A Review of the Research on the Drug Abuse Resistance Education (D.A.R.E.) Program

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Introduction

An increasing number of children and adolescents in Canada and the United States face a large number of social and psychological risk factors for substance use and abuse, such as alcohol and illicit drugs. These risk factors are challenging children and youth at a younger and younger age. According to Haans and Hotton (2004), there is a multiplicity of reasons why young people first begin to use alcohol and drugs and persist in their substance use, including curiosity, boredom, peer pressure, self-medication, or as a general coping strategy to deal with negative affective states or other social, psychological, or medical problems. Both American and Canadian research indicates that the use of alcohol and drugs among those under the age of 18 years old has continued to be significant over the past 15 years (Haans and Hotton, 2004; Rosenbaum and Hanson, 1998; West and O'Neal, 2004; Johnson, O'Malley, & Bachman, 1999), during a period in which the public has developed a more casual attitude regarding moderate marijuana and cocaine use, but which has also seen a general increase in the quantity of court cases involving drug possession and trafficking.

There is a substantial and growing body of empirical evidence that children in Canada and the United States begin to use and abuse alcohol and drugs at a very young age. In the Canadian National Longitudinal Survey of Children and Youth, 17 percent of children reported the ingestion of at least one alcoholic beverage by age 12 (Haans and Hotton, 2004). When 15 year olds were included in the analysis, the percentage increased to nearly half (42%) of the sample (Haans and Hotton, 2004). When examining the entire sample of youth included in the survey, the average age of onset for alcohol use was 12.4 years old, while the average age of intoxication for the first time was 13.2 years old (Haans and Hotton, 2004). With respect to drug use, nearly one fifth (19%) of youth between the ages of 12 and 15 years old reported having used cannabis, while 11 percent of 12 and 13 year olds reported having used hallucinogens (Haans and Hotton, 2004). Among a sample of serious and violent young offenders between the ages of 12 and 19 years old in a major urban centre in Western Canada, nearly the entire sample (94%) reported using or abusing alcohol, while at least half of the sample reported routine use of at least one hard drug (cocaine, heroin, crack). Moreover, the age of onset for both alcohol and

hard drug use was between 11 and 12 years old (Cohen, Corrado, & Cale, 2004; Corrado and Cohen, 2002).

American research yields similar results. The *Monitoring the Future Survey* (MTF), a yearly national survey of monthly, annual, and lifetime drug use by middle and high school age adolescents (i.e. Grade 8, 10, and 12) (www.drugabuse.gov, 2005), found that a majority of American youth have experimented with an illicit drug by the time they graduate from high school. Furthermore, when including inhalant use, nearly one third (30%) of youth between the ages of 13 and 14 years old have tried an illicit substance (www.monitoringthefuture.org, 2005).

The negative effects of alcohol and drug use are compounded by the fact that multiple negative behaviours, including violence and aggression, poor school performance and commitment, higher levels of truancy, lower levels of graduation, poor commitment to gainful employment, and a reduction in prosocial and familial bonds, often accompany alcohol and substance use and abuse among children and adolescents (National Institute on Drug Abuse, 2003; Corrado, Cohen, & Odgers, 2003; Hawkins, Herrenkohl, Farrington, Brewer, Catalano, & Harachi, 1999; Huizinga and Jakob-Chien, 1999; Allen, 2005). Furthermore, the nature and combination of these risk factors increases the possibility that these youth will subsequently become involved in crime (Farrington, 1993; Hawkins, Herrenkohl, Farrington, Brewer, Catalano, & Harachi, 1999; Cohen, Corrado, & Cale, 2004; Tolan and Gorman-Smith, 1999; Allen, 2005). This growing body of research highlights the importance of primary, secondary, and tertiary intervention strategies aimed at preventing adolescents and young people from experimenting with alcohol and drugs and effectively intervening with those individuals who have alcohol and drug use and abuse issues.

As with any intended prevention or reduction strategy, it is important to not only identify the aims of the program or resource, but to accurately match this strategy to the proper target audience. In classifying different target populations for intervention strategies, in general, substance *prevention* programs are designed to deter individuals who have never used alcohol or drugs from experimenting with them. In contrast, substance *intervention* programs are targeted at those individuals who are already using and/or abusing alcohol or drugs in an attempt to deter

them from continuing use. To further refine the issue, prevention and intervention programs can also be categorized as universal, selected, or indicated (NIDA, 2003). Universal programs are used with a heterogeneous population, such as students in school, who do not typically share any particular risk factors for alcohol and/or substance use. In other words, universal programs are "one size fits all" strategies in that participation is not based on having a specific identified risk factor, which determines whether one receives the intervention. In contrast, selective substance use programs target subgroups of individuals who share a particular risk for alcohol or drug use, such as the children of alcoholics (Eggert, Thompson, Herting, & Randell, 2001). Selective substance use programs typically focus on those at-risk samples before they begin to use alcohol or drugs. The third type of strategy, indicated programs, are directed at those individuals who have already tried or are experimenting with alcohol and drugs (NIDA, 2003). Unique features and strategies due to the specific clientele they are designed to assist characterize each of these different types of programs.

Based on the research indicating that first-time experimentation with drugs and alcohol begins at an early age, prevention programs must likewise be introduced at an early age, prior to the youth beginning to experiment with alcohol and drugs. Children and adolescents are also a prime target group because children and adolescents are characteristically more receptive to anti-drug messages. This is the general philosophical strategy of the Drug Abuse Resistance Program (D.A.R.E.), which, since it's founding, has been used in elementary and secondary schools to prevent the onset of the use of violence, alcohol, drugs, and nicotine.

Drug Abuse Resistance Education (D.A.R.E.)

Based on the theory that educating young children about the dangers and consequences of substance use will have a lasting effect on a child's attitudes towards drugs and alcohol, D.A.R.E. was founded in 1983 by the Los Angeles Police Department and the Los Angeles Unified School District (www.dare.com, 2005). The program is a prevention curriculum that universally targets students in promoting the development of skills to aid them in resisting substance use and engaging in violence. Specifically, the program assists youth in developing a skill set that will enable them to resist peer pressure to use drugs, alcohol, tobacco, and violence

(www.dare.com, 2005). Stemming from former First Lady Nancy Reagan's "Just Say No" drug campaign, at its core, the underlying philosophy of D.A.R.E. is deterrence and the notion that giving school aged children educational information on the consequence of alcohol and drug use by police officers will deter them from experimenting and using these substances (Howell, 2003).

The D.A.R.E. curriculum is used in over 54 countries, including Canada and the United States (www.dare.com, 2005). The program has been implemented in all 50 American states, allowing it to reach up to three quarters of American school districts, thus allowing D.A.R.E. to reach approximately 26 million school children per year (www.dare.com, 2005). In the United States, with an average yearly cost of approximately $227 million[1] and with over 50,000 police officers teaching the curriculum, D.A.R.E. is the most frequently used alcohol and substance abuse education program (Howell, 2003). Moreover, according to Maxwell and MacKillican, D.A.R.E. is the "most widely recognized substance abuse prevention program, with the most comprehensive curriculum, in the world" (2000: 1).

In its present form, this "prevention through education" program focuses on a number of specific key components. For instance, D.A.R.E. officers strive to provide students with accurate information regarding illegal drugs, as well as legal drugs, such as alcohol and tobacco (www.dare.com, 2005). In addition, the officers teach their students risk assessment and decision-making skills, and how to recognize and resist the peer pressure commonly associated with engaging in substance use and violence. Furthermore, the program aims to enhance the self-esteem of students and to assist youth in creating and identifying alternative options to alcohol and drug use. The program not only endeavors to prevent the onset of alcohol and/or drug use, but to increase the number of youth who stay in school, to decrease crime, and to create a better school environment (www.rcmp-grc.gc.ca, 2005). According to Maxwell and MacKillican (2000), the primary objectives of D.A.R.E. are to reduce substance use, to provide students with the skills to discourage substance use among their peers, to promote a healthy lifestyle among students, to encourage healthy decision making, to encourage students to communicate more

[1] According to McNeal and Hanson (1995), as reported by West and O'Neal (2004), the average cost of D.A.R.E. is closer to three quarters of a billion dollars annually in the United States.

openly about substance use and its dangers with their families, to boost self-esteem and confidence, and to increase respect for police officers through interactions with them in a friendly and helpful environment.

To achieve these goals, the D.A.R.E. curriculum is taught by uniformed, trained D.A.R.E. police officers. Each officer is assigned to a classroom where, over a period of 17 weeks, they administer the curriculum with the goal of imparting the skills and knowledge to aid students in resisting and preventing the onset of alcohol and/or drug use (www.rcmp-grc.gc.ca, 2005). Typically, the program is taught to grade 5 and 6 students because it is these youth who, at the transition point to middle or high school, are considered to be at the greatest risk from internal and external pressures to begin experimenting with drugs (www.rcmp-grc.gc.ca, 2005). However, there are also D.A.R.E. programs designed for high school students because these youth are also at increased risk for becoming involved in drugs and making unhealthy life choices (Maxwell and MacKillican, 2000).

The D.A.R.E. program not only operates at a micro-level of the classroom with D.A.R.E. officers and their students, but it also functions at a meso-level in that it involves the students' parents (Maxwell and MacKillican, 2000). Parents are encouraged to set rules articulating the disapproval of drug use and to improve their own drug knowledge in order to be more effective in discussing substance use and abuse issues with their children. Parents are encouraged to spend more time with their children, actively listen to them, get to know their friends, and talk to other parents (www.dare.com, 2005). In effect, the implementation of D.A.R.E. involves cooperation among school districts, law enforcement agencies, and the larger community (Rosenbaum and Hanson, 1998).

Due to the popularity of the program, and its subsequently wide dissemination among schools in North America and throughout the world, D.A.R.E. has been the subject of many program evaluations. However, for a number of methodological reasons, to be discussed below, the results from these studies have been largely inconsistent or extremely difficult to assess and compare. In general, however, critics of D.A.R.E. point to the many studies which find no statistically significant short or long term effects on the key outcome variables of substance use

among those who do and do not participate in D.A.R.E. (Drulak, 1997; Rosenbaum and Hanson, 1998; Clayton, Cattarello, & Johnstone, 1996; NIDA, 2003). This has led researchers, such as Howell, to conclude that D.A.R.E. is "perhaps the most widely acclaimed 'successful' intervention of all ineffective delinquency prevention programs" (2003:130). Still other researchers and supporters of the program laud D.A.R.E.'s success based mainly on the results of positive post-test results immediately following participation with the program, the positive attitudes participants express about their experiences in the program, and a fundamental belief in the general and specific deterrent effect of D.A.R.E. (Komro, Perry, Veblen-Mortenson, Stigler, Bosma, Munson, & Farbakhsh, 2004; Maxwell and MacKillican, 2000).

The difficulty in reconciling these competing views of D.A.R.E. results, in part, from the lack of standard or consistent methodologies employed in evaluating the program, and the absence of widely accepted criteria for determining whether the program is a success or a failure. In other words, the large number of evaluations completed on D.A.R.E. used different outcome measures, operationalized key constructs differently, used different follow-up time frames when measuring effect sizes or the stability of change, defined and measured success differently, employed a methodology that limited the findings' external generalizability, or were simply not methodologically rigorous to the extent necessary to draw any firm conclusions. For example, those who support D.A.R.E. frequently point to the negative attitude that students have toward drug use after completing D.A.R.E. without measuring these attitudes prior to their participation in D.A.R.E. or controlling for other programs or strategies that may have affected attitudes. Conversely, those who challenge the widespread use of D.A.R.E. highlight that the preventative effects of D.A.R.E. are not long lasting without acknowledging that the behaviors and attitudes being measured in the follow-up stages are extremely sensitive to the series of developmental stages that children and adolescents mature through during the follow-up period, regardless of exposure to D.A.R.E.

Nonetheless, as D.A.R.E. continues to be the leading substance abuse prevention program nationally and internationally, it is extremely important to determine whether or not D.A.R.E. is effective in achieving its stated objectives and, based on its large economic costs, whether this approach is cost effective. According to McCold, "public policy to crime should not be based

upon the enthusiasm or popularity of programme advocates. The history of criminal justice reform efforts warrants healthy skepticism of enthusiasm (e.g. D.A.R.E. in the U.S.A.). If a justice programme is effective, it should be possible to measure these effects. If programme advocates cannot objectively demonstrate the merits of a programme using sound empirical measures, they, too, deserve a large measure of skepticism" (2003: 67-68).

In an attempt to address some of the concerns raised by McCold and the supporters and critics of D.A.R.E., this current report summarizes a large body of published research evaluations on the D.A.R.E. program. The main purpose of this undertaking is to determine the degree to which the widespread acceptance and use of the D.A.R.E. program is justified based on valid empirical evidence, what are the methodological limitations, if any, of the evaluations that have been published on D.A.R.E., and to provide recommendations for future study.

In order to determine whether D.A.R.E. is effective in achieving its declared objectives of preventing and/or reducing substance use, creating positive changes in substance-related behaviours, having a positive influence on attitudes towards substance use, and having students develop and adopt other prosocial attitudes and skills, it is necessary to review the growing number of D.A.R.E. evaluations. For this current report, thirty published evaluations of D.A.R.E. from Canada and the United States were considered. Included in this review were primary evaluations of D.A.R.E. and a number of articles that discussed in detail evaluations that have been completed on D.A.R.E. In reviewing the literature, specific attention was focused upon information about D.A.R.E.'s research design, its implementation, objectives, and the methods used in assessing whether the objectives were met, the operationalization of key constructs, appropriate use of statistics, the drawing of valid inferences, and an assessment of the short and long term consequences of participating in the program. Due to the many problems discussed above, this report does not focus exclusively on the outcomes of D.A.R.E., but also focuses on the methodologies used to assess the success of this program.

Evaluations of D.A.R.E.

Due to a number of significant obstacles, as will be discussed below, it is extremely difficult to conclude whether D.A.R.E. is effective in achieving its many stated objectives. One of the main reasons for this challenge is because the outcome variables used to determine success are so diverse. For example, some evaluations use a reduction in substance-related behaviours as a measure of success (Aniskiewicz and Wysong, 1990; Ringwalt, Ennett, & Holt, 1991; Zagymny and Thompson, 2001; Harmon, 1993; Icing, 1994; anonymous, 1997), while others consider the degree to which participants have a positive attitude about the program upon its completion (Curtis, 1999). Some studies focus on "related" D.A.R.E. outcomes, such as positive social and psychological attitudes (Van Burgh, Render, & Moon, 1995), while others target the degree to which the perceptions of the D.A.R.E. program among educators, mediators, parents, and the community are favorable (Hansen and McNeal, 1997; Donnermeyer, 1998; Fisher, 2002). Perhaps the most difficult problems to overcome in reconciling the large number of positive and negative evaluations on the success of D.A.R.E. are:

> (1) a lack of a consistent understanding of what are or should be the most important and/or relevant variables in determining the success of D.A.R.E. In other words, should success be measured by a reduction in drug use (Mays, 1998), the prevention of drug use (West and O'Neal, 2004), a change in a participant's attitudes towards substance use (Curtis, 1999), an increased knowledge about the consequences of substance use (Zagymny and Thompson, 1997), the development and integration of specific skills to respond to the social pressures to experiment with drugs, etc…
>
> (2) the lack of a generally accepted time frame within which to measure success. A common problem in comparing evaluations is that some research exclusively measures for change immediately following the completion of the program, while others use shorter follow-up periods (within one year) or longer time frames (up to ten years) to assess success, with or without the benefit of consistent pre-test indicators (Clayton,

Cattarello, & Johnstone, 1996; Ennett, Rosenbaum, Flewelling, Beiler, Ringwalt, & Bailey, 1994; Harmon, 1993; Rosenbaum and Hanson, 1998; Lynam, Milich, Zimmerman, Novak, Logan, Martin, Leukefeld, & Clayton, 1999; Icing, 1994; Renninger and Hoffman, 1999; Dukes, Ullman, & Stein, 1996); and

(3) assigning responsibility for change to D.A.R.E. As school students are exposed to a number of anti-drug campaigns and other pro-social interventions which are rarely controlled for, it is extremely difficult in many of the evaluations to isolate the effects of D.A.R.E. from other potential programs and therefore attribute the change in the outcome variable specifically to D.A.R.E. (Ringwalt, Greene, Ennett, Iachan, Clayton, & Leukefeld, 1994; Gay, 1998; Renninger and Hoffman, 1999)

As an aside, it is interesting to note that D.A.R.E. is also a violence-prevention program, yet very few studies considered this as an outcome variable for success. In fact, of the 30 evaluations included in this review, only one focused at all at the violence prevention and reduction aspects of D.A.R.E. (Komro et al., 2004).

Still, even given this level of inconsistency, there are a few general conclusions that can be reached about the reporting on the success of the D.A.R.E. program. Many of the studies in support of D.A.R.E. focused exclusively on the attitudes of participants and those involved in the program (Curtis, 1999; Donnermeyer, 1998; Maxwell and MacKillican, 2000; Fisher, 2002). These studies concluded that D.A.R.E.'s curriculum was viewed positively by students, that the program was delivered well by its instructors, that the curriculum was designed in a way that adequately prepares students to resist drugs, that the program played a positive role in student's decisions about whether to use drugs, and that D.A.R.E. was accepted as a useful strategy by schools and the community.

Other studies contended that D.A.R.E. demonstrates, at least, a short-term benefit in terms of substance use prevention and reduction, and that the skills learned in D.A.R.E. were retained for some time. For example, Donnermeyer and Phillips (2005), using only post-test information to classify students as at high, moderate, or low risk for substance use, contended

that D.A.R.E. had a positive influence on students' attitudes and behaviours about substance use. Moreover, they concluded that participation in D.A.R.E. significantly reduced substance use, increased peer resistance, encouraged communication with parents and other responsible adults, and increased positive views of police. Also only using post-test information, Renninger and Hoffman (1999) argued that D.A.R.E. demonstrated a number of positive drug prevention outcomes. For instance, compared to non-D.A.R.E. students, participants were significantly less likely to have ever tried inhalants and tranquilizers, were less likely to have used inhalants and crack in the follow up year, and were less likely to use inhalants, cocaine, or crack in the month leading up to the follow-up test. Still, many other supportive evaluations demonstrated only moderate to small levels of success on these key issues (Clayton, Cattarello, & Johnstone 1996), and these benefits frequently diminished or disappeared the longer the post-test period was extended (Ennett, Rosenbaum, Flewelling, Beiler, Ringwalt, & Bailey, 1994).

Additional evaluations highlighted the "collateral" benefits of the D.A.R.E. program. For example, Ringwalt, Ennett, & Holt (1991) reported that their evaluation of D.A.R.E., administered to 5th and 6th grade students in North Carolina, demonstrated that the program had no effect on students' use of alcohol, cigarettes, or inhalants, or on their future intentions to use substances. However, D.A.R.E. did appear to have a positive impact on students' awareness of the costs of using alcohol and cigarettes, and it created more negative general and specific attitudes towards drugs use, and a greater perceived sense of assertiveness in relation to substance use. Similarly, Harmon (1993) concluded that while there were no differences, with respect to the use of tobacco or marijuana, the frequency of any drug use, attitudes about police, coping strategies, attachment and commitment to school, rebellious behavior, and self-esteem, participation in D.A.R.E. did contribute to significant differences for alcohol use, belief in prosocial norms, a reduction in associations with drug using peers, more positive peer associations, an increase in attitudes against substance use, and an increase in assertiveness.

Similarly, while Gay (1998) concluded that, while most of the objectives of D.A.R.E. could not be validated, the program did result in measurable changes in students' beliefs about drug use, learning resistance techniques or ways to say "no" to drugs, better coping skills to managing stress, and the development of techniques for making better decisions about risky

behaviors. With a sample of over 10,000 students, Dukes, Pullman, & Stein (1995) determined that students who participated in D.A.R.E. had greater self-esteem, stronger institutional bonds, and endorse fewer risky behaviors; however, these effects were only present in the short term. Over time, the D.A.R.E. and control samples became similar on these indicators, while there were no statistically significant effect sizes on a number of key D.A.R.E. objectives, such as frequency and onset of substance use, at any stage.

Following a period in which there were virtually no negative evaluations of D.A.R.E., there was an increasing number of studies and evaluations that were critical of the D.A.R.E. program. Using as criteria for success the stated objectives of D.A.R.E., many evaluations failed to find any significant positive results (Mays, 1998). For example, using a cohort-based model with students from multiple grades, Hansen and McNeal (1997) concluded that D.A.R.E. had a non-significant effect on alcohol use, illegal drug use, steroid use, inhalant use, and drug selling and dealing. The effects on mediating factors related to substance use and its associated behaviors were found to be extremely small. In effect, Hanson and McNeal (1997) argued that D.A.R.E. is either targeting inappropriate mediating processes or insufficiently affecting appropriate mediating constructs. Similarly, Zagymny and Thompson (2001) found that there were no significant differences on the key issues of alcohol and drug use among a sample of students who participated in D.A.R.E. compared to a sample, which had not.

There are also a number of evaluations critical of the long-term benefits of participation in the D.A.R.E. program. In one of the most methodologically sound evaluations, Rosenbaum and Hanson (1998) found no long-term effects on a wide range of drug use measures. Moreover, in assessing the long-term impact of D.A.R.E. on a sample that reported positive short-term effects, Rosenbaum and Hanson found that the previously documented short-term effects had dissipated over time. In addition, the levels of drug use among this sample in the follow up periods did not differ as a function of whether students participated in D.A.R.E. or not. Similarly, Dukes, Ullman, and Stein (1996) and Ringwalt, Ennett, and Holt (1991) concluded in their separate evaluations that there were no long-term benefits to participating with D.A.R.E. According to Dukes, Ullman, and Stein, “no statistically significant differences were detected between D.A.R.E. participants and controls in the third year after D.A.R.E.” (1996:63).

In a study of over 1,200 students in which pre-D.A.R.E. results were compared with the sample's results a decade later, and the same student's post-D.A.R.E. results were also compared with results 10 years later, Lynam et al. (1999) found very few differences between the groups on the key variables of actual drug use, attitudes towards drugs, and self-esteem. More importantly, in no instance did D.A.R.E. participants have more successful outcomes than those in the comparison group. Based on these results, Lynam et al. (1999) concluded that D.A.R.E. had no effect on either behavior or expectancies, and that there were no reliable short-term, long-term, early adolescent, or young adult positive outcomes associated with participation in D.A.R.E.

In a meta-analysis of D.A.R.E. programs, which included studies conducted on D.A.R.E. programs in the United States and Canada, to determine the nature and extent of the effects on students of D.A.R.E.'s core curriculum, Ringwalt et al. (1994), concluded that the range of effect sizes suggests that D.A.R.E. has been more effective in the immediate post-test period than in the longer term in influencing the program's main outcome objectives. Moreover, the core curriculum appears to be most effective in increasing young people's knowledge about drug use and in enhancing their social skills, however, D.A.R.E. is less successful in influencing attitudes about drugs, positively influencing participants' attitude towards the police, or enhancing self-esteem. In another rigorous meta-analysis of D.A.R.E. evaluations, West and O'Neal (2004) concluded that D.A.R.E. was generally ineffective. In this study, while the effects of D.A.R.E. were generally in the positive direction, the magnitude of the effects was so small as to be no different than one would expect by chance.[2]

A final area of growing concern is the economic costs of D.A.R.E. (Shepard, 2001). Using data from three American states, Shepard examined the costs of officer services, the training of D.A.R.E. officers, the general and administrative costs of implementing and executing the program, the costs for materials and supplies, and the costs associated with educational resources. Shepard concluded that D.A.R.E. was costly, ineffective, and possibly counterproductive. According to Shepard, "the scientific evaluations that have been done suggest

[2] West and O'Neal argue that, according to standard meta-analysis procedures of analysis and data interpretation, the effect sizes they found would have to be at least 20 times larger to be considered even small.

that the students and the community are receiving no measurable benefit from participation in the DARE program" (2001:17). This finding was also supported by the evaluation of Hansen (1996) who compared students who participated in D.A.R.E. with those who participated in the All Stars program, another drug prevention program aimed at school-aged children and adolescents. Measuring students on the outcome variables of personal commitment to avoid participating in high-risk behavior, attitudes incongruent with high-risk behaviors, bonding with prosocial institutions, and conventional beliefs about social norms regarding high-risk behaviors, Hansen reported that students who received All Stars had significantly better outcomes on each indicator, and also gave superior ratings to the program and their involvement in it. Likewise, based on their meta-analysis of the research on D.A.R.E., West and O'Neal (2004) suggested that given the time and money associated with D.A.R.E., efforts should be made to develop other techniques and programs that might result in more substantial positive outcomes.

Regardless of whether one is a supporter or critic of D.A.R.E., most of the evaluations considered in this report suffer from significant methodological problems, which make any assessment of D.A.R.E. difficult.

Methodological Issues

In attempting to assess the methodological rigor of the D.A.R.E. evaluations, the first problem is that, for the most part, the methodologies employed by the evaluators or by the D.A.R.E. program are incompletely discussed. In other words, it is extremely difficult to find a large number of evaluations that have explicitly reported the methodology of the study to the degree necessary to properly and thoroughly evaluate their conclusions. A second initial problem is the unit of analysis. Most of the evaluations of D.A.R.E. have used the individual students as the units of analysis in analyzing outcomes (West and O'Neal, 2004). However, this procedure typically results in an overestimation of program success because the more appropriate level of analysis is the schools themselves, as this is where the students are "nested" (Rosenbaum and Hanson, 1998). For example, in one evaluation, assignment into the D.A.R.E. program or the control groups was determined by matching schools on specified school characteristics with the

program delivered to classrooms of students. However, the level of analysis used in the evaluation was individual students, rather than the schools that provided the criteria for selection to the experimental or control groups (Harmon, 1993).

There is a wide range of other potential methodological flaws and problems found throughout the research reviewed for this report. A potential problem found with many of the studies was that the D.A.R.E. program was simply not consistently delivered, thus making it extremely difficult to compare. Another crucial limitation is that, in many instances, participants were not randomly assigned to the D.A.R.E. or the control groups. Moreover, risk factors for substance use or other key variables were not controlled for when random assignment was not used. In addition, many studies did not employ an experimental design or only used an experimental design with some participants and a quasi-experimental design with others, while still others changed from an experimental design to a quasi-experimental design or a natural experiment during the post-test stages.

Also, the majority of studies did not clearly identify the independent and dependant variables or the intervening/moderating variables. This problem extends to the point where similarly operationalized indicators are dependent variables in one study, but independent or moderating variables in other evaluations. The lack of a clear operationalization of all key constructs, or any discussion of the operationalization of indicators, raises concerns about the internal consistency of key measures in many of the evaluations. In effect, many studies either have internal validity issues or limitations with respect to their ability to be externally generalizable due to the lack of construct operationalization, unclear definitions, and/or different criteria for similar outcomes.

Additional limitations among many of the studies are that they did not employ control groups for comparisons, did not measure key constructs prior to the introduction of D.A.R.E., restricted their assessments to immediately following the completion of the program, have only used self-report information, such as self-reported attitude changes or drug use, to measure the key outcome variables for success, and do not control for a participant's exposure to other anti-

drug or prosocial interventions or programs during the period in which D.A.R.E. was administered or the post-test period.

Moreover, several studies claim to be longitudinal, however, they do not report pre and/or post-test results or the time between measurements. In some studies, which used pre and post testing, the questions asked in the two time frames were different (Van Burgh, Render, & Moon, 1995). A final general concern is that many of the studies did not consider the attrition rate of participants or dropout effects. As will be discussed in greater detail below, this is extremely important because those who drop out of school at a young age are more likely to be involved in substance abuse. Not controlling for the attrition or drop out of participants is likely to overestimate the success or failure of any school-based substance prevention program because failures are less likely to be in school and therefore participate in any follow-up assessment.

Conclusions and Recommendations

Since its inception over twenty years ago, D.A.R.E. has undergone a number of revisions in order to better achieve its myriad of stated objectives. However, even its supporters acknowledge that no one program or initiative can completely eradicate the presence and use of drugs in schools (Maxwell and MacKillican, 2000). Nevertheless, given D.A.R.E.'s widespread use and its associated costs, it is necessary to ensure that D.A.R.E. provides the most benefits for its high financial costs. To date, due to the aforementioned methodological limitations of the majority of the evaluations conducted on D.A.R.E., it is difficult to reach any definitive conclusions about this program.

One of the challenges facing the acceptance of critical evaluations of D.A.R.E., regardless of how transparent or methodologically sound they are, is the fact that D.A.R.E. is so popular. However, D.A.R.E. may be popular simply because it *appears* to work. In other words, parents, teachers, and community members most likely correctly perceive that the majority of children and adolescents who complete the D.A.R.E. program do not engage in problematic drug use. However, research suggests that the overwhelming majority of children, even without

exposure to any formal anti-drug intervention strategy, do not engage in problematic drug use. In this way, the public is both overestimating the actual drug use rate among children and youth and attributing the fact that a large portion of children and youth are not using or abusing drugs to the success of programs, such as D.A.R.E. and other anti-drug campaigns (West and O'Neal, 2004).

Still, it is possible to argue that D.A.R.E. is based on sound sociological and psychological theory. It is reasonable to assume that educating children and young people about the dangers and consequences of substance use by prosocial role models will have some positive impact in terms of anti-drug attitudes and behaviors. However, research in related areas, such as the Scared Straight program in which youth at-risk for crime spend a period of time with hardened incarcerated adult offenders, similarly concludes that the effects of these kinds of programs are short-term, if they have any significant measurable effect at all (Finckenauer and Gavin, 1999). This result is based on the understanding that even well designed and targeted intervention programs have difficulty supplanting all of the potentially negative influences, such as family and peer groups, that work to undermine the long-term gains made by the intervention strategy.

Given this knowledge, it is important to recognize that it may not be a fundamental flaw of the D.A.R.E. program that the preponderance of the research indicates that D.A.R.E.'s benefits dissipate over time. It seems unlikely that one intervention program, without consistent follow-up and reinforcement, would have a long term effect on the attitudes and behaviors on children and youth, particularly because this segment of the population is still emotionally, psychologically, and physically developing. It is also possible that the lack of significant effect size differences between D.A.R.E. students and control groups over time are the result of the control group "catching up" through the exposure that all students receive to other drug education programs. Still, D.A.R.E. must address the criticism that it sacrifices depth on each topic for breadth of the curriculum (Dukes, Ullman, & Stein, 1996) that may contribute to its lack of resilience over time. In addition, substance use tends to peak during adolescence and young adulthood and decrease thereafter (Johnson, O'Malley, and Bachman, 1999; West and O'Neal, 2004; Shedler and Block, 1990). According to West and O'Neal (2004), this developmental pathway is expected regardless of one's exposure to programs such as D.A.R.E.

or other anti-drug programs. Given this, the fact that many studies report few, if any, significant long-term effects of D.A.R.E. sheds considerable doubt on its utility.

Finally, as mentioned above, one of the most serious problems with many of the evaluations of D.A.R.E. is the effect of attrition or high school dropout rates. Very few of the 30 evaluations reviewed for this report considered attrition in their assessments (Clayton, Cattarello, & Johnstone, 1996; Dukes, Ullman, & Stein, 1995; Komro et al., 2004; Lynam et al., 1997; Rosenbaum and Hanson, 1998). In the evaluation conducted by Clayton, Cattarello, & Johnstone (1996), the attrition rate between pre-test and post-test was about 45 percent. Moreover, those students who dropped out of the study were significantly more likely to have used marijuana and alcohol at the pre-test stage. The Komro et al. evaluation (2004), which focused on D.A.R.E. as a violence prevention strategy, reported an 84 percent attrition rate at the one-year follow-up stage, while Lynam et al. (1997) reported a 42 percent attrition rate. The matter of considering high school dropout rates is particularly relevant where D.A.R.E. students are compared to non-D.A.R.E. students because it may well be that students not exposed to D.A.R.E. drop out of high school at higher rates than D.A.R.E. students. That they would be more likely to drop out of school may be a reasonable consideration if, in fact, they are more likely to use drugs or more likely to have a higher frequency of drug use. The practical problem is that it is extremely difficult not know what this sub sample's level of drug use is because once they drop out of the school they cease to be part of the comparison or control group. In effect, this common occurrence has the potential to mask several critically important outcome differences between D.A.R.E. and non-D.A.R.E. participants.

Given the significant limitations or omissions of much of the research literature on D.A.R.E., and the fact that this program remains the most utilized school-based anti-drug program for children and youth, it is imperative that decisions regarding the continuation of this program, as opposed to seeking an alternative, be informed by sound, evidence-based research. It is therefore necessary to develop a standardized checklist and methodology for the evaluation of D.A.R.E. that is established prior to the implementation of the program. Having a clearly defined understanding of the objectives of the program, using an experimental design with control groups, a detailed operationalization of all independent, dependant, and moderating variables,

using a standard, validated pre and post-test instrument, allowing for long-term follow up, and an unbiased analysis and reporting of the findings are all necessary for a methodologically sound evaluation.

A series of independent evaluations following similar methodologies and assessing similar outcome variables using the same indicators and instruments is both necessary and required prior to reaching any definitive conclusions on whether D.A.R.E. is effective in achieving any of its declared goals. Moreover, greater attention needs to be paid to the costs of implementing the D.A.R.E. program. Regardless of personal preference, the most cost-effective program, defined as the one that provides the greatest benefit per dollar cost, should be the basis for determining the allocation of resources used for anti-drug education programs.

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