New Inroads in Preventing Adolescent Drug Use: Results From a Large-Scale Trial of Project ALERT in Middle Schools

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Objectives. We evaluated the revised Project ALERT drug prevention program across a wide variety of Midwestern schools and communities.

Methods. Fifty-five South Dakota middle schools were randomly assigned to program or control conditions. Treatment group students received 11 lessons in 7th grade and 3 more in 8th grade. Program effects for 4276 8th-graders were assessed 18 months after baseline.

Results. The revised Project ALERT curriculum curbed cigarette and marijuana use initiation, current and regular cigarette use, and alcohol misuse. Reductions ranged from 19% to 39%. Program effects were not significant for initial and current drinking or for current and regular marijuana use.

Conclusions. School-based drug prevention programs can prevent occasional and more serious drug use, help low- to high-risk adolescents, and be effective in diverse school environments. (*Am J Public Health.* 2003;93:1830–1836)

Although drug use among secondary school students appears to have leveled off during the late 1990s,[1] US adolescents continue to use alcohol, tobacco, and marijuana at unacceptably high rates. Among 8th-graders, 52% have tried alcohol, 41% have tried cigarettes, and 20% have tried marijuana.[1] By 12th grade, these rates are substantially higher, with large numbers of adolescents engaging in regular drug use.

These statistics give society cause for concern. Adolescent use of alcohol and marijuana contributes to traffic accidents and deaths,[2] poor judgment and coordination, unsafe sexual practices, and other risky behaviors.[3,4] Cigarette use continues to be the leading cause of preventable death,[5] and early experimentation is highly likely to escalate into regular smoking.[6] Use of any of these 3 substances predicts behaviors that have productivity and public health consequences, such as school failure, violence, and emotional distress.[7–12]

Federal drug control initiatives and the health care community recognize the importance of targeting drug prevention efforts at adolescents to give them the skills and the knowledge to reach adulthood without chemical dependency problems.[13,14] Furthermore, a number of professional organizations, including the American Medical Association and the American Academy of Pediatrics, have issued guidelines and policy statements urging physicians to actively support and participate in such efforts.[15,16]

Drug prevention programs in schools are a critical element of the antidrug effort, yet only 9% of school districts are using programs whose effectiveness has been demonstrated through rigorous research.[17] Recognizing that ineffective programs are costly and do not serve the nation's youth, the US Department of Education set as one of the guidelines of its Safe and Drug-Free Schools and Communities Act Program the implementation of only evidence-based prevention activities. In 2001, the Department of Education designated 7 drug prevention programs as exemplary, 5 of which included a school-based curriculum for middle school adolescents.[18]

One of the most successful evidence-based programs is Project ALERT, a drug prevention curriculum for middle school students that has been recognized as an exemplary program by the Department of Education and as a model program by the Center for Substance Abuse Prevention. Project ALERT seeks to motivate students against using drugs and to give them the skills they need to translate that motivation into effective resistance behavior, an approach that is widely viewed as the state of the art in drug use prevention.[19–24] In the initial evaluation of Project ALERT conducted on the West Coast, Ellickson and Bell[25] found that the program effectively prevented or reduced both cigarette and marijuana use among 8th-grade students, although it did not help committed cigarette smokers. Project ALERT also had a modest initial impact on alcohol use, but this disappeared by 8th grade. The authors concluded that the program's effectiveness might be improved if it put more emphasis on curbing alcohol *misuse* (as opposed to any use at all), found a way to help the more confirmed smokers, and brought parents into the prevention process.[26]

In an unusual move for an already successful program, we revised the Project ALERT curriculum along these lines to strengthen its effectiveness. To broaden the program's generalizability to the Midwest, we conducted a randomized trial of its effectiveness in South Dakota, drawing on schools in urban, small-town, and rural communities. Although alcohol, tobacco, and other drug use is now as prevalent in rural areas as in urban areas (and actually is higher in the Plains states than elsewhere for some substances),[27–32] drug prevention programs, including Project ALERT, have been tested more extensively in urban and suburban school districts.[33]

We evaluated the revised Project ALERT middle school curriculum over 18 months (fall of 1997 to spring of 1999) during a large-scale randomized trial. That trial also included a high school component, ALERT Plus, which is not addressed in this article. In designing the experimental trial, we tried to avoid methodological problems that have plagued many school-based evaluations, such

as lack of random assignment, inadequate use of control variables to rule out alternative explanations of the results, and failure to adjust statistical tests to account for clustering of students within schools.[34] We also provided information about 2 indicators of effectiveness that have received limited attention in the literature: (1) program impacts on high-risk adolescents and (2) program effects on regular substance use and misuse.

METHODS

Curriculum Theory

Based on the social influence model of prevention, the Project ALERT curriculum synthesizes 3 theories of behavioral change: (1) the health belief model, which focuses on cognitive factors that motivate healthy behavior;[35,36] (2) the social learning model, which emphasizes social norms and significant others as key determinants of behavior;[37] and (3) the self-efficacy theory of behavior change, which views the belief that one can accomplish a task as essential to effective action.[38] The curriculum specifically seeks to change students' beliefs about drug norms and the social, emotional, and physical consequences of using drugs; to help them identify and resist pro-drug pressures from parents, peers, the media, and others; and to build resistance self-efficacy, the belief that one can successfully resist pro-drug influences. Project ALERT uses interactive teaching methods, such as question-and-answer techniques and small-group activities, which appear to be a crucial element in the effectiveness of this type of curriculum.[39]

The revised curriculum has 11 lessons in 7th grade (including 3 new ones) and 3 lessons in 8th grade. The additional 7th-grade lessons focus primarily on smoking cessation and alcohol use, while new home-learning opportunities seek to involve parents in substance use prevention. The smoking cessation lesson, which is designed to appeal especially to the more committed and alienated smokers, seeks to build motivation and skills for quitting. It includes a video of former teenage smokers talking about why and how they quit, plus group activities that expand on these topics. New material on alcohol use includes games, small-group activities, and question-and-answer techniques designed to help young people understand their own susceptibility to the negative consequences of alcohol misuse and develop alternatives to drinking. The parental involvement activities include adolescent interviews with parents about their experiences with and responses to peer pressure, parent/child drug IQ tests that assess knowledge about drugs and social influences to use them, and oral reports on drug use consequences presented to the student's family.

Experimental Design and Sample

The overall trial was designed to test the effectiveness of a combined middle school and high school program. Hence, we randomly assigned 48 school clusters (high schools and their associated middle school feeders) to 2 treatment groups and 1 control group. In the first treatment group, students received the revised Project ALERT curriculum in 7th and 8th grades, but no high school booster lessons. In the second treatment group, students received the revised middle school curriculum in 7th and 8th grades plus booster lessons in 9th and 10th grades. In the control group, students did not receive either experimental program, and all control schools continued other prevention curricula already in place. For this article, results from the 2 treatment groups have been combined through 8th grade to test the effectiveness of the revised middle school curriculum.

This study includes 4276 students from 55 middle schools included in the assignment process described above—2553 students from 34 middle schools receiving the revised curriculum, and 1723 students from 21 control schools. Nine of the middle schools are in cities with more than 50 000 residents, 11 schools are in towns of 5000 to 25 000 residents, and the remaining schools are in rural communities. Half of the students were female, 12.5% were non-White (largely Native American), and slightly more than 30% were from families where the children did not live with both biological parents. About 60% had already tried alcohol, indicating substantial limits on the program's potential for reducing alcohol initiation. A little over one-third had already tried cigarettes, and about 7% had already tried marijuana.

Assignment of Schools

To enhance pretreatment equivalence among the experimental conditions, we used blocking by geographic region and community size, and restricted assignment when randomly assigning schools to the treatment condition. Schools were organized into 3 strata by community size and type (city, town, rural community). Blocks of school clusters consisted of 3 clusters from the same stratum located in the same geographic region of the state. Within each block, 1 school cluster was randomly assigned to each experimental condition. Across blocks, we restricted the allowable assignments to those that reduced the imbalance among experimental conditions based on district enrollment, an index of school academic performance and socioeconomic status, and the existence of a drug prevention program in the district. After treatment assignment but before baseline data collection, 2 school districts (each with 1 high school) withdrew from the study. Schools in a similar region of the state and with a similar ethnic composition replaced the schools that dropped out.

Curriculum Implementation

More than 100 7th- and 8th-grade teachers were trained to deliver the curriculum in a series of 1-day workshops held across the state. Teacher manuals and videotaped lessons provided additional posttraining material. Teacher reports for 1446 lessons indicated that they covered all or some of each activity in 88% of the 7th-grade lessons and 93% of the 8th-grade lessons. However, 1 or more activities were rushed in 40% of the 7th-grade lessons and 31% of the 8th-grade lessons, a problem that diminished with greater curriculum experience. Overall, just 9% of the lessons were interrupted by external events such as fire drills, school announcements, or shortened class periods. Thus, the vast majority of these lessons were completed, and students participated in most of the requisite activities.

Data Collection

Middle school students filled out questionnaires twice: once in the fall of 7th grade, just before administration of the 7th-grade lessons (baseline), and approximately 18 months later (spring of 8th grade), after administration of the 8th-grade lessons. Makeup sessions and

tracking by mail and telephone were used to enhance completion rates. Mandatory parental consent was obtained for 90% of the students. To motivate students to participate and to tell the truth, the data collectors described our procedures for ensuring data privacy to the students (e.g., no names on the questionnaires, no access by teachers or parents, our US Department of Health and Human Services certificate of confidentiality that protects respondent privacy in the unlikely event of a subpoena). The data collectors informed students of their right not to participate and, for those who gave assent, collected saliva samples that students were told could be tested for drug use. These procedures resulted in high rates of student participation; 1.6% of the students refused to participate at baseline, and 0.4% refused at follow-up.

To assess the validity of self-reported drug use, we evaluated physiological tests and the consistency of self-reports within and across data collection waves. Saliva cotinine concentrations were assessed for a random subsample of 654 students using a radioimmunoassay method.[40] Only 3 (0.5%) of the 560 students who reported not smoking (in the prior month or 2 days) and produced enough saliva for an assay had a cotinine concentration above the 10-ng/mL cutoff typically used to identify smokers.[41] In addition, student responses were internally consistent. Only 1.7% of students gave inconsistent responses to any of the substance use questions at baseline, 1.5 % gave inconsistent responses at follow-up, and 6.5% gave responses that were inconsistent across the waves.

Measures

For alcohol, cigarettes, and marijuana, the questionnaire asked about lifetime use and frequency of use within the past month and the past year. These items allowed us to evaluate program effects on "ever," "past month," and "weekly" use. For alcohol, we also asked about various forms of misuse, using this information to construct 3 alcohol misuse scales: (1) alcohol-related consequences (sum of 5 dichotomous variables indicating that the student had experienced the following problems because of drinking alcohol: getting sick, getting in a physical fight, getting in trouble at school, getting in trouble at home, doing something he/she later regretted); (2) high-risk drinking (sum of 3 dichotomous variables: binge drinking in the past month, polydrug use of alcohol and marijuana in the past year, weekly drinking); and (3) overall misuse (sum of the above 8 variables). Baseline data on cognitive risk factors used as correlates in the prediction models tapped perceptions that have been linked with subsequent use of alcohol, cigarettes, and marijuana in previous studies: (1) beliefs about the short- and long-term consequences of use (both positive and negative); (2) normative beliefs about the prevalence of use and its acceptability to others, including peers and parents; (3) resistance self-efficacy; and (4) expectations of use in the next 6 months.

Analysis Models

Students in control schools were somewhat less likely to be White and more likely to have used marijuana than their counterparts in the Project ALERT schools. To reduce the effects of these differences and to increase the precision of our estimates, we adjusted for multiple baseline covariates—prior use of the specific substance being evaluated, intentions and beliefs about substance use, perceived peer and adult use, friends' approval of use, drug offers, resistance self-efficacy, marijuana use, parental monitoring, and several demographic variables (gender, race/ethnicity, age, parental education, household structure). To account for blocking, we included covariates for school geographic location and for enrollment size, which is highly correlated with community size.

Missing data for covariates were imputed using a Bayesian model for the joint distribution of all baseline and follow-up variables. The model used a multivariate Gaussian distribution to approximate the joint distribution for the variables conditional on the unobserved parameter values. Imputed values tend not to be sensitive to the particular distribution.[42] The imputed values are a random sample for the posterior distribution of the missing data conditional on the observed data and the model. Using NORM software,[43] we created 5 sets of imputed values.

To account for possible intraschool correlation among follow-up responses, we used a generalized estimating equation that assumed a linear model for the natural logarithm of the odds of use and constant correlation among responses from students from the same schools and equal intraschool correlation across all schools.[44] We used empirical sandwich standard errors to allow for error in our model specification of the correlation among responses.

To summarize the model results, we present adjusted probabilities of use. Using the model, we calculated the probability of use for every student in the sample, assuming that every student received the ALERT curriculum but using each student's observed baseline covariates. We then repeated the process, this time assuming that every student received the control condition. The estimates provide the expected rates of use for our entire student sample under both Project ALERT and the control condition. For ease of presentation, we refer to the estimate of the expected use rate for students under the ALERT condition as the "rate for students in ALERT schools"; similarly, we refer to the estimate of the expected rate of use for students under the control condition as the "rate for students in control schools." Statistical tests of the significance of the effect of Project ALERT were conducted using the estimated logarithm of the odds ratio from our model, not the adjusted probabilities. All of the outcomes are based on an intent-to-treat analysis.

The evaluation of the original Project ALERT, which classified students into 1 of 3 risk groups for use of each substance, found differential program effects across risk groups.[25] To assess whether, and to what degree, the revised curriculum has improved on the original, we follow that procedure here, presenting model results for 3 risk groups per substance as well as for the entire sample.

For alcohol use. The low-risk group included only students who had never used alcohol by baseline. These students are referred to as "nonusers" (38.8%). The moderate-risk group included students who had used alcohol in the past but fewer than 3 times in the past year and not at all in the past month. These students are referred to as "experimenters" (45.3%). The high-risk group included students who had used alcohol 3 or more times in the past year or in the past month. These students are referred to as "users" (15.9%).

For tobacco use. Similar criteria were used to define cigarette nonusers (65.2%), experimenters (21.4%), and users (13.4%).

For marijuana use. Students who had not used marijuana were a heterogeneous group that included some cigarette experimenters. Hence, we divided marijuana nonusers into 2 risk groups: "low-risk" students who had used neither marijuana nor cigarettes by baseline (65.0%) and "moderate-risk" students who had not used marijuana but had tried cigarettes (28.5%). The "high-risk" group for marijuana included all of the students who had used marijuana by the time of the baseline survey (6.5%).

RESULTS

Analysis Sample

Of the 5412 students enrolled in participating schools, 4689 (86.6%) completed the baseline survey. The nonrespondents included 10.1% whose parents refused consent and 3.3% who were absent from both the survey and makeup sessions or who refused to participate. The analysis sample comprised 4276 students who completed both the baseline and follow-up surveys (91.2% of the baseline group). Of the 413 students lost to follow-up, 329 moved and could not be tracked via phone or mail follow-up. Overall, students who dropped out of the sample were more likely to be male, to be non-White, to have low grades, to have fathers with low educational attainment, to live with a single parent or stepparent, and to have used alcohol, cigarettes, or marijuana. However, as shown in Table 1, the attrition rates and the students who were lost from the study were similar across experimental conditions. In both groups, about 9% of students were lost from the study, and in both groups those lost to attrition tended to be students at greater risk for substance use.

Effects for All ALERT Versus Control Students

Figure 1 shows the revised Project ALERT's effects on cigarette, marijuana, and alcohol use for the entire analysis sample.

Cigarette use. Eighteen months after baseline, Project ALERT had curbed cigarette initiation (ever use), reducing the proportion of new smokers by 19% ($P<.01$). Although cigarette initiation rates in the control schools climbed to 31.6% by the end of 8th grade, the initiation rates were significantly lower (25.5%) in the ALERT schools by the same time. The revised curriculum also held down current (past month) and regular (weekly) smoking, producing 23% reductions in both measures of use ($P<.01$).

Marijuana use. Eighteen months after baseline, Project ALERT had curbed marijuana initiation, reducing the proportion of new marijuana users by 24% ($P<.01$). Initiation rates were nearly 17% in the control schools, compared with 13% in the ALERT schools. Although the curriculum also produced moderate reductions in current and regular marijuana use (15% and 18%, respectively), neither of these results attained significance.

Alcohol use. The revised curriculum's best results were for measures that tapped the different categories of alcohol misuse (Figure 1). Students assigned to ALERT schools had significantly lower overall alcohol misuse scores than did those in the control schools ($P<.05$). They were also significantly less likely to engage in drinking that resulted in negative consequences ($P<.04$) and marginally less likely to engage in multiple forms of high-risk drinking ($P<.10$). However, the program did not curb alcohol initiation or current use in the combined sample, although the differences all favored the treatment group (results not shown).

Effects for Risk Groups

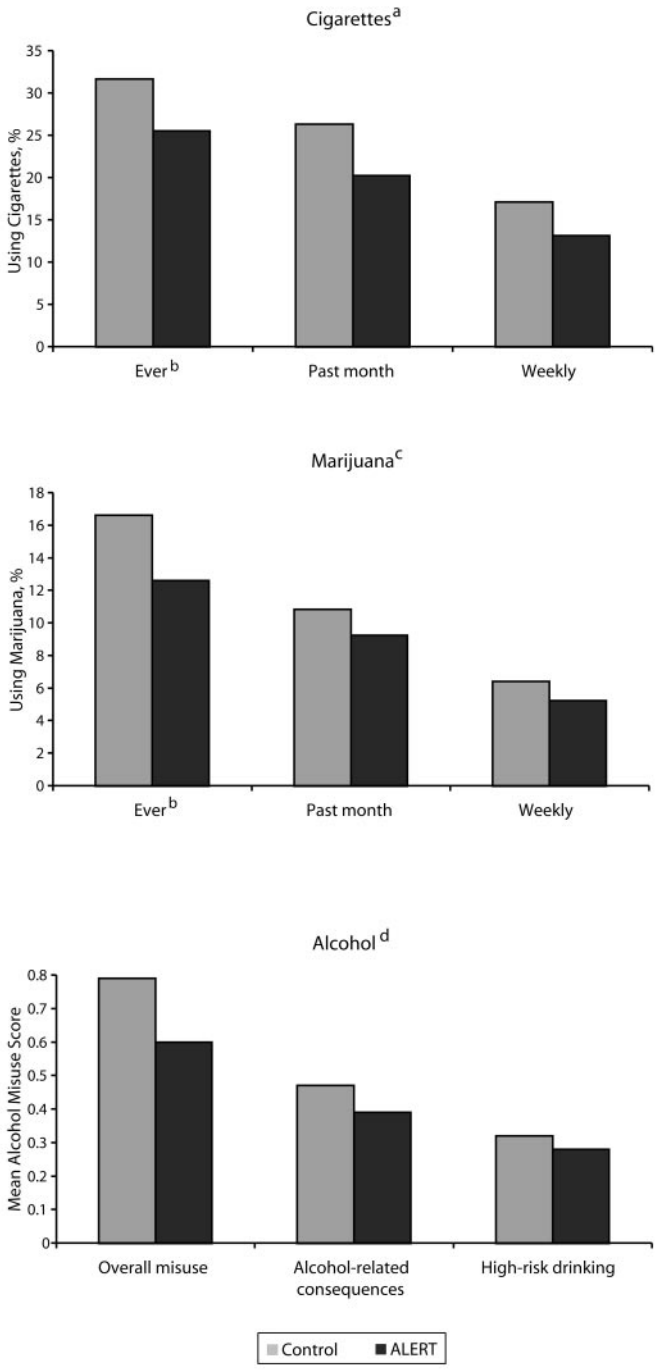
Cigarettes. The revised Project ALERT yielded positive results for all 3 risk groups—baseline nonusers, experimenters, and users. As shown in Table 2, it curbed current use among the high-risk experimenters and the even higher-risk baseline smokers (users) by about 20% ($P<.03$). It also cut regular (weekly) cigarette use across all 3 groups by anywhere from 19% ($P<.06$) to 39% ($P<.02$).

Marijuana. The revised curriculum curbed marijuana initiation in both the low-risk group (those who had tried neither marijuana nor cigarettes by 7th grade) and the moderate-risk group (those who had tried cigarettes but not marijuana) (Table 2). About 5% of the low-risk ALERT students started to use marijuana between the beginning of 7th grade and the end of 8th grade, compared with 8% in the control schools, a reduction of 38% ($P<.01$). Although initiation rates were considerably higher in the moderate-risk group, the program still curbed marijuana initiation among these students by 26%, shifting it from an absolute rate of 37% in the control schools to 27% in the ALERT schools ($P<.02$). It also yielded lower rates of current and weekly marijuana use in the low- and moderate-risk groups (reductions ranging between 16% and 31%), but the results were not significant.

Alcohol. The revised program was most successful with the highest-risk early drinkers (users). For these adolescents, it had a marginally significant impact on current (past month) drinking, reducing it from 73% to 67% ($P=.10$) (results not shown). It also curbed alcohol misuse among these high-risk users (Table 2), producing adjusted means for ALERT students that were about one-fifth of

TABLE 1—Student Characteristics in the Baseline and Analysis Samples by Experimental Condition

	Control Students		Project ALERT Students	
	Baseline Sample (% of 1879)	Analysis Sample (% of 1723)	Baseline Sample (% of 2810)	Analysis Sample (% of 2553)
Male	50.8	50.0	52.7	52.1
Non-White	17.7	15.7	12.3	10.4
Low grade average (C or lower)	22.6	22.7	22.4	20.1
Father not a high school graduate	28.1	27.9	32.0	31.6
Does not live with both biological parents	31.7	30.2	32.9	30.9
Ever used alcohol	62.6	61.7	61.4	60.8
Ever used cigarettes	37.7	34.8	37.2	35.0
Ever used marijuana	10.3	8.6	6.9	5.3



[a]All differences are statistically significant at $P < .01$. Owing to item nonresponse, n = 4247.
[b]Postbaseline initiates.
[c]Difference in ever using is statistically significant at $P < .01$; other differences are not statistically significant. Owing to item nonresponse, n = 4227.
[d]Differences are statistically significant at $P < .05$ for overall misuse and alcohol-related consequences, and at $P < .10$ for high-risk drinking. Owing to item nonresponse, sample sizes are n = 4189 overall misuse, n = 4247 for alcohol-related consequences, and n = 4213 for high-risk drinking.

FIGURE 1—Project ALERT's impact on cigarette, marijuana, and alcohol use (combined sample) 18 months after baseline.

a standard deviation below the means for control students on all 3 indices: overall misuse, high-risk use, and alcohol-related consequences ($P<.04$ for each index). However, differences in misuse between control and ALERT students were small and not significant for the nonuser and experimenter groups. Also, ALERT did not reduce initiation or current use in the 2 lower-risk groups.

DISCUSSION

These results indicate that the revised Project ALERT curriculum replicated and improved on the original program's effectiveness for middle school students. It continued to curb both cigarette and marijuana use, yielding positive impacts for the entire middle school sample as well as for each of the different risk groups (baseline nonusers, experimenters, users).

It also produced new and significant effects for alcohol misuse, for adolescents at moderate risk for marijuana use, and for baseline users and nonusers of cigarettes. The new reductions in alcohol misuse apply to the highest-risk early drinkers. The new reductions in marijuana initiation apply to students in the moderate-risk group, who are 3.5 times more likely to become regular marijuana users than are the baseline nonusers.[6] Project ALERT also yielded a larger reduction (38%) in marijuana initiation for adolescents who had tried neither marijuana nor cigarettes at baseline than that obtained in the trial of the original program (31%).

The results for cigarettes apply to all 3 risk groups. Whereas the original program's impact on cigarette use was largely confined to the baseline experimenters, the revised program also helped the low-risk nonsmokers and the high-risk smokers. For the baseline nonusers, it yielded 2 new results: (1) it kept some students from starting to smoke and (2) for those nonusers who did try cigarettes, it kept about 40% from making the transition to regular smoking. For the baseline smokers, the revised ALERT program reversed the negative effects reported in the study of the original program. Instead of reacting negatively to the curriculum, the more-committed smokers responded positively, cutting back on both current and regular use after receiving the re-

TABLE 2—Project ALERT's Effects on Cigarette, Alcohol, and Marijuana Use by Risk Group 18 Months After Baseline

	Baseline Nonusers (Low-Risk)		Baseline Experimenters (Moderate-Risk)		Baseline Users (High-Risk)	
Outcomes at 18 Months	ALERT, %	Control, %	ALERT, %	Control, %	ALERT, %	Control, %
Cigarette use						
Past month (current)	8.6	11.1	28.9**	36.6	56.8**	70.8
Weekly (regular)	4.0**	6.6	18.0**	23.5	45.1*	56.0
Marijuana use						
Ever (initiation)	5.0***	8.0	27.2**	36.8	. . .	. . .
Past month (current)	2.8	3.4	14.1	19.1	48.1	45.7
Weekly (regular)	1.5	1.7	7.1	10.2	34.0	35.9
Alcohol use (mean scores)						
Overall misuse	0.22	0.30	0.64	0.65	1.78**	2.23
Alcohol-related consequences	0.13	0.18	0.38	0.39	1.04**	1.29
High-risk use	0.10	0.11	0.27	0.25	0.74***	0.92

Note. Nonusers = never used the specific substance for cigarettes and alcohol, and never used marijuana or cigarettes for marijuana; experimenters = tried the specific substance once or twice but not in past month for cigarettes and alcohol, and tried cigarettes but not marijuana for marijuana; users = tried the specific substance 3 or more times or in the month before baseline for cigarettes and alcohol, and tried marijuana for marijuana.
*$P < .10$; **$P < .05$; ***$P < .01$. Results are 2-tailed.

vised middle school lessons. These results are all the more important because early smokers are 3 times more likely than experimenters to become daily smokers by 8th grade[25] and 6 times more likely to do so by 12th grade.[6]

Students in Project ALERT schools showed lower rates of current and regular marijuana use compared with controls (in both the entire sample and the low- to moderate-risk groups), but these results did not achieve statistical significance. Similarly, the program did not curb alcohol initiation or current use. Although insufficient power may account for the null marijuana effects, it does not explain the null findings for alcohol. A more likely explanation is that curbing any or moderate alcohol use is difficult in societies where drinking is widespread and socially acceptable. Prevention programs stand a greater chance of making inroads on less socially acceptable forms of drinking, such as problematic use.

Overall, these results provide further support for the effectiveness of the social influence prevention model and for implementation of evidence-based programs such as Project ALERT in the nation's schools. They are especially important because they demonstrate the possibility and potential of continued program improvement over time. Few school-based programs have been explicitly revised in response to prior research findings; even fewer have demonstrated that the revisions improve on the original.

Particularly noteworthy is the revised Project ALERT's impact on baseline cigarette experimenters and smokers, as well as the highest-risk early drinkers. The results respond to critics of school-based programs who contend that such programs fail to affect high-risk adolescents.[45,46] These early smokers and drinkers have substantially elevated risks for increased drug use and a variety of other high-risk behaviors, such as violence, unsafe sex, and dropping out of school.[4,9,47] Hence, they are precisely the youth who need help the most. Curbing alcohol and cigarette use among these high-risk youth when they are in middle school may help prevent the emergence of more serious problems later on.

Our findings for alcohol misuse indicate that school-based programs have important potential for reducing adverse effects related to drinking. The reductions in high-risk drinking and alcohol-related problems such as fighting, impulsive behavior, and school difficulties suggest that programs such as Project ALERT can generate a broad range of public health benefits. The fact that the vast majority of teenage drinkers are highly likely to misuse alcohol[48] suggests that these programs can help large numbers of adolescents. Few studies have evaluated the impact of middle school drug prevention programs on alcohol misuse.[49] Given the results reported above, the topic deserves further investigation.

The results of this trial have added significance because they expand the variety of environments in which Project ALERT has been proven effective. The original Project ALERT was tested in 30 schools from 8 urban, suburban, and rural communities in California and Oregon. The revised Project ALERT trial, which took place in a Midwestern state with comparatively high rates of alcohol dependence, binge drinking, and current smoking, included more than 40 rural and small-town (as well as urban) communities. Taken together, both trials indicate that Project ALERT works in the Midwest as well as on the West Coast, in rural and small-town communities as well as in urban and suburban environments, and in a region with norms highly favorable toward drinking and smoking.

We also note that the rigorous nature of the design and analysis has reduced the likelihood that there are alternative explanations for the results. Nevertheless, these results pertain only to the middle school years. They do not tell us whether ALERT's impact on drug use persists over time. Future reports will assess whether the high school booster lessons help maintain and enhance the middle school reductions in drug use. Such studies should provide needed information about the long-term effectiveness of Project ALERT and ways in which it could be further improved. ■

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Contributors

P.L. Ellickson supervised curriculum development, survey design, and data analysis, wrote the first draft of the article, and helped revise it. D.F. McCaffrey developed the school assignment procedure, conducted the statistical analyses, and helped revise the article. B. Ghosh-Dastidar conducted the imputation and covariate selec-

tion analyses and helped revise the article. D.L. Longshore supervised school recruitment, data collection, and data analysis and helped revised the article.

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Human Participant Protection

RAND's institutional review board approved all data collection and privacy protection procedures and reviewed the study annually.

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