

ASSESSING THE EFFECTS OF SCHOOL-BASED DRUG EDUCATION:
A SIX-YEAR MULTI-LEVEL ANALYSIS OF PROJECT D.A.R.E.

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ABSTRACT

A randomized longitudinal field experiment was conducted to estimate the short- and long-term effects of the Drug Abuse Resistance Education program (D.A.R.E.) on students' attitudes, beliefs, social skills, and drug use behaviors. Students from urban, suburban, and rural schools (N= 1798) were followed for more than six years, with surveys administered each year from 6th through 12th grades. Teachers were also surveyed annually to measure students' cumulative exposure to supplemental (post-D.A.R.E.) drug education. Multi-level analyses (random-effects ordinal regression) were conducted on seven waves of post-treatment data. The results indicate that D.A.R.E. had no long-term effects on a wide range of drug use measures, nor did it show a lasting impact on hypothesized mediating variables, with one exception. Previously documented short-term effects had dissipated by the conclusion of the study. D.A.R.E., although ineffective by itself over the long haul, appears to inoculate students against the apparent negative aspects of supplemental drug education. Some D.A.R.E.-by-Community interactions were observed: urban and rural communities showed some benefits, while suburban areas experienced small adverse effects from participation.

Drug Abuse Resistance Education (D.A.R.E.) is the nation's most popular school-based drug education program; it is administered in approximately 70% of the nation's school districts, reaching 25 million students in 1996, and has been adopted in 44 foreign countries (Law Enforcement News 1996). Its effectiveness in combating drug usage, however, has been a matter of bitter controversy, and this debate is taking place in the context of rising drug use among our nation's youth. After experiencing large declines in drug use in the 1980s, the national trend began to reverse in the early 1990s: the percentage of high school seniors who reported using illegal drugs "during the past year" increased from 22 percent in 1992 to 35 percent in 1995 – a 59 percent increase (Johnston et al. 1996). Marijuana is one drug where dramatic increases were observed. The number of eighth graders who reported using marijuana during their lifetime jumped from 10.2 percent in 1991 to 19.9 percent in 1995 – a 92 percent increase. Reports from the Office of National Drug Control Policy (1997) reflect a growing concern about recent trends in drug-use attitudes and behaviors among America's youth, and call upon the nation to act swiftly to prevent a future drug epidemic.

This growing drug problem has caused a flurry of media coverage and political finger pointing, all leading to closer scrutiny of our nation's efforts to control and prevent drug abuse. The spotlight has been especially strong on America's most popular and visible program—D.A.R.E. Whether or not D.A.R.E. has been an effective preventive program has been the subject of considerable debate and research. The publication of a national study that questioned the effectiveness of D.A.R.E. in preventing drug use (Ringwalt et al. 1994) opened the door to an avalanche of criticism in the popular press. A *Washington Times* article in 1996 declared that "D.A.R.E.'s success...is a political illusion, based on massive publicity efforts and a contempt for results" (Bovard 1996). A prominent police chief characterized D.A.R.E. as "enormously popular" yet an "enormous failure," and hence, decided to drop the program because "it does not work" (NBC Dateline 1997). Of course, the problem of demonstrating effectiveness in drug prevention is not unique to D.A.R.E. Several literature reviews and meta-analyses of school-based drug prevention programs have concluded that most are ineffective in preventing drug use (see Battjes

1985; Bangert-Drowns 1988; Botvin 1990; Bruvold and Rundall 1988; Ennett et al. 1994; Hansen 1990; Ringwalt et al 1994; Tobler 1986).

The latest pressure on school-based drug education programs comes from federal legislation. Congress enacted the Drug-Free Schools and Communities Act in 1987 (and many subsequent amendments) to beef-up our nation's drug education and prevention programs. Effective July 1, 1998, local school districts will be expected, for the first time, to provide evidence of program effectiveness in order to receive federal Title IV funds. Funding is widely available for "research-based" strategies that are consistent with the new "Principles of Effectiveness." One of the core principals is that "...grant recipients shall...select and implement programs that have demonstrated that they can be effective in preventing or reducing drug use, violence, or disruptive behavior." The new SDFSCA language will force many states, school districts, and schools to give more attention to drug education goals, processes, and evaluation results. If proposed school-based programs are taken at face value, their main goal is clear – to prevent drug use among the target population. Whether programs can achieve this goal is an empirical question that should be answered, in part, through rigorous evaluation research.

The present article reports on a comprehensive longitudinal evaluation of D.A.R.E. that occurred between 1989 and 1996 in the State of Illinois. This paper includes the final analyses of the full data set collected as part of the Illinois D.A.R.E. study, which tracked students from 5th and 6th grades through their junior and senior years of high school.

The D.A.R.E, Program

D.A.R.E. is a series of school-based drug and violence prevention programs for kids in Kindergarten through 12th grade. It is a cooperative venture between law enforcement agencies, schools, and the local community, and it involves the use of trained, uniformed police officers in the classroom to teach a carefully planned drug prevention curriculum. Created in 1983 as a collaborative venture between the Los Angeles Police Department and the Los Angeles Unified School District, D.A.R.E. has expanded to become the largest drug education initiative in the world. The core D.A.R.E. curriculum, which is the subject of this research, focuses on children in their last year of elementary school (5th or 6th grade). It is based on the assumption that students at this age are the most receptive to anti-drug messages as they approach the age of drug experimentation.

Theoretical Framework

Evaluations of D.A.R.E.'s effectiveness as a public policy can also be viewed as a test of its theoretical underpinnings. Although some researchers have referred to D.A.R.E. as "atheoretical" (Winfrey, Esbensen, and Osgood 1996), this is far from accurate. Unlike the earlier generation of drug education programs in the 1970s, D.A.R.E. is solidly grounded in a body of theory and research that laid the foundation for a second generation of school-based prevention initiatives. The program is deeply rooted in the social skills and social influence model of drug education. As Botvin (1990) notes, a variety of strategies can be characterized as part of this "psychosocial" approach to drug prevention, but three general categories of programs can be identified: psychological inoculation, resistance skills training, and personal and social skills training. D.A.R.E. has elements of each approach in its curriculum.

Botvin compares psychological inoculation to "traditional preventive medicine" in that individuals are exposed to weak doses of "infection" so that "anti-bodies" may be developed. (D.A.R.E.'s "vaccine" takes the form of simulated temptations and pressures

to use drugs). The resistance skills training approach places emphasis on teaching specific skills for evading or resisting these “negative social influences,” including subtle media influences (D.A.R.E. students engage in role playing scenarios to resist peer offers of drug use). The personal and social skills training approach is not problem-specific, but more broadly oriented to the “acquisition of generic personal and social skills.” These will have the incidental effect of preventing the development of socially learned behaviors and attitudes that are believed to be associated with substance use. Recent applications of the personal and social skills approach were modeled after earlier interventions shown to be effective in preventing cigarette smoking (Flay et al 1983). Some successful applications of this model to drug abuse have been reported in the literature (Botvin 1990; Clayton et al 1991; Flay 1985; Hansen 1992; Tobler 1986). Particular attention is given to helping youth develop the social skills to recognize and respond appropriately to peer pressure.

From the outline of the curriculum (see Table 1), it is apparent that D.A.R.E. also includes what Botvin (1990) calls “information dissemination” and “affective education.” The former is designed to provide students with enough knowledge to make informed cost-benefit decisions about drug use (e.g. D.A.R.E. includes information on drug use, misuse, and consequences; media influences; drug use alternatives). The latter is similar to the “personal and social skills” approach, but is focused on a strategy of “social enrichment.” D.A.R.E. attempts to do this by focusing the curriculum on self-esteem building, managing stress, decision-making, role modeling, and forming support systems. The general hypothesis implicit in the D.A.R.E. model is that classroom instruction by trained police officers will result in enhanced self esteem, self-understanding, and assertiveness, a clearer sense of values, and more responsible decision-making habits, which, in turn, should make students less vulnerable to the enticements and pressures to use drugs and alcohol.

Table 1

Original D.A.R.E. Curriculum

Session Topic	Description
1. First Visit/Personal Safety	Introduction of DARE and law enforcement officer safety practices; discussion of personal rights
2. Drug Use & Misuse	Harmful effects from misuse of drugs
3. Consequences	Consequences of using and choosing not to use alcohol, marijuana and other drugs
4. Resisting Pressures	Sources of pressure, types of pressure to use drugs
5. Resistance Techniques	Refusal strategies for different types of peer pressure
6. Building Self-Esteem	Identifying positive qualities in oneself; giving/receiving compliments; importance of self-image
7. Assertiveness	Personal rights/responsibilities discussion; situations calling for assertiveness skills
8. Managing Stress Without Drugs	Identification of sources of stress; when stress can be helpful or harmful; ways to manage stress; deep breathing exercise
9. Media Influences	Media influences on behavior; advertising techniques
10. Decision-Making & Risk Taking	Risk-taking behaviors; reasonable and harmful risks; consequences of various choices; influences on decisions
11. Drug Use Alternatives	Reasons for using drugs; alternative activities
12. Role Modeling	Meet older student leaders/role models who do not use drugs
13. Forming Support System	Types of support groups; barriers to friendships; suggestions to overcoming barriers to forming friendships
14. Ways to Deal with Gang Pressures	Types of gang pressure; how gangs differ from groups; consequences of gang activity
15. DARE Summary	DARE review
16. Taking a Stand	Taking appropriate stand when pressured to use drugs
17. DARE Culmination	Award assembly: recognition of participants

Previous D.A.R.E. Evaluations

There have been many outcome evaluations of the core D.A.R.E. curriculum, but the methodological rigor of these assessments vary considerably.' Most of these studies are of limited scientific value because of their weak research designs, poor sampling and data collection procedures, inadequate measurement, and analysis problems. Indeed, the boldest claims of D.A.R.E.'s success are especially vulnerable to such criticism given rampant problems with internal validity. Most evaluations have been Posttest-Only designs, i.e., the survey instrument is administered for the first time after students have participated in the program. Some of these Ex Post Facto evaluations did not include any type of control group (Aniskiewicz and Wysong 1987; Carstens et al. 1989; Correll 1990; McMahon and Wuorenma 1992; Netburn 1989; Silva 1995). Other studies required the respondents to recall, retrospectively, whether or not they had received D.A.R.E. (De Jong 1987; Donnermeyer 1998; Dukes et al. 1996; Dukes et al 1997; Fife 1994; Wysong et al. 1994), or they used a non-equivalent control group (McDonald et al. 1990). Many of these evaluations reached conclusions that were favorable to D.A.R.E.,' some on the basis of responses to as few as Ave survey items. The limitations of these studies are too numerous to be listed here, but clearly, the observed differences may be the result of self-selection processes (or other pre-existing differences) rather than the D.A.R.E. program (see Cook and Campbell 1979, 98).'

There have been several D.A.R.E. evaluations that could be classified as "quasi-experimental." Three used pretest-posttest designs without a control group (Anonymous 1987; Kethineni et al. 1991; Wiegand 1991), and two of those were also flawed by survey instruments of the type used in the weakest of the Ex Post Facto evaluations. A larger number of quasi-experimental evaluations (Reeker et al. 1992; Clayton 1987; Etheridge and Hicks 1989; Faine and Bohlander 1988; Faine and Bohlander 1989; Harmon 1993; McCormick and McCormick 1992; Manos et al. 1986; Walker 1990) have sufficient scientific integrity to allow estimates of causal effects. These quasi-experimental studies produced more modest assessments of D.A.R.E. than the weaker evaluations. They uncovered fairly consistent short-term effects of D.A.R.E. on mediating variables such as knowledge, attitudes, and social skills (Reeker et al. 1992; Clayton 1987; Faine and Bohlander 1989), but provided little evidence of D.A.R.E.'s impact on drug use behaviors.

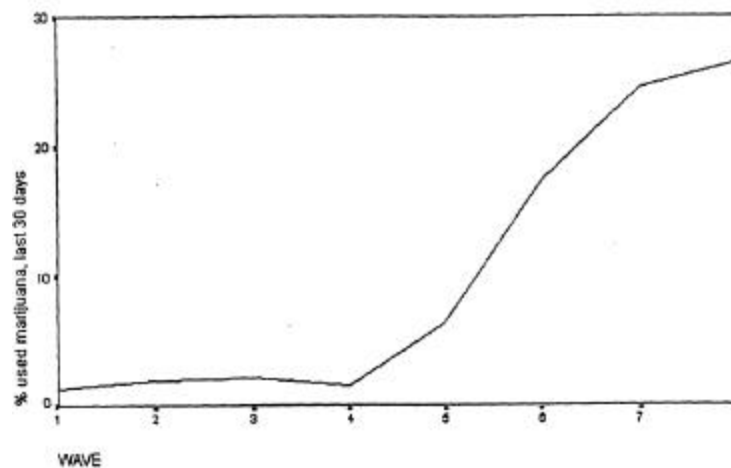
The strongest design used to assess D.A.R.E. (with the fewest threats to validity) is the randomized experiment. Only a few evaluations have employed experimental designs with sufficiently large sample sizes and repeated measurement over one or more years (Clayton et al. 1991a; Clayton et al. 1991b; Clayton et al. 1996; Ennett et al. 1994; Lindstrom 1996; Ringwalt et al. 1990; Ringwalt et al. 1991; Rosenbaum et al. 1994). These studies clearly indicate that D.A.R.E.'s positive effects on students tend to dissipate over time. D.A.R.E. has its largest short-term benefits on students' knowledge about drugs, but statistically significant positive effects have also been observed for social skills, drug-related attitudes, attitudes toward the police and, less frequently, self-esteem. The effects on drug use behaviors are often small and nonsignificant, although significant short-term reductions in tobacco use have been noted on more than one occasion (see meta-analysis by Ennett et al. 1994). The literature of D.A.R.E.'s effectiveness as a drug prevention strategy can be summarized in this way: the stronger the research design, the less impact researchers have reported on drug use measures.

One of the major limitations of even the best D.A.R.E. evaluations is the short lag between pre-test and post-tests. Despite the growth in the number of D.A.R.E. studies, surprisingly few are longitudinal in nature. Most of the stronger studies have examined program effects immediately after students participated in D.A.R.E. (Becker et al. 1992; Faine and Bohlander 1988; Harmon 1993; Kethineni et al. 1991; Lindstrom 1996; Manos et al. 1986; Ringwalt et al. 1990; Ringwalt et al. 1991; Wa3cer 1990); a few have looked at one-year and two-year outcomes (Clayton et al. 1991a; Clayton et al. 1991b; Ennett et al. 1994; Rosenbaum et al. 1994). Given the relatively low base rates for drug use at the ages of 11 or 12 (when D.A.R.E. is introduced), short time lags between pretest and posttest measurement can severely restrict the opportunity to detect preventive effects.

Figure 1 captures the essence of this problem: most of the students in the present study entered high school at wave 5 of the survey. This is the point at which marijuana use within the past 30 days, for example, begins to rise dramatically, from 2.5% of those surveyed at wave 4 to more than 25% at wave 8. D.A.R.E. is typically administered in sixth grade, well in advance of the steep rise in usage patterns common to most substances. Thus, a real test of program effectiveness must extend to the age group where opportunities for drug use are substantial; otherwise there will be a ceiling or upper limit on the dependent variable.

FIGURE 1

PERCENT USED MARIJUANA WITHIN LAST 30 DAYS



Prior D.A.R.E. research has virtually ignored the possible effects of supplemental (i.e. post-D.A.R.E.) drug education during the middle school and high school years. School-based drug prevention is now mandatory in many states, including Illinois where this study was conducted. This post-D.A.R.E. instruction could have the effect of contaminating the control group and confounding the effects of the treatment. Also, D.A.R.E. may be more or less effective in combination with other drug education initiatives.

The national study by Silvia and Thorne (1997) found that students were exposed to a wide range of drug prevention programs at all grade levels and that these programs were delivered inconsistently with wide variability. One state-wide study (Donnermeyer

1998) reports evidence of a cumulative “booster effect,” i.e., students who participated in multiple drug use prevention activities reported less drug use than students who reported less exposure to school-based activities. Unfortunately, this study is a one-shot cross-sectional design’ that suffers from numerous threats to validity, including self-selection at the individual and school levels. Rather than rely on students’ recall, which is vulnerable to considerable memory decay, the present study measures their exposure to supplemental drug education by interviewing their teachers on an annual basis.

Finally, previous D.A.R.E. evaluations have been plagued by a variety of data analytic problems, ranging from improper use of statistical tests to a failure to use covariates or control variables in the analysis. Even the strongest D.A.R.E. evaluations typically suffer from the problem of treating individuals as the only unit of analysis when in fact students are “nested” within specific schools. Statistically-minded critics have argued that evaluations of school-based programs fail to consider school-level effects in the analysis of data collected from individual students, a mistake which can lead to overly-liberal estimates of program effects (Murray and Hannan, 1990). The current study corrects this problem through the use of multi-level analyses.

Earlier Findings From This Longitudinal Study

In both published and unpublished technical reports, we have reported the effectiveness of this program at various measurement points. Given that the literature contains only one other long-term study of D.A.R.E., we believe it is important to summarize the earlier findings here.

Drug use outcomes.

Immediately after graduation from the D.A.R.E. program, students in the experimental group reported a significant decline in recent (30-day) use of cigarettes relative to the control group, but no other changes were observed on a wide range of drug and alcohol behavior measures. Follow-up studies conducted one, two, and three years after the program found that D.A.R.E. had no main effects on any of the drug and alcohol measures.’ After four years, some new drug use measures were added (considered inappropriate for younger students) and we found that D.A.R.E. students were significantly older when they “first got drunk” and when they started “drinking “at least once a month.” These delayed-onset effects, however, were not sustained at the 5-year measurement point. In fact, after five years, the program was associated with unexpected adverse effects on the primary drug outcomes; that is, D.A.R.E. students, relative to controls, reported significantly higher scores on the Total Drug Use and Total Alcohol Use indices, as well as the severity of

Mediating variables.

The presence of D.A.R.E. was associated with a number of hypothesized changes in attitudes, beliefs, and social skills. At the immediate posttest, significant gains were observed on seven outcome measures. Students exposed to D.A.R.E. (in comparison to those in the control group) were more likely to report negative attitudes toward drugs in general, negative peer attitudes toward drugs, greater awareness of media influences concerning beer (and cigarettes), positive changes in self-esteem, greater assertiveness in social situations, and positive attitudes toward the police. Over time, however, the effects of D.A.R.E. on attitudinal and psychological variables declined. After one year, the effects on self-esteem, assertiveness, and attitudes toward the police had dissipated. Four attitudinal effects continued after two years, but after three years, all such effects were

gone with one exception: D.A.R.E. students continued to feel more confident in their ability to resist peer pressure. After four years, however, all effects relevant to attitudes, beliefs, and social skills were gone.

Academic and school behavior.

Overall, with a few subgroup exceptions, D.A.R.E. had no effect on self-reported grades, the number of times students were in trouble with teachers, the number of times they skipped class, or the frequency of their involvement in delinquent or criminal activities.

The present article employs the entire 6-year data set to estimate the effects of D.A.R.E. on students attitudes, beliefs, social skills, and behaviors. To date, the rests of this longitudinal study suggest that the effects of D.A.R.E. have waned over time. Some conflicting endings across the years may be due to interactions between program and maturational effects or may be due to slight improvements in the measurement and analytic procedures that were introduced by the researchers. Hence, the complete data set is used here to test the fundamental hypothesis that D.A.R.E. had a significant overall effect on theory-based and program-based outcomes. This study is not a wave-by-wave analysis (as previously completed), but rather addresses the basic question of whether, in the Goal analysis, students who participated in D.A.R.E. are different than students in the control group ashen all posttest test are analyzed.

METHODOLOGY

The Illinois D.A.R.E. Evaluation was conducted as a randomized field experiment with one pretest and multiple planned post-tests. The researchers identified 18 pairs of elementary schools, representative of urban, suburban, and rural areas throughout northern and central Illinois. Schools were matched in each pair by type, ethnic composition, number of students with limited English proficiency, and the percent of students from low income families. None of these schools had previously received D.A.R.E.. For the 12 pairs of schools located in urban and suburban areas, one school in each pair was randomly assigned to receive D.A.R.E. in the spring of 1990; the remainder were placed in the control group. For each of the remaining six pairs, all in rural communities, a non-random assignment process was necessary due to logistic considerations that affect the availability of D.A.R.E. officers. The remaining 6 "treatment" schools were selected from rural areas in which D.A.R.E. officers were already assigned, and 6 more control schools were then selected from nearby counties. The same matching variables were employed for all schools in the study.

Two types of surveys were administered each year over the six years of data collection: one for students and one for specific teachers. The purpose of the student survey was to determine D.A.R.E.'s overall effects on students' beliefs, attitudes, and behaviors related to drug use. The student survey data are the focus of this longitudinal evaluation. The teacher survey provided supplemental information to assess the extent of students' exposure to post-D.A.R.E. drug prevention programs during each current academic year.

Recruitment of Schools and Students

Two waves of data (pre-post) were collected from the thirty-six (36) schools in the first year (1989-1990). In the second year (wave 3, 1991), when students left these elementary schools and entered middle school, the recruitment process was repeated with approximately 150 schools. In the third year and beyond, as students continued to

move, transfer, and graduate, the number of schools in the sample fluctuated between 150 and 300. For the 1992-93 academic year, most of the evaluation sample entered high school for the first time, which required the research team to develop relationships with an entirely new group of school officials.

Similar to the initial procedure, letters were mailed to all high school superintendents and principals from the existing sample of schools, informing them of students' prior participation in the study, seeking their cooperation, requesting verification of enrollment, and explaining the research procedures. With all the transience in the sample, the research staff was continually making contacts with representatives from new schools. A financial inducement to participate in the study was offered to major schools, depending on the number of students participating from their school and the level of cooperation obtained.

In each school, eligible students were those who had participated in the Wave I survey in 1990. Passive consent procedures (to obtain parental permission) were approved by the Institutional Review Board of the University of Illinois at Chicago. Consent forms were mailed to parents in January of 1990 requesting their child's participation for three academic years. The letter informed parents of the purpose and content of the project, stressed the confidentiality of the information to be collected, and invited parents to return the form in a stamped envelope if they did not wish their child to participate. During the fall of 1993, a new consent letter was distributed to parents by mail or through the school, requesting their consent for the final three years of the study.

Changes in the Evaluation

Two issues emerged in the drug education literature during the course of this evaluation. First, there was the possible "contaminating" influence of students being exposed to additional drug education programs in the years following their participation in D.A.R.E.. Evaluators inevitably face "multiple treatment interference" (Cook and Campbell 1979) as they attempt to estimate the effects of D.A.R.E. in the context of subjects' exposure to other types of drug education. With the rapid growth of drug education in recent years (including the enactment of legislation *requiring* that schools teach drug education), students in *both* the experimental (D.A.R.E.) group and the control group were frequently given some additional drug prevention education in subsequent years. To the extent that these supplemental programs had some favorable impact on students they may have equalized the two groups on drug-related outcomes, and therefore, biased the evaluation findings in favor of the null hypothesis (i.e. increase the likelihood of finding no difference between the experimental and control groups). The reverse outcome is also possible. Researchers have lamented this problem in the literature, but have rarely taken steps to measure or control for the effects of this "contamination." In contrast, the Illinois evaluation gave additional attention to this issue. With additional survey work, we were able to develop a cumulative index of a student's exposure to supplemental drug education programs over *several* years. This measure also allowed us to test the "booster" hypothesis, namely, that additional drug education programs at the middle and high school levels will boost or reinforce the anti-drug messages and skills received in the D.A.R.E. program, and that this consistent reinforcement will make a difference in drug use behaviors during the years of greatest opportunity and pressure.

A second issue concerns the proper approach to data analysis. As noted earlier, statisticians now recommend that school-level effects be assessed when analyzing data collected from students representing multiple school settings. There is now considerable support for this argument among statisticians and other methodologists, who have

developed new statistical programs for conducting multi-level analysis (e.g. Hedeker and Gibbons 1993). Furthermore, a time-Game that carries well beyond the “nesting” of students in their original elementary schools, and involves a multi-wave posttest analysis, is more likely to need some means of controlling for the difference between students who have been surveyed at all waves, and those who dropped out or were absent at one or more waves.

Multi-level analysis software such as Hedeker’s MIXOR and MIXREG have been developed in part to control for the attrition-related effects of being in the experimental or control group. Differential attrition may inflate or deflate estimates of program effectiveness. The results of logistic regression analysis indicate that attrition in the present data set was more likely among: students in the control group, students from single-parent families, African-Americans, Hispanic, urban students, and males. However, an Analysis of Variance found no support for the hypothesis that the subjects experimental condition (0,1) interacted with attrition status (0,1) to influence any of the four major drug use measures (defined below). More importantly, we used a mixed-level analysis strategy that controls for violations of the assumption of random variance and accounts for both individual differences and clustering within schools (see details in results section). This strategy incorporates the above-named variables as covariates in the regression equation.

Description of Student Instrument

The effects of D.A.R.E. were assessed with multiple mediating and outcome measures. The reliability and validity of these measures have been established in previous research and only slight modifications were made in the present investigation. The following measures were employed:

Drug Use Behaviors. Students were asked two sets of questions about their use of various drugs, including tobacco, alcohol, and other substances. The format for these questions was originally devised by Moskowitz and his colleagues (1981) for their “Drug and Alcohol Survey.” Students indicated whether they had used these substances in “their whole life” and “during the last month (30 days).” Students were instructed not to count the legitimate use of substances, either for religious services (i.e., wine) or because they were prescribed by a doctor (e.g. Librium, codeine). A composite Alcohol Use Index was constructed from measures of four different types of alcohol: beer, wine, wine coolers, and hard liquor. For the 30-day Alcohol Use Index, a value of “1” indicated that the student had used one of four different types of alcoholic beverage during the past 30 days; a value of “2” indicated use of two or more. A 30-day Total Drug Use Index was a combination of students’ responses to 11 different types of drugs and alcohol questions. (In addition to the 4 alcohol measures, this index included smokeless tobacco, marijuana, inhalants, hallucinogens, cocaine, “other drugs,” and “alcohol to get”). For the 30-day Total indices, a value of “1” indicated that the student had admitted to one or two types of drug use during the past month, while “2” indicated three or more. Similarly, the lifetime measures were scored as continuous variables with ranges from 1 to 4 for Alcohol Use and 1 to 11 for Total Drug Use.

Onset of alcohol use. To measure the onset of alcohol use, students were asked to indicate how old they were when they “first got drunk or very high using alcohol” They also reported how old they were when they began to drink “at least one drink at least once a month.”

General attitudes toward drugs. Students indicated their level of agreement with 8 statements concerning drug use, which Moskowitz et al (1981) originally developed for the “Drug and Alcohol Survey.” After reversing the scores of positively worded items, a scale was computed by summing student responses, so that a high score represented a positive attitude toward drugs (Alpha Range = .78-.89).

Attitudes toward the use of specific drugs. These questions, also extracted from the “Drug and Alcohol Survey,” assess specific attitudes toward those substances youth are most likely to use. We grouped together (i.e., summed) student responses to questions concerning their attitudes toward beer, wine coolers, and wine. A higher score on this scale indicates a more positive attitude toward alcohol use (Alpha Range = .82-.90).

Perceived benefits and costs of using drugs. Students were asked eight questions about their perceptions concerning the benefits, and five concerning the costs of smoking cigarettes and drinking beer and wine coolers (Moskowitz et al. 1981). By adding student responses four indices were created to assess the perceived costs and benefits of using cigarettes and alcohol. A higher score indicates the undesired outcome of lower perceived costs and higher perceived benefits of drug use (Alpha Range = .82-.86, .86-.90; .81-.86, .86-.90).

Perceptions of the media's influences on smoking and beer drinking. These two constructs were measured by totaling student responses to questions about media influences on beer drinking and cigarette smoking (Bauman 1985). Students indicated what they thought (1) television and (2) newspapers and magazines made beer drinking and cigarette smoking “look like.” Students who responded that the media made substance use look like “both a good and a bad thing to do,” or “neither a good nor a bad thing to do,” were scored as a neutral intermediate category between those who thought it was a “good” and a “bad” thing to do. A higher score indicates less student recognition of media attempts to make drugs look attractive (Alpha Range = .79-.82; .79-.85).

Self-esteem. This construct was measured by adding six items extracted from the Rosenberg (1965) self-esteem scale, which was developed for use with adolescents. Questions were modified slightly to make the language more appropriate for contemporary students. A higher score indicates higher self-esteem (Alpha Range = .80-.88).

Attitudes toward police. Students rated five items extracted from the “Attitudes Toward Police” scale developed By Faine and Bohlander (1989). The items were then summed, with a higher score indicating more favorable attitudes toward the police (Alpha Range = .84-.90).

Peer Resistance Skills. Students responded to four hypothetical situations in which either their best friend or an acquaintance offered them either cigarettes or alcohol (Hansen, 1989). They then rated their ability to “say no” on a four-point scale ranging from “not sure at all” to “very sure.” The four items were summed, with a higher score indicating greater confidence in one’s ability to resist peer pressure to use substances (Alpha Range = .86-.90).

School Performance. Self-reported grades were used as a measure of school performance. The range was from 1 to 8, from less than D’s (coded as 1) to mostly A’s (coded as 8). A separate component of this study conducted at wave 4 revealed that self-reported grades were a good reflection of official grades (i.e., the correlation coefficient between the two was 0.60). ● *Delinquent and Violent Behavior.* A multi-item index was created to measure students’ involvement in delinquent behaviors. Several of these items are derived from the High School Senior Survey conducted by the University of Michigan (Johnston et al., 1988). Behaviors include group violence, theft of property under \$50, theft of property over \$50, shoplifting, and damage to school property. Participation in a group fight (involving one group or gang against another) was also treated as a separate measure of violence.

RESULTS

Characteristics of the Student Sample

The results reported here are based on the combined sample of students surveyed at all waves. The wave-by-wave characteristics are shown in Table 2.

Table 2

Characteristics of Students¹ - All Waves

	1	2	3	4	5	6	7	8
Gender								
Male	51.1	50.7	50.4	50.4	51.1	48.5	48.2	49.1
Female	48.9	49.3	49.6	49.6	48.9	51.5	51.8	50.9
Race/Ethnicity								
White	51.1	51.5	50.4	52.1	54.6	58.6	60.2	62.8
Afr-Amer.	29.8	25.9	29.1	28.6	26.7	25.3	22.9	21.0
Hispanic	10.8	9.8	10.8	10.7	10.7	11.5	8.7	10.6
Other	8.4	12.9	8.8	8.7	7.2	7.4	6.7	5.6
Wave 1 Grade								
Fifth	34.4	35.4	33.6	33.2	35.9	30.5	30.1	31.0
Sixth	65.6	64.6	66.4	66.8	64.1	69.5	69.9	69.0
Intact Family								
Yes	63.8	59.9	59.1	60.0	60.6	62.4	61.3	61.7
No	36.2	40.1	40.9	40.0	39.4	37.6	38.7	38.3
Area								
Urban	41.0	38.9	39.2	38.0	36.0	29.9	28.8	27.1
Suburban	35.7	36.6	35.8	36.8	37.4	41.5	40.4	41.6
Rural	23.2	24.5	25.0	25.2	26.5	28.5	30.8	31.4
Group								
D.A.R.E	54.2	51.6	53.8	53.2	53.1	53.0	52.4	52.2
Control	45.8	48.4	46.2	46.8	46.9	47.0	47.6	47.8

¹Figures are percentages

Approximately two-thirds of the students were in sixth grade at the time of wave 1 data collection (with the remainder in fifth grade). Roughly 6-10 students indicated that they were living with both parents in the same household at all waves. Slightly more than half (52%) were exposed to D.A.R.E. in the spring of 1990, while the remaining students were part of the control group. Attrition over the six years was most noticeable among the urban and African-American samples.

Analysis Strategy

We employed a random-effects ordinal regression model that allowed us to examine the relationship between D.A.R.E. and individual-level outcomes while controlling for random effects. We used the MIXOR and MIXREG programs, developed at the University of Illinois at Chicago by Donald Hedeker and his colleagues. The program uses maximum marginal likelihood solution and is applicable to both probit and logistic response functions (see Hedeker & Gibbons, 1993; Hedeker, Gibbons, & Davis, 1991). Maximum marginal likelihood regression was used within the framework of multi-level analysis. Each substantive model included an indicator for whether the student had received D.A.R.E., plus a set of binary-coded control variables that included race/ethnicity, gender, family structure (intact vs. non-intact), and metropolitan status (urban, suburban, or rural).

Merging Waves. Data from the seven post-test surveys were merged. The analysis strategy involved a level and trend comparison of the D.A.R.E. and control groups across all post-test waves. Cases were sorted by student identification number so that there would be up to 7 observations per student, with each observation representing a different wave of post-test data.

Before adding each wave to the composite data set, a "Time" variable was created, with all of the observations for a particular wave receiving the same Time value. After merging the seven post-test waves, the Time variable was recoded so that wave 2 was Time 0, wave 3 was Time 1, and so on up to wave 8, or Time 6. The Time variable was the basis for determining the existence of significant changes in attitudes or drug usage over time, and of controlling for this trend in the comparison of D.A.R.E. group and control group responses. The basic model for all attitude measures, and for the delinquency index, can be simply expressed as...

$$Y = b_0 + b_1 \text{Time} + b_2 \text{D.A.R.E.} + b_3 (\text{D.A.R.E.} * \text{Time}) + \text{demographic area covariates}$$

...where Y is the scale mean, b_0 is the wave 2 or Time 0 mean, controlling for the

demographic and area covariates, b_1 is the rate of change per wave or year, b_2 is the effect of D.A.R.E. on the wave 2 or Time 0 mean, and b_3 is the effect of D.A.R.E. on the rate of change per wave or year. D.A.R.E. is equal to 0 or 1, where 0 = control group and 1 = D.A.R.E. group. When D.A.R.E. is 0, all terms in the equation containing D.A.R.E. become 0. For analyses where the dependent variable was some type of alcohol and total substance use, a binary variable for high school years (grades 9 through 12) was added and interacted with Time in the same manner as the D.A.R.E. variable. The high school variable was added to control for the dramatic increases in drug usage during those years.

In order to test for differential effects on female, African-American, and Hispanic students, these demographic covariates were interacted with D.A.R.E. and added to a second model. The area covariates were interacted with D.A.R.E. in a third model to test for main effect (b_2) differences in rural, urban, and suburban areas. Because of potential

problems with multiple interaction terms, these subgroup interaction effects were, for the most part, only estimated in models that did not control for cumulative exposure to supplemental drug education (discussed below).

Exposure to Supplemental Drug Education

At each wave, beginning with wave 3 (one year after exposure to D.A.R.E.), a survey of the “most knowledgeable” local school teacher was conducted to determine the number of hours of additional drug education that students received at their current schools: the number of hours per week was multiplied by the number of weeks of drug education. The cumulative supplemental drug education variable was computed by adding the number of hours at that wave to the number of hours at each preceding wave. To correct for skewness, these figures were then grouped into 5 dosage levels at intervals of 36 cumulative hours, with the exception that the highest level included all students with more than 144 cumulative hours. In separate models, this variable was also interacted with D.A.R.E. to estimate the effect of D.A.R.E. plus supplemental drug education in relation to the effect of supplemental drug education only.”

Recoding

Several attitudinal and drug use scales were skewed, and therefore necessitated recoding prior to the regression analysis. The Delinquency Index and Peer Resistance scales were recoded into 3-point scales (1-3) with roughly equal numbers of cases in each group. Four-point scales were created for Perceived Benefits of Alcohol and Cigarettes, General Attitude Toward Drugs, and Self Esteem Again, the groups were of similar size.

Clustering and Random Variance

A variable representing the 36 original schools was retained for the purpose of estimating the effect of students being “nested” within particular schools at the time of exposure or non-exposure to D.A.R.E. (See Hedger 8c Gibbons, 1993; Murray 8c Hannan, 1990 for a detailed discussion of this issue). It was expected that this

“clustering” effect would have eroded over time, and that the principal violation of the assumption of constant variance would be subject-specific rather than school-specific. The results of regression analysis at specific time points largely confirmed this expectation. The other time points and all other scales and usage measurements had intra-cluster correlations below .05, and most were well below that level.”

Because of this, student identification numbers became the basis for bi-level analysis. With continuous outcome measures, regressor effects were estimated while controlling for the effect of subject-level variance in the constant term and over time.” The random effects were statistically significant in all models. Hence, controlling for subject-level variance differences across waves was an important analytic contribution to all models used to estimate program effects.

Effects on Hypothesized Mediating Variables

We tested the hypothesis that D.A.R.E. would have a sustained effect on the variables that are assumed to mediate the relationship between drug education and drug use, namely, students’ attitudes, beliefs, and social skills pertaining to drug use. On the whole, the results did not support this hypothesis (see Table 3). When controlling for changes in these variables over time and for changes in cumulative exposure to supplemental drug

education, only one significant D.A.R.E. effect remained. Specifically, students who participated in D.A.R.E. were more likely than students in the Control group to report awareness of media efforts to make beer appear attractive. Even here, the D.A.R.E. interaction with Time (.01*, not shown) was significant in the opposite direction, suggesting that the sophistication of the Control group would eventually catch up to the D.A.R.E. group. All other D.A.R.E. effects were small and nonsignificant.

Although not posited as a mediating variable, we also examined the impact of D.A.R.E. on violence and delinquency prevention. Our Delinquency Index, which measures incidents of theft, vandalism, and/or participation in group violence, showed change over time in the desired direction, but not as a result of D.A.R.E. A separate analysis of individual and group violence revealed no D.A.R.E. effects. Previous evidence that African-American students reported less group violence after D.A.R.E. was no longer statistically significant.

In addition, we examined the hypothesis that D.A.R.E. would be able to improve academic performance. Self-reported grades, on a scale of 1 ("below D") to 8 ("mostly As") were used to measure academic performance. Although the trend was favorable, the overall results did not support this hypothesis. In the face of a significant drop in grades over time (.07 per wave), the D.A.R.E. effect was positive (.09 per wave), but was only significantly higher for rural students (.29*).

A test of the booster hypothesis revealed that exposure to supplemental drug education appears to have been largely counterproductive: each additional 36 hours of cumulative drug education accounted for significantly greater negative attitudes toward police, more positive attitudes toward drugs, alcohol, and cigarettes, and more delinquency (see Table 3). The only favorable outcome was that students' with more supplemental drug education reported greater awareness of attempted media influences on drug use.

Table 4

D.A.R.E.-by-Supplemental Drug Education (SUE)
Interaction Effects on Attitudes, Beliefs, and Social Skills¹

Outcome Scales	Adjusted Mean Wave 2	D.A.R.E.	Supp Drug Ed	D.A.R.E. and SDE
Attitudes Toward Police ²	3.22	-.01	-.04**	.02
Toward Specific Drugs	1.53	-.02	.06**	-.05**
Benefits of Alcohol	1.73	.03	.08**	-.07*
Benefits of Cigarettes	1.88	.03	.05**	-.06**
Cost of Alcohol	1.48	-.00	.03*	-.05**
Cost of Cigarettes	1.70	.03	.06**	-.07**
Delinquency Index	1.91	-.03	.03*	.01
General Attitude	1.55	.04	.02	-.02
Media Influence on				
Beer	1.39	-.07**	-.01**	.00
Cigarettes	1.39	-.03	-.01*	.00
Self Esteem	2.73	-.02	-.00	.04
Peer Resistance	2.26	.04	-.02	.04*
Skills				

¹Regression Analysis Controls for Time, D.A.R.E. By Time, Gender (Female), African-American, Hispanic, Intact Family, Rural and Suburban schools

²Current scale includes only Beer, Wine, and Wine Coolers.

Level 2 Observations = 1254 for most analyses

These findings transform the “booster” hypothesis into a question of whether D.A.R.E. is able to neutralize the potentially harmful effects of other follow-up programs. The analysis of D.A.R.E.’s interaction with supplemental drug education suggests that, in fact, the core program does have this effect (see Table 4). The interaction model separates the joint effects of “D.A.R.E. and supplemental drug education” from the independent cumulative effect of “supplemental drug education” alone. The result is that the positive and negative coefficients, respectively, tend to cancel each other out. The Perceived Benefits of Alcohol index, for example, is higher by .08 for each dosage level of supplemental drug education without D.A.R.E., but only .01 higher (.08** minus .07*) for students who participated in D.A.R.E. Thus, the combined effect of D.A.R.E. and supplemental drug education is about the same as for students who received no drug education at all.

D.A.R.E. also appears to have differential subgroup effects. Curiously, D.A.R.E. has been less effective in communicating the costs associated with alcohol and cigarette use to African-American participants, yet more effective in helping this group recognize media attempts to promote beer and cigarettes. Hispanic D.A.R.E. graduates had a significantly lower delinquency score than the reference group. D.A.R.E. appears to have had the desired effect of enhancing self-esteem and one’s perceived ability to resist peer pressure in urban and rural areas, while appearing to have had negligible or counterproductive effects in suburban areas. Suburban D.A.R.E. graduates also had a significantly higher delinquency score than non-D.A.R.E. suburban students.

Effects on Drug Use

We tested the hypothesis that D.A.R.E. would have a sustained preventive effect on drug use behaviors. All analyses of drug use activity had to control for the reality of increased usage over time, as well as for dramatic shifts in level and rate of increase during the high school years (Grades 9-12). Students moving into and through the high school years provided the most powerful explanation for the increases in drug use beginning at wave 5, or what was grade 9 for most students. As noted earlier, two composite Alcohol Use Indices were constructed to measure the use of four types of alcohol in the past 30 days and during the subject’s lifetime. In addition, two composite Total Drug Use Indices were developed to measure usage of 11 types of drugs and alcohol in the past 30 days and during the subject’s lifetime.

The results provide no support for the drug prevention hypothesis (see Table 5). After controlling for the effect of the high school years (Grades 9-12) and supplemental drug education, we found that D.A.R.E. had no significant impact on any of the four primary drug use scales.

That is, students who participated in D.A.R.E. were no different from students in the control group with regard to their recent and lifetime use of drugs and alcohol.

Table 5

Main Effects of D.A.R.E. and Supplemental
Drug Education (SDE) on Drug Use¹

Outcome Scales	Adjusted Mean Wave 2	Slope (Time)	D.A.R.E.	SDE
30 Day Alcohol Use	0.33	.02	.07	.03**
Lifetime Alcohol Use	1.07	.13**	.11	.09**
30 Day Total Drug Use	0.34	.03	.06	.04**
Lifetime Total Drug Use	1.51	.22**	.15	.15**

¹Regression Analysis Controls for Gender (Female), African-American, Hispanic, Intact Family, Rural and Suburban schools, High School Grades, High School Grades By Time, and D.A.R.E. By Time

* p < .05* ** p < .01

Level 2 Observations = 1767 for most analyses

The adverse effects of supplemental drug education were apparent once again, as cumulative exposure to these activities is associated with significantly higher levels of composite drug use. The apparent neutralizing effect of D.A.R.E. is again evident. As shown in Table 6, students whose supplemental drug education was preceded by D.A.R.E. were less likely to use drugs than students whose exposure to high dosages of drug education did not include D.A.R.E.; However, the reader should be cautioned that the result of combining D.A.R.E and supplemental drug education is to return students to the level of drug use that would be expected without any drug education. In sum, D.A.R.E. alone has no main effect on drug use, supplemental programs appear to have adverse effects, and together, they have no effect.

Table 6

D.A.R.E.-by-Supplemental Drug Education (SDE)
Interaction Effects on Drug Use¹

Outcome Scales	Adjusted Mean Wave 2	D.A.R.E.	SDE	D.A.R.E. and SDE
30 Day Alcohol Use	0.34	.05	.05**	-.04
Lifetime Alcohol Use	1.09	.07	.14**	-.10**
30 Day Total Use	0.36	.04	.07**	-.06**
Lifetime Total Use	1.55	.07	.25**	-.22**

¹Regression Analysis Controls for Time, Gender (Female), African-American, Hispanic, Intact Family, Rural and Suburban schools, High School Grades, High School Grades By Time, and D.A.R.E. By Time

* p < .05 ** p < .01

Level 2 Observations = 1254 for most analyses

There were few differences in D.A.R.E.' impact on drug use across different communities. The only significant subgroup effect occurred with suburban D.A.R.E. students. As shown in Table 7, suburban students who participated in D.A.R.E. reported significantly higher rates of drug use on all four composite indices than suburban students who did not participate in the program. Controlling for cumulative exposure to supplemental drug education, however, reduced the probability value to marginally significant ($p < .10$) for three of the four measures, leaving untouched the apparent adverse effect on the Lifetime Total Drug Use index. Also, we should emphasize that the effect sizes are small. Suburban participation in D.A.R.E. is associated with an increased level of drug use of 3 to 5 percentage points on average, depending on the type of drug.

Table 7

D.A.R.E.-by-Area Interaction Effects on Drug Use¹

Outcome Scales	Adjusted Mean Wave 2	D.A.R.E. and Urban	D.A.R.E. and Rural	D.A.R.E. and Suburban
30 Day Alcohol Use	0.45	.01	-.03	.09*
Lifetime Alcohol Use	1.25	.09	-.04	.18*
30 Day Total Drug Use	0.48	-.01	-.05	.09*
Lifetime Total Drug Use	1.82	.06	-.17	.28*

¹Regression Analysis Controls for Time, D.A.R.E. By Time, Gender (Female), African-American, Hispanic, Intact Family, Rural and Suburban schools, High School Grades, and High School Grades By Time

* p < .05 ** p < .01

Level 2 Observations = 1767 for most analyses

To rule out the possibility that D.A.R.E. might be having beneficial effects on specific types of drugs or alcohol (e.g. cigarette smoking), but not on composite indicators, we conducted a series of statistical tests on individual drug use items. Given the distribution of responses, these items were appropriate for treatment as dichotomous variables, and hence were subjected to multi-level logistic regression using the MIXOR program (Hedeker and Gibbons 1993). As shown in Table 8, the results are consistent with the previous analyses and provide no support for the hypothesis that D.A.R.E. would have a sustained preventive impact on specific types of drug use. Controlling for the powerful effect of the high school years (Grades 9 through 12), supplemental drug education was associated with significantly higher usage likelihoods. The *net* effect of interaction with D.A.R.E. produced odds ratios close to 1.00 (i.e. no different from the Control group) for all ten measures, and only three of these D.A.R.E. interactions differed significantly from the effect of supplemental drug education alone.

TABLE 8

D.A.R.E.-by-Supplemental Drug Education (SDE)
Interaction Effects on Drug Use Likelihoods¹

Outcome Measures	High School Grades	D.A.R.E	SDE	D.A.R.E. and SDE
Last 30 Days				
Beer	1.96**	1.07	1.21**	1.05
Cigarettes	2.54**	0.92	1.25**	1.04
Drinking to get Drunk	4.09**	1.16	1.16**	1.00
Marijuana	1.83	0.84	1.67	1.11
Smokeless Tobacco	1.36	0.73 ²	1.46**	0.89**
Lifetime				
Beer	1.50 ³	1.08	1.25**	1.11
Cigarettes	2.35**	1.14 ²	1.48**	1.03**
Drinking to Get Drunk	3.53**	1.44	1.12	0.98
Marijuana	1.21	0.72	1.14	1.10
Smokeless Tobacco	0.65** ³	1.01 ²	1.42**	0.89**

¹Logistic Regression Analysis Controls for Time, Gender (Female), African-American, Hispanic, Intact Family, Rural and Suburban schools, High School Grades By Time, and D.A.R.E. By Time. Numbers are odds ratios.

²Interaction of D.A.R.E. with Time is positive and statistically significant.

³Interaction of High School Grades with Time is positive and statistically significant.

* p < 05 ** p < 01

Level 2 Observations = 1254 for most analyses

Finally, we tested the hypothesis that D.A.R.E. could delay the onset of drinking alcohol – measures believed to be important as students reached high school. The study measured the age at which students first “got drunk” and started having “at least one drink at least once a month.” Students in the Control group first got drunk and started drinking regularly between the ages of 14 and 15. The effect of D.A.R.E. on these two measures was not statistically significant. These small changes were in the positive direction for delaying the onset of getting drunk (.11) and in the negative direction for delaying regular driving (-.05).

SUMMARY AND CONCLUSIONS

We believe the findings from this study are especially important given the centrality of D.A.R.E. to the national drug control policies of the United States and dozens of other countries. These results are also noteworthy because of the paucity of controlled longitudinal studies that can answer the most fundamental question – Can this popular school-based program prevent drug use at the stage in adolescent development when drugs become available and are widely used, namely, during the high school years? Unfortunately, the answer to this question is “no.” Specifically, the main finding is that levels of drug use (using a variety of measures and analyses) did not differ as a function of whether students participated in D.A.R.E. or did not. This outcome confirms the results of previous controlled evaluations, and goes further to provide an extended test of the D.A.R.E. hypothesis. Across many settings and research projects, D.A.R.E. has been unable to show consistent preventive effects on drug use, and the observed effects have been small in size and short-lived.

We can only speculate about the reasons for not finding larger and more persistent effects from this program. First, there may be some degree of theory failure with respect to curriculum content or instructional methods. Ennett and her colleagues (1994) argue that the D.A.R.E. curriculum uses less interactive methods (e.g. peer discussions) than programs that have been shown to be more effective in preventing drug use. Hansen (1997) argues that the components of the curriculum should be revisited because “D.A.R.E. is either targeting inappropriate mediating processes or insufficiently impacting appropriate mediating constructs.” Based on his empirical analysis, Hansen argues that several mediating variables should be given more attention because of their established ability to impact substance use onset, including the subject’s personal commitment to avoid drug use, erroneous perceptions about the prevalence and acceptability of drug use, and the belief that drug use would be incongruent with one’s values and lifestyle. Other mediating processes, such as building social skills, may even have an adverse effect on drug use according to Hansen, although other studies have not found this to be the case.

In the present study, we found that D.A.R.E. was able to have both immediate and short-term effects (up to two years) on several mediating variables (e.g. resistance skills, attitudes about drugs), but nearly all of these effects dissipated with the passage of time and did not survive into the critical high school years. Unfortunately, the absence of good booster programs creates a “Catch 22” for the elementary school D.A.R.E. program, as researchers attempt to link mediating variables to drug use. In fifth and sixth grades, the base rates for drug use are generally too low to detect program effects, but by the time drug use levels reach measurable variability (2 to 3 years later), the likelihood of sustained effects from the original program has been dramatically reduced in the absence of sound reinforcement programs.

D.A.R.E. advocates argue that the null findings from this research provide evidence that more D.A.R.E. programming (not less) is needed at the junior high and high school levels

to reinforce the lessons of the not-so-effective core program. Whether police officers can be effective with older students who show considerably less respect for authority figures is uncertain. Thus, there is a compelling need to evaluate these D.A.R.E. and other booster programs prior to widespread implementation. Unfortunately, the practice of school-based drug education at these higher grade levels is dismal, which may account for some unusual findings in this study. While D.A.R.E. by itself yielded very few long-term effects on either mediating perceptual variables or drug use, it appears to negate the potentially counterproductive effects of subsequent drug education programs. Students who were exposed to higher cumulative levels of supplemental drug education – but not to D.A.R.E.-scored significantly worse with regard to attitudes and beliefs about drugs, peer resistance skills, and most importantly, drug use behaviors. Exposure to D.A.R.E. seems to inoculate students against these adverse effects and keep them at the level of the “No Drug Education Control Group.” Future research should attempt to replicate this inoculation effect and, more generally, determine the extent to which distinguishable drug education programs interact to influence patterns of drug use. With respect to post-D.A.R.E. drug education, several competing hypotheses need closer scrutiny: (1) supplemental programs are causing more drug use; (2) more drug use is causing schools to introduce more drug education; or (3) these variables are spuriously related.

One of the limitations of the current study is that it focuses on the effectiveness of a D.A.R.E. curriculum, which has since been modified by D.A.R.E. America. Changes introduced in 1994 were arguably small, but additional research is needed to determine whether the new curriculum and the accompanying modifications to officer training were sufficient to enhance the effectiveness of the elementary school program

The present study found that D.A.R.E. had the most beneficial effects on urban children and the fewest beneficial effects on suburban children. In fact, there is some evidence of a possible boomerang effect among suburban kids. That is, suburban students who were D.A.R.E. graduates scored higher than suburban students in the Control group on all four major drug use measures. Because schools were carefully matched and then randomly assigned within the same suburban communities, we are doubtful that these effects can be explained by factors such as sampling or other design issues. Furthermore, because this set of findings was replicated in a separate study (to be published), with completely different samples of students, we believe it should not be ignored in future research.

Members of our research team conducted classroom observations in several schools in an attempt to understand and explain the observed differences between urban and suburban schools. In this preliminary study, blind observers looked for possible differences in instructor teaching styles, student responses, and school environments. Although we did not find striking differences in classroom instruction or teacher-student interaction, other differences were noteworthy: (1) At urban schools, D.A.R.E. officers tended to spend more time on the school grounds and typically interacted more with students outside the classroom, including the playground setting. In contrast, D.A.R.E. officers in suburban schools were quick to move on to another school. In essence, students in urban schools had more opportunity to “connect” or “bond” with the D.A.R.E. officer than did their suburban counterparts, and to see them as part of the school environment; and (2) At urban schools, D.A.R.E. was typically offered to students at the 5th-grade level, while in suburban schools, it was offered at the 6th-grade level. Given the well-documented differences in student academic achievement and teaching resources (favoring the suburban schools), one would expect to see the standardized D.A.R.E. curriculum administered at the 5th-grade level in the suburbs. Under the current arrangement, our informal interviews suggest that suburban students are less impressed with the D.A.R.E. officers, perhaps because students’ expectations for teaching performance and their own academic progress are substantially higher than in the typical

inner-city school. Other unconfirmed hypotheses offered to explain these differences include: (1) more negative attitudes about police in the suburbs, which would undermine the instructor's credibility; (2) a greater need to rebel against authority figures and the "Say No to Drugs" message; and/or (3) less knowledge about drugs and therefore, a greater fascination with drug paraphernalia and drug information introduced by the D.A.R.E. officer.

If these urban-suburban differences are replicated in future research, one policy implication is that a standardized curriculum and training package may need to be modified or tailored in response to community differences. While standardization is one of D.A.R.E.'s greatest strengths, too much uniformity may limit its effectiveness. Given the stark reality of very large differences between communities in their cultural/ethnic composition, income levels, family problems, and quality of local education, the idea that "one size fits all" may need to be re-examined in this particular field. At this point in time, the best available evidence suggests that D.A.R.E. may be having different effects in different communities, and may need to be adjusted accordingly.

Collectively, these findings suggest that it may be time for us to "return to the drawing board" and reexamine our drug prevention policies and practices. Our society, searching for a silver bullet or a panacea to the drug problem, has expected far too much from a single program. Compounding the problem, parents, educators, and police officers have confused program popularity with program effectiveness. Drug prevention experts, both researchers and practitioners, have worked with the National Institute of Drug Abuse to outline many of the key components of effective prevention strategies (see Sloboda and David 1997). The next step is for concerned communities, armed with the best available knowledge about effective program practices, to develop their own prevention plans with full recognition that there are no simple solutions to complex social problems.

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NOTES

1. The accusation of “contempt for results” stems from various claims by researchers and reporters who say they have been subjected to harassment, slander, and professional ostracism for presenting unfavorable findings about the effectiveness of D.A.R.E. (see Glass, 1997, 1998).
2. This legislative requirement seems directly responsive to a major Department of Education study which recommended that “The Safe and Drug-Free Schools and Communities Act (SDFSCA) program at the national level should consider supporting and encouraging more use of approaches that the research has found to be effective and less use of approaches that do not have strong evidence of effectiveness” (Silvia and Thorne 1997, E-27).
3. A table of evaluation studies is attached as supporting documentation.
4. Wysong et al. (1994) was a notable exception, suggesting a possible “boomerang effect with regard to use of hallucinogens. Also, Donnermeyer (1998) was not specifically evaluating D.A.R.E. but some portion of this sample was exposed to the program.
5. In one evaluation, the sample was supplemented via “random replacement” after high attrition between pretest and posttest (Nyre et al. 1990).
6. Students in the eleventh grade were asked to recall their exposure to drug education classes over the previous six years.
7. After three years, we reported that the presence of D.A.R.E. was associated with favorable changes on the Total Drug Use and Total Alcohol Use Indices after controlling for students’ exposure to subsequent drug education. A note of caution: This was our first attempt to measure post-D.A.R.E. drug education, and we used a dichotomous indicator of educational activity in the current year only. After four years, a multi-year composite index was constructed to capture cumulative exposure to drug education, and the D.A.R.E. effects reported the previous year were not replicated under these conditions.
8. Aggregate family income, by school, was determined by the percent of students in that school who were eligible for the Bee or reduced price lunch program of the United States Department of Agriculture.
9. We requested and received a Certificate of Confidentiality from the National Institute on Drug Abuse (NIDA), which provides broad legal protections against any efforts to breach the confidentiality of our records.
10. The only other longitudinal study to track students for more than two years discovered that subjects in the control group received drug education as part of their health science curriculum in the first year (Clayton et al. 1991b).
11. Models including these variables could not make use of the full data set: supplemental drug education had not been gathered at wave 2.
12. Only two attitude scales, Attitudes toward Police and Attitude Towards Specific Drugs, had intra-cluster correlations as high as .055 and .052 at Time 0 (wave 2).

13. The sole exception was for estimates of the age at which the student had “at least one drink at least once a month.” The random effect over time for this outcome measure was too small to be estimated.
14. For most students, we are fairly certain that their supplemental drug education did not include a D.A.R.E. curriculum or any of the prototype programs that are being recommended as alternatives to D.A.R.E. Rather, most of these activities are local efforts that, in our opinion, are not well conceived (i.e. based on scientific research) or well implemented.