manual (Vol. 3)*, Rockville, MD: NIAAA; 1991.
32. Perry C, Luepker RV, Murray DM, Hearn MD, Halper A, Dudovitz B, Maile MD, Smyth M. Parent involvement with children's health promotion: A one year follow-up of the Minnesota Home Team. *Health Educ Q.* 1989;16:171-180.
33. Williams C, Perry C, Dudovitz B, Veblen-Mortenson S, Anstine P. A home-based prevention program for sixth grade alcohol use: Results from Project Northland. *J Primary Prev.* 1995;16:125-147.
34. Hingson RH, Howland J, Schiavone T. The Massachusetts Saving Lives Program: Six cities in widening the focus from drunk driving to speeding, reckless driving, and failure to wear safety belts. *J Traffic Med.* 1991;18(3):123-132.
35. Komro KA, Perry CL, Veblen-Mortenson S, Williams CL. Peer participation in Project Northland: A community-wide alcohol use prevention project. *J Sch Health.* 1994;64(8):318-322.

36. Toomey T, Williams C, Perry CL, Murray DM, Dudovitz B, Veblen-Mortenson S. An alcohol primary prevention program for parents of 7th graders: The Amazing Alternatives! Home Program; submitted for publication.
37. Bracht N, Gleason J. Strategies and structure for citizen participation. In Bracht N, ed. *Health Promotion at the Community Level*. Newbury Park, CA: Sage Publications; 1990:109-124.
38. Safer LA, Harding CG. Under pressure program: Using live theatre to investigate adolescents' attitudes and behavior related to drug and alcohol abuse education and prevention. *Adolescence*. 1993;28:135-148.
39. Williams CL, Toomey T, McGovern P, Wagenaar A, Perry CL. Development, reliability and validity of self-report alcohol-use measures with young adolescents. *J Child Adolesc Subst Abuse*. In press.
40. Forster JL, McGovern PG, Wagenaar AC, Wolfson M, Perry CL, Anstine PS. The ability of young people to purchase alcohol without age identification in northeastern MN, USA. *Addiction*. 1994;89(6):687-693.



41. Wolfson M, Toomey TL, Forster JL, Wagenaar AC, McGovern PG, Perry CL. Characteristics, policies, and practices of alcohol outlets and sales to youth. *J Stud Alcohol*. in press.
42. Sosale S, Finnegan J, Schmid L, Perry CL. Where does the issue fit in the community agenda? A study of community leadership structures and leader perceptions of alcohol-related issues. *J Stud Alcohol*. 1994; submitted.
43. Murray DM, Wolfinger RD. Analysis issues in the evaluation of community trials: Progress toward solutions in SAS/STAT MIXED. *J Community Psychol*. 1994;CSAP\_Special Issue:140-154.
44. SAS Institute, Inc. The MIXED procedure. *SAS Technical Report P-229*. Cary, NC: SAS Institute:289-366; 1992.
45. Kelder SH. *Youth cardiovascular disease risk and prevention: The Minnesota Heart Health Program and the Class of 1989 Study*. Doctoral dissertation, University of Minnesota, Minneapolis; 1992.
46. Kelder SH, Perry, CL, Klepp K-I, Lytle LA. Longitudinal tracking of adolescent smoking physical activity, and food choice behaviors. *Am J Public Health*, 1994;84(7):1121:1126.
47. Cook T, Campbell D. *Quasi-experimentation, Design and Analysis Issues for Field Settings*. Chicago, IL: Rand McNally College Publishing Company; 1979.
48. Werch CE, Young M, Clark M, Garrett C, Hooks S, Kersten C. Effects of a take-home drug prevention program of drug-related communication and beliefs of parents and children. *J Sch Health*. 1991;61(8):346-350.

49. Wagenaar AC, Komro KA, McGovern P, Williams CL, Perry CL. Effects of a saliva test pipeline procedure on adolescent self-reported alcohol use. *Addiction*, 1993;88:199-208.
50. Komro KA, Kelder SH, Perry CL, Klepp K-I. Effects of a saliva pipeline procedure on adolescent self-reported smoking behavior and youth smoking prevention outcomes. *Prev Med*. 1993;22:857-865.
51. Perry C, Luepker R, Murray D, Kurth C, Mullis R, Crockett S, Jacobs D. Parent involvement with children's health promotion: The Minnesota home team. *AJPH*. 1988; 79:1156-1160.