

## **PREVENTING SUBSTANCE USE PROBLEMS AMONG YOUTH: A LITERATURE REVIEW & RECOMMENDATIONS<sup>1</sup>**

Angela Paglia and Robin Room

Addiction Research Foundation Division  
Centre for Addiction and Mental Health  
33 Russell St.  
Toronto, Ont. M5S 2S1, Canada

### **Abstract**

This paper critically reviews the evaluative literature on programs and other interventions designed to prevent substance-use problems among youth. We start from a description and discussion of patterns and trends in youthful drug use, and evidence on types of harm. We then describe and assess the literature evaluating programs and initiatives to prevent youthful drug problems. The following headings were used: Education & Persuasion, Community-Based, Legal and Regulatory Policies, and Harm Reduction. Lastly, in the light of this review, we offer some commentary and analysis concerning the reality of program goals, theoretical underpinnings, and cost-effectiveness. We conclude with recommendations for future prevention strategies.

### **1. Scope of this Report**

This paper reviews the evaluative literature on programs and other interventions designed to prevent substance-use problems among youth. Our goal has been to specify “what works” in youth problems prevention, and to suggest paths forward in future programs and experiments. The “substances” covered include tobacco, alcohol and illicit drugs. For most youth prevention programs discussed in the literature, marijuana is the primary illicit drug covered.

We acknowledge at the outset that carrying out a good evaluative study on a prevention initiative or program is a difficult task. Somehow the enthusiastic conviction necessary for the initiative to have a chance of success must be wedded to the detached skepticism necessary to a good evaluation (Room, 1990). The initiative or program must operate in real time and real life, and under these circumstances the evaluator may have no choice but to compromise on methods

---

<sup>1</sup>The opinions expressed here are those of the authors, and do not necessarily reflect the views or policies of the Addiction Research Foundation or of the Addiction and Mental Health Services Corporation. Special thanks are due to Andrea Stevens-Lavigne and other members of ARF Youth Team for their helpful comments on earlier drafts.

or fieldwork. Considering the difficulties, it is surprising that good prevention evaluations are completed at all.

The present undertaking depends very heavily on the scope and strength of the underlying research literature -- and it is with this issue we encounter an immediate difficulty. The available evaluative research is very heavily based in the United States, and is mostly from the last 15 years. This concentration by place and time is a reflection of two strong social trends in the U.S. during the 1980s and 1990s. One of these is the Reagan/Bush era "war on drugs," in the course of which different parts of the political spectrum vied with each other in funding, among other things, drug prevention demonstrations. The resulting dominance of U.S.-based research in the drug literature continues today; NIDA press releases proudly note responsibility for 85% of drug research in the world. The other trend, led by a different part of the political spectrum, might be described as a "war on tobacco." Through popular referenda at the state level, as well as U.S. federal funding, this trend has led to a growing literature on youth smoking prevention initiatives. U.S. concern about youthful drinking and driving has also fuelled a smaller boom in alcohol problems prevention programs.

At the end of the 1980s, the efforts these literatures represent were riding high. Across the whole spectrum of drug use, youthful drug use had fallen in the U.S. (as elsewhere) in the 1980s -- though in fact this decline had begun well before the advent of the new drug prevention programs (Gorman, 1998). In the 1990s, as youthful drug use began to rise again in the U.S. (as elsewhere), despite all the programs, a more skeptical reevaluation of the literature's findings has gotten under way (Brown & Kreft, 1998). We have tried to take advantage of this ongoing reevaluation in the present review.

The concentration of the literature by place and time, however, has greatly constrained the research, particular in terms of the goals of prevention efforts. Almost all of the literature adopts the goal of life-long abstention from tobacco and illicit drug use, and postponement of alcohol use until at least age 21 (minimum legal age in the U.S.). Beck (1998) has recently shown that this "just say no" orientation has long roots in American history, except for a brief period during the 1970s.

As we shall detail below, these goals are thoroughly unrealistic, in terms of actual youth behaviour. While many American teenagers do not use tobacco, drugs or alcohol, those who do typically start using at a mean age in the range of 12 to 14 years. There is very little evidence in any available study of a program influencing youth to stop using once they have started. In view of this, most prevention programs do not have anything to say to those who have started using, and who presumably are at highest risk of harm. Since patterns of use of alcohol, tobacco and marijuana are similar for Canadian youth to those for U.S. youth, programs based on these U.S. models will have the same drawback in the Canadian situation.

The specific U.S. situation has also resulted in a narrow scope of the literature in terms of the institutional bases of the interventions. The overwhelming bulk of the prevention research concentrates on school-based programs, usually directed at children between ages 8 and 17. There is a secondary cluster of community-based programs, though many of them might better be described as "school-plus" programs. For the legal drugs -- alcohol and tobacco -- recent years have seen an increase in legal regulatory programs, usually based on deterring under-age sales and purchases. What has been notably lacking in the literature has been programs that address those

who are already using the drugs -- programs which aim to shape the drug use into less risky patterns, or to minimize the harm from the drug use.

We must, nevertheless, take the literature as we find it, and apply it as best we can to the Ontario situation. In this paper we start from a description and discussion of patterns and trends in youthful drug use in Ontario and other regions, and consider in a public health perspective the evidence on harm to health from youthful drug use. We then describe and assess the available literature evaluating programs and initiatives to prevent youthful drug problems. Lastly, in the light of this review, we offer some commentary, analysis and recommendations.

## **2. Patterns and Trends in Substance Use and Abuse**

### *Prevalence Data & Trends*

#### Ontario:

The longest ongoing study of adolescent substance use in Canada is the Addiction Research Foundation's Ontario Student Drug Use Survey (OSDUS). Since 1977, surveys have been conducted biennially in schools across Ontario, using students in grades 7, 9, 11, and 13. Results from the 1997 survey reveal that 75% of students had used alcohol in their lifetime, and 60% had used during the past year (Adlaf, Ivis, & Smart, 1997). Roughly 40% of young drinkers (past year use) reported becoming drunk, or consuming at least 5 drinks on one occasion. After alcohol, tobacco is the next common drug, with 50% having reported lifetime use, and 28% considered to be current smokers (past year use). Cannabis is the most common illicit drug, and the third common drug overall, with 30% reporting lifetime use, and 25% reporting past year usage. Just over 10% of students used hallucinogens in their lifetime, as well as during the past year.

The OSDUS also provides valuable trend data. The years between 1993 and 1995 showed an upswing in youthful drug use for eight of twenty substances (Adlaf, Ivis, Smart, & Walsh, 1995). Although this is a cause for concern, the increase in prevalence rates was really most prominent for cannabis, and now appears to be levelling off for almost all substances (Adlaf, Ivis, & Smart, 1997). However, comparisons between 1995 and 1997 do show increases for certain hallucinogens (e.g., mescaline, psilocybin) among certain subgroups (i.e., females, 9th and 13th graders), and the proportion of students consuming five or more drinks per occasion during the past month increased (35% vs. 40%, respectively). On a more positive note, the inhalation of glue decreased significantly between 1995 and 1997 (2.4% vs. 1.5%, respectively). It is important that one keep in mind that the current levels of drug use are not as high as they were during the late 1970s and early 1980s, with the exception of some hallucinogens.

#### Northwestern Ontario:

In 1997, a separate survey was conducted in Northwestern Ontario schools for the first time, using students in grades 7, 9, 11, and 13. Findings showed that a total of 59% had used alcohol during the previous year; 28% had used tobacco; and 26% had used cannabis. Generally

the prevalence rates for most substances did not differ from those of other Ontario students. However, when grade comparisons were made, Northwestern Ontario students in grades 9, 11, and 13 showed higher rates of alcohol use than their Ontario counterparts; a higher percentage of grade 9 Northwestern Ontario students reported tobacco use and cocaine use than did their counterparts; and a higher percentage of grade 13 students reported past year cannabis use, compared to their provincial counterparts (Adlaf, DePeuter, Karioja, & Nalezyty, 1998).

#### The Atlantic Provinces:

In 1996, the four Atlantic provinces (Nova Scotia, Newfoundland, Prince Edward Island, and New Brunswick) collaborated to conduct a standardized student drug use survey in each province, based on students in grades 7, 9, 10 and 12 (Poulin, 1996). Although complete analyses using combined data from the four provinces are not yet available, preliminary reports reveal the following: over half of all students in the provinces have used alcohol in the prior year, just over one-third smoked cigarettes, and about one-quarter to one-third used cannabis (lower in PEI and Newfoundland). The use of LSD among students in New Brunswick (15%) and Nova Scotia (12%) was almost double that of the other two provinces. Trend data reveal that the proportion of cannabis use between 1991/92 and 1996 nearly doubled in these provinces (Poulin, 1996; Poulin & Elliott, 1997).

#### The United States:

The Monitoring the Future (MTF) Study is a survey of American student drug use, carried out annually in schools using students in grades 8, 10, and 12. Initial reports and data tables from the 1997 survey reveal that about 75% of 12th graders used alcohol, and 53% reported being drunk, in the prior year. Heavy alcohol use (five or more drinks on one occasion) in the prior two weeks was reported by 15% of eighth graders, 25% of 10th graders, and 31% of 12th graders. Regarding tobacco use, proportions of those who ever smoked were 47% for 8th graders, 60% for 10th graders, and 65% for 12th graders. Lifetime cannabis use was reported by 23% of 8th graders, 42% of 10th graders, and 50% of 12th graders, while past year cannabis use was reported by 18% of 8th graders, 35% of 10th graders, and 38% of 12th graders.

The MTF data indicate that the prevalence rates for most substances have plateaued in 1997, after six years of steady increase, and heavy smoking showed signs of declining among 8th graders. Exceptions to this levelling trend include an increase in daily and monthly smoking among 12th graders between 1996 and 1997, as well as an increase in their past-year alcohol use and their lifetime cannabis use (for initial reports and tables see the MTF website: [www.health.org/mtf](http://www.health.org/mtf)).

Taken together, the student surveys indicate that the increases in youthful substance use that characterized the early 1990s seem to have levelled off. Current prevalence data reveal a general stability among rates of alcohol, tobacco, and illicit drug use, with a few increases and decreases for specific substances and subgroups. With respect to region, rates and patterns of the various drugs seem similar in Ontario, the Atlantic provinces, and the United States. It is also worth mentioning here that the 1994 Youth Smoking Survey showed that, across Canada, Ontario youth smoking rates were among the lowest in the country, while the highest were found in Newfoundland and Quebec (Adlaf & Bondy, 1996). No recent provincial comparisons could

be found for alcohol or other drug use prevalence rates.

The above discussion focussed on rates of student substance use. One limitation of student surveys is the omission of youth not attending school, for instance street youth. To address this problem, the Addiction Research Foundation interviewed a sample of street youth in Toronto in 1992 (age range 13-24 years). Not surprisingly, results showed very high levels of alcohol use (e.g., almost all reported past year use), and drug use (e.g., over half reported past year cannabis use and LSD use; just under one-third reported past year cocaine use and crack use) (Adlaf, Zdanowicz, & Smart, 1996).

### *Age of Onset*

Historically speaking, Adlaf et al. (1997) found that the first use of alcohol, tobacco, and cannabis occurred at an earlier age for Ontario students during the late 1970s and early 1980s, compared to students in the 1990s. A recent study of Ontario students showed that the age of first tobacco use, as well as first alcohol use, is approximately 12 (grade 7), while the average age for first marijuana use is about 14 (Adlaf, Ivis, Smart, & Walsh, 1996). Using Ontario data, DeWit, Offord, and Wong (1997) found that, for various substances, the risk of first use peaks at around age 16, with the exception of cocaine which begins later. The risk period for regular alcohol use peaks at age 19. "Binge drinking," defined as consuming five or more drinks on one occasion, usually begins between the ages of 13 and 15, and is more common among males (Windle, Thatcher Shope, & Bukstein, 1996). Nationwide, the critical time in which smoking begins is typically between the ages of 13 and 14 (Adlaf & Bondy, 1996). Of note, an earlier age of drug initiation has been associated with an increased probability of later abuse and other problems (DeWit et al., 1997; Hawkins et al., 1997; Kandel, Yamaguchi, & Chen, 1992). Given this, the delay of substance use has been seen as a worthwhile alternative goal for preventive efforts.

### *The Developmental Context of Substance Use*

Adolescence is a period of identity formation and experimentation. Part of this developmental process includes risk taking, whether it be unsafe sex, dangerous driving, not using seatbelts, or substance use. Motives for experimenting with substances vary. Some youth perceive it as a form of rebellion or sensation-seeking, providing pleasure, alleviating boredom, satisfying curiosity, facilitating social bonding, attaining peer status, or as an escape/coping mechanism (Amos, Gray, Currie, & Elton, 1997; Arnett, 1992; Banwell & Young, 1993; Franzkowiak, 1987; Igra & Irwin, 1996; Wilks, 1992). In this sense, substance use is a functional behaviour. It can also be a symbolic behaviour. Drinking or drug use is often a performance in front of an audience of associates and others, expressing solidarity in a group or marking off social boundaries (Room, 1994).

During the slow transition into adulthood, substance use can symbolize freedom and autonomy, providing youth with a seemingly adult status (Jessor, 1992; Jessor & Jessor, 1977). Positive lifestyle advertisements and sponsorships contribute to general favourable associations and expectancies from alcohol and tobacco (Wyllie, Fang Zhang, & Casswell, 1998). Messages about not drinking "until you are old enough" have a double edge, reinforcing the status of drinking or smoking as claims on adult status. In the context of the social acceptance of drinking

and smoking among adults, youth see abstinence messages as hypocritical and, thus, are likely to reject them (D'Emidio-Caston & Brown, 1998).

A large proportion of adolescents try alcohol or illicit drugs without becoming frequent or problem users. A developmental perspective illustrates that alcohol and other drug experimentation or use is normative in the teenage years, and use will likely decline in one's mid-to-late 20s (Chen & Kandel, 1995; DeWit et al. 1997; Kandel & Logan, 1984). This "maturing out" process usually coincides with the adoption of adult roles and responsibilities (Bachman, Wadsworth, O'Malley, Johnston, & Schulenberg, 1997). One notable study showed that experimental use of drugs was associated with good psychological health in late adolescence, compared to frequent use or no use, and further, that experimenters were the most psychologically adjusted as children (Shedler & Block, 1990).

Many researchers consider alcohol and tobacco to be "gateway" drugs, in that their use most often precedes marijuana use. Similarly, marijuana use precedes harder illicit drug use, such as cocaine and heroin (Kandel et al., 1992; Yamaguchi & Kandel, 1984a, 1984b). However, the popular idea that alcohol, tobacco, and marijuana inevitably lead to harder drug use is basically an enduring cultural myth, with historical roots stemming from temperance times (Peele & Brodsky, 1997). While epidemiological studies of the sequence of drug involvement have shown that youth who use harder drugs such as cocaine or heroin have already used alcohol, tobacco, and marijuana, it is important to recognize the converse -- that the majority who use alcohol, tobacco, and marijuana *do not* progress to use cocaine or heroin. In conducting focus groups with youth, Coffield and Gofton (1994) found that most did not place drugs on a continuum from soft to hard drugs. Marijuana use was considered highly distinct from heroin and cocaine, and most who were current users of marijuana rejected the myth of progression to experimenting with these other drugs. Further, some studies of high-risk samples demonstrate that "serious" drug users (as opposed to experimental or occasional) show atypical sequencing, with marijuana use preceding alcohol use, or, in certain cases, bypassing marijuana use altogether (Blaze-Temple & Low, 1992; Golub & Johnson, 1994; Mackesy-Amiti, Fendrich, & Goldstein, 1997). Moreover, any relationship between "soft" and "hard" drug use is correlational, not causal, in nature, and other predisposing factors (e.g., family disruption) are likely the causal links.

Though experimentation with substances may be normative adolescent behaviour, youthful drug abuse -- defined here as the frequent use of alcohol or other drugs or use in a manner which leads to a problem -- extracts considerable costs on a personal and societal level and hence is a considerable cause for concern. Decades of research on drug abuse (e.g., dependency, heavy use) during adolescence has led to a clearer understanding of the risk and protective factors (often detected as correlates) associated with abuse. Briefly, risk factors originate from various spheres: the individual (e.g., genetic susceptibility, sensation-seeking trait); the family (e.g., poor parenting skills, high conflict); school (e.g., academic underachievement, poor attendance); peers (e.g., peer rejection, selecting peers who use); and society/community (e.g., norms, availability laws). Similarly, recent research on protective factors/resiliency has unearthed various potential buffers such as a strong family bond, school commitment, positive adult role models, and a belief in one's own self-efficacy (for a review on risk and protective factors, see Hawkins, Catalano, & Miller, 1992).

It is important to recognize that the antecedents of initial drug use are not necessarily

those that lead to chronic drug abuse. Glantz and Pickens (1992) state that experimentation and infrequent substance use is a function of peer and social factors, whereas abuse or problem use may be more associated with biological and psychological factors. This etiological difference implies that prevention initiatives should distinguish between substance use and abuse.

### *Spirit of the Times: The 1990s*

Prevalence rates of alcohol, tobacco, and other drug use among youth should always be interpreted with larger cultural trends in mind. Among youth, as among adults, substances are often used as items of consumption in much the same way as clothes and music are used -- that is, to carve out a desired image and/or to connect oneself with a specific subculture or clique (Lupton, 1994; McCracken, 1992). Specific "patterns of leisure" surrounding youthful substance use -- taking into account the drug used, the way it is used, the accompanying activities and the setting of use -- contribute to how substances become "definitional resources" for the self.

That said, one way to understand the increase in substance use in the 1990s may be to look at it as an extension of trends in fashion (e.g., the retro look, heroin chic, the "freak/goth" look among middle-class suburban youth) and music (e.g., rave/techno, ambient, grunge) of this era. To some extent, the trends of the 1990s are a reaction against yuppie materialism and the "health and fitness" craze of the 1980s. "Each generation seems compelled to define itself stylistically and ideologically as the opposite of the previous generation." (Polhemus, 1994, p. 50). In the 1990s, there have been signals of reaction against "health moralism" among adults too, with the substantial comebacks of cigars and martinis.

### **3. Substance Use and Harm: A Public Health Perspective**

What are the harms from which preventive programs seek to save youth? Parents' and other adults' worries about youthful drug use often have more to do with potential harm to the youth's future career or social and personal development than with harm to health. Use of the drug may substitute for other activities more desired by adults. The young drinker may be victimized by his or her drinking companions. Reflecting laws against purchase and use by youth, even of substances like alcohol or tobacco which are legal for adults, the main worry may be about being arrested and the potential blot on the youth's record that this would entail.

### *Overall Levels of Harm to Health*

Concerns about health, however, including concerns about casualties and addiction, also rank high among societal concerns about youthful drug use, and are the primary rationale for control laws on psychoactive substances. In terms of the overall burden of disease, death and disability, psychoactive substances are an important set of risk factors. Murray and Lopez (1996) have estimated that, of the total global loss of disability-adjusted life-years (DALYs), 3.5% are due to alcohol, 2.6% to tobacco, and 0.6% to all illicit drugs taken together. Closer to home, a study of the direct health costs attributable to alcohol, tobacco and illicit drugs in Ontario in 1992 found costs attributable to alcohol of \$442 million, to tobacco of \$1,073 million, and to all illicit drugs of \$39 million (Xie, Rehm, Single, & Robson, 1996). Marijuana accounted for \$8 million of these costs of illicit drugs (Addiction Research Foundation, 1997).

These costs are obviously very significant. Their distribution underlines that, on present

patterns of use, alcohol and tobacco far outrank illicit drugs as sources of harm to public health. The Ontario cost-of-illness study shows this to be true also among youth. But whereas tobacco ranks first in health costs and years of life lost over the whole lifespan, it is alcohol which predominates in the years under age 25 (see Table 1). Alcohol accounts for 69% of the drug-related days of hospital stay among 10-19 year olds, and 61% of the days among 20-24 year olds. Among 10-19 year olds, tobacco accounts for 22% and illicit drugs for 9% of the hospital days; among 20-24 year olds, the respective figures are 26% and 13%.

In terms of person-years of life lost from deaths at a young age, alcohol is even more predominant, accounting for 87% of the years lost in ages 10-19 and 85% in ages 20-24. For deaths in these age groups, illicit drugs (9% of the years lost in each age-group) outrank tobacco (4% in ages 10-19, 6% in ages 20-24).

Alcohol, tobacco and illicit drugs, thus, all cause substantial harm to the health of young people, both in the short term and in the longer term. By a very substantial margin, alcohol accounts for the greatest immediate harm to young people. In terms of the longer-term outcomes of youthful habits if continued, tobacco also holds a prominent place.

### *Specific Types of Health Harm*

Table 2 shows a qualitative assessment of the main adverse effects of regular use of the most harmful form of each type of drug, as commonly used for nonmedical purposes (Hall, Room, & Bondy, 1998). For tobacco and marijuana, this means the smoked form; for alcohol, distilled spirits; for opiates, injected heroin. The table distinguishes roughly between effects that are important (marked \*\*), in terms of the number of heavy users who are affected, and effects which are less well-established or less important numerically (marked \*). The focus is on adverse health consequences of use, without consideration of any potential beneficial health effects. While the table is based on the epidemiological literature, it is a rough first approximation; there is considerable room for disagreement about its ratings among experts.

The table illustrates that the profile of health harm varies quite considerably for different drugs. Adverse health consequences can result from a single occasion of use, or can be the long-term result of chronic use. Some chronic effects -- liver cirrhosis, heart disease, and cancer -- are primarily diseases of the middle-aged and elderly.

The first four categories in the tables (traffic and other accidents, violence and suicide, overdose death, and HIV and liver infections) are all important potential consequences for young people. In terms of young lives lost, accidents and violence related to alcohol are by far the most important of these categories. Both tobacco and marijuana smoking can worsen respiratory diseases. For young people, this is the most important immediate health concern for tobacco. Along with traffic casualties, respiratory diseases are also the most immediate health concern for marijuana. Overdose and infections from injection equipment are a concern with respect to the small minority of youths who use heroin and cocaine.

Pregnancy is common in youth, and the last line of the table indicates that heavy or frequent use of any psychoactive substance is of concern during pregnancy. Drug dependence is also a concern for young people who use any of these substances regularly and heavily. As the case of nicotine exemplifies, the harm from dependence may come primarily from what it entails, rather from the dependence itself. It is the tar and carbon monoxide in smoked tobacco, and not



the nicotine itself, which is the chief source of health harm. The harm may thus be largely prevented if the user switches to a “cleaner” method of ingesting nicotine.

### *Focusing on the Immediate in Youth Prevention Work*

The long term is important in drug use, and thus in prevention programming. We know well from grim experience that tobacco smoking habits established in the teenage years can eventuate in cancer years later. But while the longer term must be kept in mind, there are several good reasons for putting the greatest weight in youth prevention work on the more immediate potential harms from substances.

First, preventing a proximal harm is inherently an easier task than preventing a distal harm. Most commonly, the effects of any intervention decays over time: in the long run, there is just too much “noise” from the intervening activities and events of everyday life. For instance, a youth prevention program focussing on alcohol has a much better chance of preventing a tragedy from driving home drunk after an upcoming high-school prom than it has of preventing a death from liver cirrhosis in a 50-year-old. Secondly, a youth audience will be more open to prevention messages about immediate problems in their lives than to messages about how to prevent problems which may or may not occur when they are in their 60s (USDHHS, 1994). Thirdly, more strategies are available for preventing harms related to the immediate drug use event or pattern than are available for preventing long-term chronic conditions (Room, 1974). While the main way of preventing liver cirrhosis is by affecting the person’s cumulative amount of drinking, preventing a drinking-driving casualty can be accomplished not only by affecting the driver’s drinking, but also by such means as providing an alternative driver or transport, relocating the prom, or even by seat-belts and airbags.

In this framing, the most important harms to focus on in youth prevention are the accidents and violence associated with drinking, and the overdoses and infections associated with injection drug use. Becoming dependent on the drug is also an important concern for each substance, particularly where, as with tobacco and marijuana, the most common methods of use are associated with long-term harms.

The goal of preventing use at all -- if it is actually attained -- is, of course, a sure way to prevent any harm from use. But the literature reviewed in the present review makes clear that this goal is only sporadically attained. In this context, youth prevention policies with a true public health orientation must also take into account other strategies of preventing the harms associated with youthful drug use.

## **4. Approaches to Preventing or Reducing Substance Use and Related Harm**

Prevention approaches can be classified on a number of dimensions: according to the **goal** of the particular program (e.g., preventing use, preventing harm, preventing stigma); the **strategy** (e.g., deterrence, education/persuasion, regulation); the **institutional base** (e.g., the schools, the courts, the community, the family, the media); or the **target population** (e.g., youth in general, high-risk youth, heavy users). A classic typology in alcohol problems prevention focuses on the program goals, distinguishing between interventions aimed at the “phase of choice” (whether or not there is drinking), those aimed at the “phase of use” (shaping the pattern of drinking), or at the “phase of consequences” (avoiding harm from a given drinking pattern) (Bruun, 1971; Moore

& Gerstein, 1981). In the context of youthful drug use, the last two of these goals are commonly combined in current discussions under the rubric of “harm reduction.” Usually, the “phase of choice” is divided in current discussions into two types, on the basis of the target population: nonusers are subdivided into “high risk youth,” who are contemplating drug use or are expected to be doing so, and other non-using youth.

The resulting typology of approaches resembles the split between “primary,” “secondary,” and “tertiary” prevention which has been conventional in the public health field. In a recent publication, Kumpfer and Baxley (1997) propose a new terminology for much the same three types, based on a classification system devised by Gordon (1987). **Universal** prevention programs are those that target entire populations (e.g., students) with messages of preventing or, at least, delaying use. These are blanket programs, designed to target a large group of people, some of whom may not have individual risk factors for use. **Selective** prevention programs target subgroups considered at high risk for substance use or abuse (e.g., children from low-income families, or with a poor academic record), but yet show no signs of involvement. These subgroups are considered at higher risk than others, and the programs are usually intended to delay or prevent abuse by reducing risk factors and increasing protective factors. **Indicated** prevention programs are designed to prevent abuse among those who already use substances and show early signs of misuse (e.g., drinking binges) or show signs of other serious problems or disorders (e.g., depression) that increase their chances of developing a substance abuse problem. In this formulation, the intentions of indicated programs are to curb the progression of substance abuse and other problem behaviours -- an approach much akin to harm reduction. Reflecting the current shape of the literature, universal prevention programs predominate in the present review, though selective and indicated-population programs are also discussed.

**Harm reduction** is a growing, yet controversial, topic. The goals do not focus on abstinence, but rather to impart information in order to reduce the harm stemming from substance use and to promote safer drug using skills. In this model, abstinence is conceptualized as the “ultimate risk-reduction goal” (Marlatt, Baer, & Larimer, 1995). Experts argue that accepting that drug use does occur is not equivalent to condoning use, and assert that there is a place for harm reduction programs within a larger preventive strategy, which carefully target problem users or those considered at risk for harm.

Although they oversimplify, it is worth keeping the above dimensions and typologies in mind when assessing the evaluative literature on preventing youth drug problems. However, it would be difficult and confusing to organize a review of the literature rigidly on their basis. Instead, our review follows the literature in being organized on varying principles: sometimes by strategy, sometimes by institutional base, and sometimes by goal. The main headings we have used are: Education & Persuasion, Community-Based, Legal and Regulatory Policies, and Harm Reduction.

#### A. Education & Persuasion Approaches

##### *i. School-Based Programs*

Most schools in North America have some type of education curriculum designed to prevent substance use and abuse among students. The desired interim objectives of such education include not only increasing knowledge and awareness about the adverse effects of

substances, but also changing values, attitudes and beliefs which are assumed to ultimately influence behaviour, as well as building social and personal skills.

#### Knowledge-Only / Information Approaches:

Early approaches to substance education provided information about alcohol, tobacco, and drugs, based on the assumption that youth (and adults) behave in a rational manner and, given new information, will alter their behaviour accordingly. By now it is clear that this strategy is ineffective. While providing information does increase knowledge and awareness of the adverse drug effects, and at times negative attitudes, it does not have an impact on drug use behaviour (Botvin, 1995; Tobler, 1992). Furthermore, providing information about the dangers and risks may even be counterproductive with those who seek adventure, and it may also arouse curiosity in some. Though an information-only approach is not sufficient to affect drug use, providing facts is a necessary component of any drug education curriculum. However, it should be kept in mind that, in terms of appealing to students, less emphasis should be given to discussion of any long-term adverse effects, and instead focus on the short-term effects of use, and when possible the *social* drawbacks that can ensue (e.g., diminished attractiveness).

Bachman, Johnston and O'Malley (1991) recommend presenting straightforward information on the health risks and consequences of drugs. This may lead to increased perceived personal risk, and, in turn, to a decrease in use; conversely, low perceptions of risk are found to be associated with increases in drug use. Thus, changing personal beliefs about risk via credible, factual information can lead to demand reduction among youth. However, attempting to generate fear and anxiety by dramatizing the risks associated with substance use is not effective, as youth tend to disbelieve the exaggerations and then eschew the entire program. In addition, the moral approach does not work. Lecturing student about the "evils" of smoking, drinking, and drug use will likely distance youth, and may even backfire, especially if the information contradicts their own experiences.

#### Affective-Only Approaches:

The affective model of drug education assumes that those who use substances have personal problems such as low self-esteem, inadequate social skills, and poor/unclear values. Thus, the objective is to improve students' self-image and ability to interact socially. This is done through discussions of feelings, values and self-awareness. There is very little focus on substance use per se. Evaluation studies on affective programs have showed poor results, with virtually no effects, and counterproductive effects in some cases, on students' substance use (Donaldson, Graham, Piccinin, & Hansen, 1995; Hawthorne, Garrard, & Dunt, 1995; Tobler, 1992). This may be because of the low correlation between self-esteem and drug use (Clayton, Leukefeld, Grant Harrington, & Cattarello, 1996; Coggans & McKellar, 1994; Schroeder, Laflin, & Weis, 1993), or because such programs do not explicitly relate the skill-building to specific drug situations (Ellickson, 1995).

#### Psychosocial Approaches:

The strategies falling under this heading pertain to the social influence model -- the most promising of the substance-use prevention models to date. The basic premise is that youths who use substances do so because of social pressures from peers, the family, and the media, as well as

internal pressures (e.g., the desire to be cool and popular). Along with an information component on health and social consequences, these programs seek to teach methods to counter those pressures, and, more importantly, attempt to motivate students to resist them (Ellickson, 1995). One way this is done is through normative education which seeks to undermine popular beliefs that drug use is prevalent and acceptable. Highlighting antidrug social norms and attempting to form non-use norms by discussing alternative ways to achieve the perceived benefits of substance use are further components. Also exposed are the tactics of the alcohol and tobacco advertisements and counterarguments to those messages are taught. Resistance skills are also developed, as are personal and social skills, such as decision-making, problem-solving, goal-setting and assertiveness. These programs are usually taught through interactive delivery modes such as small-group discussions, role playing, and demonstrations. In a meta-analysis, Tobler and Stratton (1997) found that programs using such interactive group processes were more effective than a didactic presentation style.

Generally, studies evaluating the effectiveness of psychosocial prevention programs have found significant behavioural effects regarding the delay or prevention of substance use, typically lasting only a few years after initial program delivery (Tobler, 1992; Tobler & Stratton, 1997), with one study showing sustained effects for up to six years (Botvin, Baker, Dusenbury, Botvin, & Diaz, 1995).<sup>2</sup> Moreover, such programs have been lauded as being effective with ethnic minorities, and as having curbed regular and occasional substance use, especially tobacco (Ellickson, 1995; Perry & Kelder, 1992). It should also be noted that while these types of programs contain an assortment of strategies, we know little about which of the components or combinations are the most beneficial. There is, however, some evidence suggesting that challenging perceived social norms and beliefs about positive consequences of substance use are important mediators in prevention or reduction of use (MacKinnon et al., 1991).

A note of caution is required here about too much reliance on developing resistance skills as part of a prevention program. Studies have shown that it is not “peer pressure” per se that leads to substance use. Rather, more accurate terms may be “peer influence” or “peer preference” because, typically, there is no overt coercion by peers to try drugs, as commonly thought. Most adolescents are not socially incompetent and lacking in self-esteem. They play an active role in decisions of first use, already having the intentions or “readiness” to experiment, and tend to select users as peers (Banwell & Young, 1993; Coggans & McKellar, 1994; Michell & West, 1996; Warner, Adlaf, & Room, 1997). Further, in an experiment comparing the effectiveness of resistance skill training versus normative education, it was found that resistance skill development had little effect on prevention (Donaldson, Graham, & Hansen, 1994). Thus, a worthwhile task for prevention programers would be to tackle adolescents’ positive expectations and images surrounding substances. When doing so, discussions should be consistent with students’ personal experience, and, hence, should distinguish between use and abuse and should not overlook the associated benefits of use for certain substances. If a program fails to deal with these issues the result may be students’ discrediting and dismissing the program (Brown, D’Emidio-Caston, &

---

<sup>2</sup> It should be noted that Botvin et al.’s long-term follow-up study has recently been criticized for failing to report negative results on alcohol use (Brown & Kreft, 1998), as well as for issues surrounding sample selection (Gorman, 1998).

Pollard, 1997; D'Emidio-Caston & Brown, 1998).

Regarding the choice of program leader, research has yielded equivocal results (Tobler & Stratton, 1997). Some experts recommend choosing same-aged or older peers as deliverers in order to provide normative examples (Perry & Grant, 1988; USDHHS, 1994). Teachers, on the other hand, are believed to be more effective with elementary school children (Howard, 1997). A good combination, however, would involve both teachers, who have good classroom management skills, and peer leaders to assist in implementation and discussion (Botvin, 1995). In the end, high credibility and the ability to facilitate group interaction are requisites for good program leaders.

There are a number of further issues to be resolved through further research. There is little evidence on the appropriate duration of a school-based program, other than that one-shot and other short-term activities are unlikely to be effective. It is not clear whether such programs should focus on substance use in general, or be targeted to individual substances. Of course, other factors such as time and resources would also play a role in such decisions.

In sum, regarding the implementation of school-based universal prevention programs, there seems to be consensus on the following points:

#### Structure of School-Based Drug Education:

- a program should be on-going, from kindergarten to the final year of high school, and should be especially intensive in junior high, just prior to the median age of onset; short-term programs do not work; if programs are short in duration, then booster sessions are necessary
- different approaches should be used for various subgroups (e.g., different drug sophistication, levels of use, psychographic or demographic groups) where possible; these targeted strategies must be based on formative research
- involve students in curriculum planning and implementation

#### Content of School-Based Drug Education:

- knowledge-only or affective-only approaches do not change attitudes or behaviour
- discuss the reasons people use drugs, what they hope to gain, and other ways this can be attained (philosophical discussion about self-discovery and expression); present alternative behaviours that will enable youth to receive those benefits
- present honest factual material; if there are no answers, it must be admitted; present both the dangers and the benefits of using and not using drugs, with discussions focussing on the short-term effects; if the information imparted is perceived as contradictory to their personal experiences or reflecting adult exaggeration and hysteria, then it will be dismissed
- together with providing information, discuss and correct perceptions regarding normative use; life-skills development may also be beneficial (e.g., assertiveness, decision-making, and communication techniques)

#### Delivery of School-Based Drug Education:

- provide a tolerant atmosphere, free of moralizing and fear tactics; there should be an open, non-evaluative dialogue between the program leader and students
- emphasize active learning about drug effects (e.g., experiments ); do not rely on passive lectures and films; interactive delivery methods, such as small-group discussions and role playing, are best
- leaders should be someone the students trust, who will present the facts accurately and in an unbiased manner; teachers can be effective leaders, with assistance from peer leaders; be careful when choosing peer leaders, as rigid social groups already exist among students and,

consequently, some students may be alienated or plainly “turned off”

- *most importantly, anything taught in the school must be reinforced in the community by parents, media, and health policies*

The above discussion has centred on providing universal prevention in a school setting. The school can also be used to deliver selective prevention programs -- that is, programs designed to target youth considered at-risk for substance use or abuse. Opening Doors (Addiction Research Foundation, 1995) is an example of a school-based program targeted to at-risk students (grades 8-10), with the aim of preventing/reducing substance use and other problem behaviours, such as school dropout and violence. In this context, “at-risk” is defined as those likely to experience drug use, truancy, school problems, or violence. The program is delivered by a school staff member and a health care professional (e.g., social worker, public health nurse) from the community. The curriculum entails the enhancement of social and personal skills (e.g., self-esteem, self-efficacy, coping) via group activities and discussions. The program is voluntary, requires parental consent, and lasts for 17 sessions. A 5-session parent component is also included, which seeks to improve family management and interaction.

An initial evaluation of Opening Doors, based on grade-9 student data from 21 schools in a quasi-experimental design, showed promising, albeit mixed, results (DeWit, Braun, et al., 1997). At 7-months follow-up, the experimental group showed decreases in the frequency of alcohol use and binge drinking; less favourable attitudes toward alcohol, cannabis use, and cigarette use; and lower susceptibility to peer pressure to misbehave and engage in violence, compared to a control group. No significant differences were found at follow-up for cannabis use, tranquilizer use, attitudes toward school, or psychosocial variables. That the hypothesized mediating variables (e.g., self-esteem, self-efficacy) were not affected by the program offers further support for the notion, mentioned earlier, that low self-esteem or lack of social competency may not be strongly associated with substance use among youth. Explanations for the positive results found are not clear; it may be that other factors related to the parent component or the improvement in drug-use attitudes may have played a key role. Further, the factors of non-randomization, non-equivalence at baseline, and the voluntary participation warrant caution when interpreting these findings. A similar school-based program with the explicit goal of reducing the level of substance use among current users (Eggert, Thompson, Herting, Nicholas, & Garii Dicker, 1994) is discussed under the Harm Reduction section.

## *ii. Mass Media Campaigns*

For several decades mass media campaigns have been utilized in attempts to decrease youthful substance use. Certainly, campaigns have the potential to be effective communication and education tools, given the findings that youth report obtaining most drug information from television, followed by parents and other print media (Mirzaee, Kingery, Pruitt, Heuberger, & Hurley, 1991), and that hard-to-reach subgroups (e.g., school dropouts) can also be targeted. Generally speaking, studies have shown that anti-substance use/abuse campaigns have had greatest impact on increasing knowledge and awareness, but modest success in affecting attitudes and behaviours (Bauman, LaPrelle, Brown, Kock, & Padget, 1991; Murray, Prokhorov, & Harty, 1994; Popham et al., 1994). Flay and Sobel (1983) suggest that public service messages have failed to change behaviour because of the following: failure in reaching the audience; messages are

directed at unidentifiable audience segments; too much reliance on fear and moral messages; drug users and those at risk for using are likely to avoid the typical antidrug public service announcement (PSA); and, lack of ability to stimulate interpersonal discussions regarding the issue of concern. It also should be kept in mind that there exists a lack of high-quality evaluation research assessing the efficacy of mass media campaigns (Botvin, 1995).

There are, however, a few sound studies evaluating the efficacy of the mass media that have demonstrated positive results on adolescents' cigarette use. One such campaign, implemented in Norway in between 1993 and 1994, sought to raise dissonance in young smokers by highlighting inconsistencies between personal values and smoking (Hafstad et al., 1997; Hafstad, Aaro, & Langmark, 1996). It was believed that the provocative messages used would raise dissonance which, in turn, would stimulate interpersonal discussion among smokers. Interpersonal communication with peers was considered an influence to reduced smoking. The campaign was also intended to strengthen nonsmokers' decisions to abstain. Results showed that, compared to a control group, more young girls in the intervention group had stopped smoking, and fewer nonsmokers in the intervention group had taken up smoking.

A second noteworthy study conducted by Flynn and colleagues showed that the combination of a mass media intervention with a school-based program over four years had a preventive effect on smoking, compared to the use of only a school component (Flynn et al., 1992; Flynn, Worden, Secker-Walker, Badger, & Geller, 1995). The researchers attribute the success of the campaign-plus-school intervention to changing acceptable peer and community norms.

Most experts agree that although direct influence by media messages is plausible -- yet very difficult to confirm -- the media are likely to be most effective when used as agenda-setting mechanisms (Pentz, 1995; Redman, Spencer, & Sanson-Fisher, 1990). The media can be used to increase community awareness and motivation to participate in community-level programs (e.g., counselling, hotline services), and to increase support for new policies. For example, media publicity is believed to have been a significant factor in changing acceptable societal norms around drinking and driving behaviour, and increasing support for more stringent policy (Casswell, Gilmore, Maguire, & Ransom, 1989; Zunz, 1997).

In sum, the following are generalizations as to how the mass media can be used more effectively in promoting health behaviour to youth:

- using multiple media helps promote a lifestyle norm
- combine media campaigns with various other prevention efforts in order to help change norms
- utilize the media to stimulate interpersonal discussion about the issue
- using entertainment programming is another way to avoid a "hard sell" and promote lifestyle norms
- segment the audience (e.g., psychographic or demographic subgroups) and base messages on formative research with subgroups in order to understand their beliefs, attitudes, and values
- avoid fear and moral tactics, and blatant "hard sells"; avoid using the health agency logo when possible; be cautious with humorous messages -- while they are well-liked by youth, they have proven to be ineffective
- do not use celebrity spokes people, as youth are sceptical about their genuineness
- messages should present information in an honest and factual manner; emphasize the short-term

negative consequences rather than long-term; in certain cases, the positive effects of use should be acknowledged with provisions of alternative ways to achieve those benefits

### *iii. Health Warning Labels*

Providing health warning labels on cigarette packages, billboards, and alcoholic beverage containers is another strategy intended to, at least, educate the public about the potential consequences of use. Similar to other information approaches, communicating risk is an interim objective, while altering behaviour is considered the ultimate goal.

There are a few studies evaluating the effectiveness of cigarette warnings among youth. Generally, results have showed that in Canada, the various circulating cigarette warning messages have had some positive impact on youth. The national 1994 Youth Smoking Survey found that the majority of 10- to 19-year olds have seen the warnings and find them credible and important (Paglia, de Groh, & Pederson, 1996; Paglia, de Groh, Rehm, & Ferrence, 1996). The survey also offers some evidence that warnings are an effective informational tool, given the positive relationship found between highly-recalled warnings and knowledge of the corresponding health problems.

A warning label has been on alcohol beverage containers in the U.S. since 1989. The warning is lengthy, printed in small type and is hard to read. The effectiveness of this warning appears to fare worse than tobacco warnings, although research with youth is very scant. One study evaluated their effectiveness one year after implementation using a sample of adolescents (MacKinnon, Pentz, & Stacy, 1993). Results showed that the warnings did not have very high exposure (only 40% reported seeing it), and, not surprisingly, alcohol consumption did not change among the youth, nor did beliefs about the health risks described on the label.

Thus, warning labels may not be a strong singular preventive approach. However, their use can, at least, serve to inform the public and may enhance other approaches if used as part of a comprehensive program.

## B. Community-Based Approaches

While the majority of youth prevention programs have been school-based, there has been a recent push to widen the scope of efforts and involve the larger community. Community intervention efforts usually include one or both of the following targets: the community residents or selected subgroups, and the environment (e.g., policies and norms).

### *i. Alternative Activities & Youth Groups*

One preventive strategy, popularized in the 1970s, is to present youth with alternative activities to substance use. This approach involves providing youth with recreational non-drug related activities and projects, such as tutoring, sports, art, entertainment activities, or business ventures. It is believed that these programs provide youth with a sense of responsibility, self-esteem, fulfilment, and an environment upholding community values. Anti-substance use messages are usually not a component of these programs. Generally -- although there is a lack of good methodological evaluation -- alternative activity programs have not been found to substantially decrease rates of substance use among participants (for a review see Norman, Turner, Zunz, & Stillson, 1997). However, this does not rule out the possibility that alternative



activity programs would be integral components of larger community interventions. Moreover, alternative activities can serve a more general social purpose in providing opportunities for personal development to “high-risk” youth who have few opportunities otherwise, and may strengthen protective factors such as pro-social bonding; any possible effect on drug use is secondary to this more general social purpose (Carmona & Stewart, 1996; Tobler, 1986).

Youth groups can be considered a sub-category of alternative activities programs, believed to aid in preventing substance use and abuse. Usually such groups take part in various recreational activities, community service projects, and school/community awareness campaigns, while also providing drug education. One evaluation study of a network of drug-free youth groups in Nebraska found that, over a six-year period, about 90% of the youth involved abstained from alcohol, and about 97% abstained from tobacco (Nelson-Simley & Erickson, 1995). Further, more than one-third of the youth studied met “high risk” criteria. Caution is warranted when interpreting this high success rate given that the youths who joined and participated in the groups were initially committed to the notion of a drug-free lifestyle. The problem of self-selection is an inevitable confounder in youth group and alternative activity studies in general.

### *ii. Family-Based Approaches*

In recent years there was a growing “parents movement” in the U.S. While the movement also had more general policy concerns, it brought a refocusing on the role of parents and parenting in preventing drug use and abuse. Researchers posit that strengthening parent-child communication about drug use, enforcing prevention in the home, having parents serve as positive role models, and strengthening general parenting skills can all serve to prevent or reduce youthful use. Family-based prevention programs include parent education, parent involvement, and parent and family skills training programs. However, there is yet no experimental study that can speak to the effectiveness of such an approach in prevention among the general population (i.e., universal prevention; Orlandi, 1996) -- one obstacle being the low degree of regular parental participation in programs, especially in non-home-based formats (Botvin, 1995; Pentz, 1995). Self-selection is another methodological problem encountered in studies of parent programs, as most do not randomly assign parents to intervention or control groups. This poses a problem for the validity and generalizability of a study, as findings have showed that parents who participate in prevention programs already have better parenting skills and relationships with their children, compared to parents who do not participate (Cohen & Linton, 1995).

Whereas the above studies were used samples of “average” families, there is a subset of interventions targeted to high-risk families -- that is, families in which children have a greater probability of developing substance abuse (e.g., families with low income, child abuse, lack of adult supervision, or with parents who abuse substances). Interventions with high-risk families include family skills training, parent support groups, parent-peer groups, family counselling, and structured family therapy. Outcome evaluations of these types of programs are scarce, mainly because attracting and retaining parents is most challenging with high-risk families. Family skills training, in which the family participates in activities geared towards improving communication and interaction, is to date considered the most promising family-based selective prevention approach (Kumpfer & Baxley, 1997).

The Strengthening Families Program (SFP; Kumpfer, DeMarsh, & Child, 1989; Kumpfer,

Williams, & Baxley, 1997) is an example of a successful family-based selective prevention program, designed to reduce family-based risk factors. The target group is 6- to 10-year old children of substance abusers (a program for children aged 11-14 has also been recently designed). Components include parent training, which is designed to improve parenting skills; children's skills training, which is designed to decrease problematic behaviour and increase socially acceptable behaviour; and family skills training, designed to increase and improve family interaction. An evaluation of the original 1983-1985 SFP experiment showed that the combination of the three skills training components (child, parent, family) was the most effective in reducing children's problem behaviours, as well as *intentions* to use alcohol and tobacco. Improvements were also found in parenting skills, family conflict, and family communication (DeMarsh & Kumpfer, 1986). Generally, these positive results have since been replicated across different ethnic subgroups, in urban and rural settings (Aktan, Kumpfer, & Turner, 1996; Kumpfer & Alvarado, 1995; Kumpfer, Molgaard, & Spoth, 1996). Results of a five-year follow-up study should be forthcoming, which will likely speak to the issue of whether the SFP can be effective in preventing substance use among adolescents in high-risk families.

"Focus on Families" is another program intended to reduce family environmental risk factors and bolster protective factors among families with a parent in methadone treatment (Catalano, Haggerty, Gainey, & Hoppe, 1997). This structured program offers parents training in parenting, communication, and family management skills, as well as relapse prevention. Structured family sessions are also included in the 16-week program. In an experimental study, researchers found that, compared to controls, those parents assigned to the program showed increases in holding family meetings, problem-solving skills, relapse coping skills, and in self-efficacy; reductions in the amount of opiates used were also observed among the treatment group. However, no differences were found concerning the degree of family conflict and family bonding. Given that these results were in a preliminary report describing only the immediate post-test results, the effects of the program on children's (aged 9-14) behaviours are yet to be seen. As the researchers claim, these results "encourage guarded optimism" for the potential of the program to promote substance use/abuse prevention.

Another longitudinal prevention study with high-risk families warrants attention, mainly because it investigated parental involvement in a youth group setting. Using a sample of at-risk youths in Boys & Girls Clubs, St. Pierre and colleagues (1997) compared the effects of four conditions: (1) providing a 3-year psychosocial drug prevention program to early adolescents in the clubs, with monthly activities and parent involvement; (2) providing the 3-year prevention program with activities, but without parent involvement; (3) providing only the 3-year prevention program; and (4) providing none of the program components (control group). The main research question was whether parent program involvement -- which was geared toward strengthening family bonding, providing parental support, providing opportunities for family activities, and helping parents influence their children to be drug-free -- would be effective. Results showed that after 3 years, there were no differential effects between any of the groups regarding substance use behaviours (i.e., tobacco, alcohol, marijuana). The high attrition rates and the highly-individualized parental participation may have been factors in the null findings.

To summarize, structured family-focussed programs targeted specifically to high-risk families, that include parenting skills and children's skills training and structured family sessions,

may be effective in reducing risk factors and strengthening protective factors which etiological models link to drug use. However, whether these types of effects actually become translated into the prevention of substance use or abuse among youth has yet to be confirmed by long-term empirical evaluations.

### *iii. Multi-Level Community Approaches*

Full-scale or comprehensive community programs are argued to be more promising than the single preventive strategies discussed above. This type of program requires integration and participation from various sectors: schools, families, workplaces, churches, government, and the mass media. The Midwestern Prevention Program (MPP) is an example of an ambitious 5-year program implemented in Kansas City and Indianapolis during the late 1980s (Pentz, 1986; Pentz, Dwyer et al., 1989). The MPP consisted of five components sequentially introduced into the community: a school program (Project STAR), a parent program, mass media advertising, community organization, and policy change to restrict access and availability. The rationale for using multi-channels at various times was to preserve the novelty and salience of the prevention messages.

During the first year, both the mass media and the school-based components were launched, with the media introducing the concept of the school program to the community. The school program was a social influence curriculum delivered by teachers, starting in junior high and enduring for two years. During the second year, a parent program was introduced which educated parents about adolescent substance use, instructed how to communicate prevention in the home, and how to work with principals to change school policy. The media were used to convey these messages to the wider community. Community organizations were formed during the third year to implement prevention and treatment services for the larger community, and to plan changes in local policy. Again, the media reflected these activities. During the fourth and fifth years, policy changes occurred, which included establishing drug-free school zones, restricting smoking in public places, store policies requiring proof of age for alcohol purchases, and penalizing sales to minors. The media simultaneously provided non-use messages. The study design included control groups which were delayed only in receiving the school-based and parent programs, thereby precluding assessment of the effects of mass media and the larger community efforts.

Evaluation of the effects of the MPP on youth prevalence rates at 1-year follow-up indicates that students receiving the school program (Project STAR) showed significantly lower rates of tobacco, alcohol, and marijuana use, compared to the control group (Pentz, Dwyer et al., 1989). At 3-years follow-up, the positive effects for tobacco and marijuana use still held among both low- and high-risk youth, but the prevalence of alcohol use was not significantly different from the control group (Johnson et al., 1990).

While the MPP has been considered a successful program by many, methodological criticisms have cast a shadow of doubt on the validity of its effects. Specifically, the schools in the two experimental groups were not randomly assigned, and, further, the groups were not equivalent in terms of socio-economic and ethnic composition, as well as grade level -- variables that have been found to affect substance use (Klitzner, Fisher, Moskowitz, Stewart, & Gilbert, 1991).

Project Northland is another large-scale community trial aimed at preventing alcohol use among adolescents (Perry et al., 1993). During the first phase of the trial, programs targeted sixth grade students for three years until the end of the eighth grade, and phase two took place when the students were in grades eleven and twelve. The components of the first intervention (1991-1994) included a school-based program (social influence curriculum with peer leaders), a parent program, peer leadership of alcohol-free extracurricular activities, and community policy changes. All programs were implemented simultaneously. Twenty-four school districts were randomized to either the intervention group or the control group (delayed intervention, beginning in 1994).

The second phase (1996-1998) included five strategies: community organization to reduce access to and availability of alcohol; parent education and involvement in community action; youth action teams focussing on reducing alcohol-related problems; print media used to advertise community events, and a larger campaign targeting older youth, considered the “social providers” of alcohol to younger adolescents; and, a school curriculum in grade 11 which covers the social and legal consequences of alcohol use, using a mock trial format.

Findings from phase one indicated that, by the end of the eighth grade, the intervention group had lower rates of alcohol use and less reported tendency to use alcohol, compared to the control group. Further, students reported less perceived peer influence to use alcohol and knowing fewer peers who drink, reported increased self-efficacy to resist influences, and indicated more parent-child communication about alcohol. Also noteworthy was the finding that the program appears to have been more successful with students who reported no alcohol use at baseline, versus the baseline users (Perry et al., 1996).

The second phase of intervention was deemed necessary mainly because alcohol use becomes much more normative and, hence, potentially harmful during the high school years. More importantly, like most interventions, the preventive effects of the initial phase decayed over time, and by the tenth grade the intervention and control groups had similar levels of alcohol use (Perry et al., 1998). Results from the second phase are not yet available.

To summarize, theory and research suggest that comprehensive strategies, such as the MPP and Project Northland, may be the most promising means of preventing or delaying youthful substance use and abuse. Simultaneous and consistent messages from various social sectors, including policy interventions in availability as well as educational and persuasive approaches, may be most effective. This is likely due to changes in acceptable societal norms and values. However, the specific key strategies necessary to achieve these broader social changes have yet to be determined.

### C. Legal and Regulatory Approaches

#### *i. School Policy*

Schools appear to have inherited the drug use/abuse problem, but in reality they cannot solve it alone. Schools cannot assume the roles of parents, the police, medical officials, or clergy. Nonetheless, a uniform policy on substance use and possession on school property is an important component of a comprehensive preventive strategy for youth.

There are various potential disciplinary approaches to student substance use adopted by schools: (1) a laissez-faire approach stipulating that, unless it disrupts the class or threatens the

safety of others, the school has no authority over substance users; (2) no disciplinary action is taken for anything that occurs off school grounds; (3) schools can forbid possession, sale or distribution of substances, punish dealers and be less harsh with users; (4) an overall hardline approach can be taken that identifies the user (e.g., urinalysis or locker searches), that expels the user, and/or that requires reports of use to police. Ross et al. (1995) found that the most common consequences for violating substance use policy in American schools included suspension from school, a meeting between school counsellor, the student and parents/guardians, suspension from extracurricular activities, and detention.

Goodstadt (1989) has outlined four functions of school policies: (1) reflect community norms and expectations about substance use; (2) explicitly specify the punishment for norm violation; (3) reinforce those who comply with the norms; and, (4) compel those who would not otherwise observe these norms. Additionally, it is argued that policies are likely to be most effective if, indeed, they are accepted as reflecting the norms of outside groups, and if the penalties for violation are considered certain and serious to students. However, very little systematic research has been conducted to ascertain the effectiveness of school policy on student substance use. The handful of studies on school policy and substance use is described below.

In Ontario, all Boards of Education were mandated to develop and implement drug education programs and policies by Autumn 1991. Guidelines highlighted three major elements of a comprehensive school drug policy: a preventive curriculum, early intervention, and disciplinary action (Addiction Research Foundation, 1991). Gliksman and colleagues (1992) conducted a study in Ontario that sought to assess the impact of school policy on students' level of alcohol use, and problems related to use. Three policy categories were identified, depending on extensiveness: no or minimal policy, moderate policy, and comprehensive policy. Dependent measures were taken from a 1991 population survey with grades 7, 9, 11, and 13. Results showed that policy type had no relation to problems stemming from use, but there was a relation to the amount of alcohol consumed and heavy drinking among students in the 9th and 11th grade. Students who were in schools with comprehensive policies showed less alcohol consumption than those with minimal or moderate policies. Regarding frequency of heavy drinking, students in schools with full or moderate policies showed less frequent heavy drinking, compared to their counterparts with no/minimal policy. Thus, this exploratory study offers suggestive evidence attesting to the significance of school drug policy on student substance use.

It may be the case that comprehensive and "assistive" school smoking policies may be more effective in reducing the amount smoked, rather than deterring smoking entirely. Pentz, Brannon and colleagues (1989) carried out a study to assess the impact of smoking policy on students in 23 schools. The effect of school policy was assessed using four variables: comprehensiveness (i.e., enforcing a ban on smoking on school grounds, a ban on smoking near school grounds, limited opportunity for smoking off grounds [leaving grounds], and a formal education plan), prevention emphasis, cessation emphasis, or punishment emphasis. Smoking measures included amount of cigarettes smoke and prevalence rate. Several interesting findings emerged. First, more comprehensive policies were related to lower amounts of smoking, but not to prevalence rates. Second, an emphasis on prevention and cessation simultaneously had a positive effect on amount smoked and somewhat on prevalence, whereas policies with a punitive focus had no effect on smoking behaviour.

Another study, carried out in Australia, on school policy and smoking behaviour among students suggests that school structural variables, such as type or policy, have little impact on student smoking (Clarke, White, Hill, & Borland, 1994). Specifically, the researchers found no relationship between the presence or absence of smoking policies oriented towards students, staff, and visitors, as well as no-smoking signs, and student smoking prevalence, based on data from approximately 350 schools.

Recently in Ontario there were discussions about creating a “zero tolerance” environment in schools regarding possession and use of substances among students. The proposal included punitive elements ranging from automatic school suspension to raising the legal age for various activities (e.g., drinking, obtaining a driver’s licence) if found possessing or distributing any substance, including cigarettes. Apart from the fact that this type of measure would be virtually unenforceable, whether it would have positive effects on substance use among students is debatable. As mentioned above, punitive school policies have not been found to prevent or curb substance use (Pentz, Brannon, et al., 1989). Imposing sanctions for use may also further alienate those students already on the “periphery of the school community” (i.e., at-risk groups; D’Emidio-Caston & Brown, 1998), and may discourage help-seeking by those with drug-related problems. Punitive school policies regarding youthful use of cigarettes and alcohol may also serve to reinforce the “adult status” of such behaviours, and thereby lead to an increase in curiosity, sensation seeking, or desire to try these “forbidden fruits.” A more productive way to reduce substance use is to implement policies in the wider environment which stem minors’ access. These methods are discussed below.

In summary, although there remains insufficient information as to what components of school policy are most effective in preventing and reducing substance use among students, experts seem to agree that schools should have, and actively enforce, some type of comprehensive policy. Schools should also provide cessation programs as well as counselling to abusers -- or at least referrals to programs should be given when deemed necessary.

## *ii. Laws and Regulations*

Legislative and regulatory approaches can be effective in preventing/reducing youthful substance use, as well as in reducing the associated harms. There are various policies that have been shown to achieve one or both of these objectives in North America and elsewhere. These are: increasing taxes; increasing the minimum legal age; enforcing sales-to-minors laws; reducing the legal blood alcohol limit for underage drivers; and, graduated licencing.

### Taxes:

Adolescents tend to be particularly price-sensitive. For this reason, increasing the price of alcohol and cigarettes by tax hikes has been found to be an effective way to reduce consumption - especially initiation -- and other harms among youth. Studies of tax increases on cigarettes in Canada and the U.S. have shown significant drops in smoking prevalence rates among youth (Department of Finance Canada, 1993; Ferrence, Garcia, Sykora, Collishaw, & Farinon, 1991; Harris, 1987; Lewit, Coate, & Grossman, 1981; Sweanor, Martial, & Dossetor, 1993), while decreases in taxes have been associated with increases in the incidence of smoking onset (Hamilton, Levinton, St. Pierre, & Grimard, 1997), as well as the amount smoked (Brown,

Taylor, Madill, & Cameron, 1996). Studies of increased taxes on alcoholic beverages have similarly shown favourable effects on drinking behaviour, as well as reductions in motor vehicle fatalities (Chaloupka, Saffer, & Grossman, 1993; Saffer & Grossman, 1987). Further, simulation studies demonstrate that heavy drinking and its ensuing harm would be reduced among youth if taxes on alcohol were increased (for a review see Grossman, Chaloupka, Saffer, & Laixuthai, 1995).

#### Minimum Purchasing Age:

During the 1980s, the minimum drinking age was raised to 21 in the U.S. Subsequent studies have shown that this increase in legal age not only positively affected drinking behaviour, but also other alcohol-related problems, such as suicides and injuries, among youth (Jones, Pieper, & Robertson, 1992; O'Malley & Wagenaar, 1991). Moreover, marijuana use did not supplant alcohol use, as is commonly thought to occur when alcohol becomes less available (O'Malley & Wagenaar, 1991). The raise in legal drinking age has also been found to be a factor in reducing the drinking and driving rates among youth (Klepp, Schmid, & Murray, 1996; Moskowitz, 1989; O'Malley & Wagenaar, 1991; for a review see Wagenaar, 1993).

#### Regulatory Approaches to Deterring Sales to Minors:

Merchant sales of tobacco and alcohol to minors is a significant public health concern. In Ontario, for example, the main source for cigarettes among students is the local grocery/convenience store, and, further, less than half of the underage youth attempting to purchase tobacco are usually asked for age identification (Hobbs, Pickett, Brown, Madill, & Ferrence, 1997). Several studies have investigated the enactment and enforcement of laws prohibiting tobacco sales to minors, with some examining the combination of laws with community/merchant education. Generally, the research demonstrates that, at least in the short-term, enforcing ordinances restricting sales to minors and/or providing education can reduce the number of over-the-counter sales, and there is some suggestion of reduced tobacco use among youth (Altman, Rasenick-Douss, Foster, & Tye, 1991; DiFranza, Carlson, Caisse, 1992; Feighery, Altman, & Shaffer, 1991; Hinds, 1992; Jason, Ji, Anes, & Birkhead, 1991; Keay, Woodruff, Wildey, & Kenney, 1993). However, a two-year controlled study found that communities that enforced a tobacco sales-to-minors law did not differ with respect to adolescents' perceived access to tobacco, nor with adolescents' tobacco use, compared to control communities. These outcomes were found despite the other findings showing high merchant compliance and decreased sales to minors in the intervention communities (Rigotti et al., 1997). Thus, the efficacy of enforcing sales-to-minors laws, in terms of reducing tobacco use among youth, remains equivocal at this point in time.

Alcohol differs from tobacco in that retail sales of alcohol are subject to a specific control system everywhere in the U.S. and Canada. It has long been true that private alcohol retailers can lose their licences to sell alcohol if they sell to minors, and sale to minors is the most common reason for liquor licence suspension or revocation throughout North America. Sales to minors are further restricted in jurisdictions with retail alcohol sales monopolies (all Canadian provinces except Alberta, over a dozen U.S. states), since there are fewer sales outlets and shorter opening hours; the retail sales staff is stable, relatively well-paid and often trained in refusing sales to

minors; and there is no private profit incentive for sales. Alcohol retail stores run by the Liquor Control Board of Ontario (LCBO) have programs in place to ensure that those under age 19, those who are suspected of purchasing liquor for someone underage, or those who seem intoxicated, do not purchase alcohol. Although these programs have not been formally evaluated, the LCBO reports that in 1996, 76,000 people were refused service (LCBO, 1997).

There has been very little scientific research assessing the effects of enforcing alcohol sales-to-minors laws, with two known exceptions. Wagenaar and colleagues (1994; 1998) have implemented a long-term randomized community trial to attempt to change local alcohol policies, with the ultimate intention of reducing underage alcohol use. The Communities Mobilizing for Change on Alcohol (CMCA) project sought to reduce the number of alcohol on- and off-premise sale outlets that sell to minors; reduce the availability of alcohol from personal sources who are over age 21; and change cultural norms that tolerate or glamorize underage drinking. Following the three-year trial, results assessing the impact on illegal outlet sales to minors revealed an increase in the proportion of outlets that checked age identification in the intervention communities, as well as an increase in merchants' perceptions concerning the likelihood of being penalized for underage sales. In terms of youths' perceptions and drinking behaviour, findings showed a decrease in alcohol purchase attempts, an increase in reported difficulty in purchasing alcohol, and a decrease in reported drinking in bars/taverns among 18-20-year-olds (Wagenaar et al., 1998). Additional findings from the CMCA trial should be forthcoming.

The Community Trials Project is another community intervention with one element involving the enforcement of underage alcohol sales laws (Holder et al., 1997). Findings from the longitudinal trial indicated that the combination of increased enforcement and media advocacy served to reduce the number of alcohol sales to apparent minors (Grube, 1997). However, whether this reduction in underage sales translated into reduced underage drinking has yet to be determined.

#### Restrictions for Young or New Drivers:

A policy that lowers the legal blood alcohol limit for drivers under the minimum drinking age has been shown to reduce fatal crashes. Two studies have found that "zero tolerance" laws regarding blood alcohol levels (i.e., lowering limits to 0.00%-0.02%) have been effective in significantly reducing alcohol-related car crashes among young drivers, relative to control communities (Blomberg, 1992 as cited in Hingson, Berson, & Dowley, 1997; Hingson, Heeren, & Winter, 1994). Public campaigns to promote awareness are important in maximizing the policy's effectiveness.

Graduated licencing is a step-wise approach to obtaining a full-status driver's licence, allowing new drivers to gain driving experience while minimizing the risk of collision. Stipulations during the early stages of driving include a zero blood alcohol limit, restrictions on the number and age of the passengers, and prohibition of night driving. Evaluation studies of the graduated licencing system in New Zealand, as well as a preliminary study of the Ontario system, show that it is an effective approach in significantly reducing the number of young drivers, the number of motor vehicle crashes among youth, as well as drinking and driving behaviour among youth (Langley, Wagenaar, & Begg, 1996; Mann et al., 1997; Mayhew & Simpson, 1990; Sweedler & Stewart, 1993).



Studies on legal and regulatory approaches appear to be not only the most methodologically sound, but also the most consistent in demonstrating positive effects on youthful substance use and related harm. For some measures (e.g., taxes), there are estimates of effect sizes, an unusual feature for the prevention literature.

Nevertheless, it should be noted that legal and regulatory approaches are no panacea. They do not always have effects in the intended direction. Furthermore, legal and regulatory approaches typically restrain or shape a behaviour, but do not eliminate it. Thus, minimum-age laws diminish the amount of under-age drinking, but most teenagers report that they know how to get alcohol if they want to. If a legal approach focuses on criminalizing teenage drug use, it will create a large number of criminals, as well as all the social and administrative problems which this entails. Criminalizing the seller has the drawback, with respect to controlling youthful drug use, that an illicit seller has little incentive to distinguish between adult and youthful customers. Approaches that regulate legal sellers, and approaches of excise taxation, have the advantage over both these approaches that they can potentially be enforced efficiently and inexpensively with civil penalties (e.g., sales licence suspension), and that legal sellers are usually allied with the government in driving illicit sellers from the market. Results of the graduated licencing experiments suggest that regulation of potential consumers in terms of other highly-valued behaviours (in particular, licences for driving) are a relatively efficient way of affecting youthful consumption behaviour.

#### D. Harm-Reduction Approaches

It is important to recognize that educational approaches have very little impact on convincing current users to stop. The school programs and the community interventions discussed above are more effective among young non-users and experimenters, rather than frequent users or those who abuse. Further, preventive efforts are more likely to fail with regards to alcohol use, given its normative nature in later adolescence and young adulthood. Thus, minimizing the likelihood of adverse consequences from alcohol use, including dependence, is a worthwhile strategy. In the specific context of the prevention of driving casualties, there has been some acceptance of a harm reduction model, accepting the realities of teenage drinking and seeking to minimize the casualties. An example of this is the promotion of the “Contract for Life” -- an agreement between parents and a teen that the teen will call for help or a ride when a teenager has been drinking. Although there is a dearth of scientific study of harm reduction policies and programs targeting youth, the few studies that exist do show promise.

In a school-based study designed to prevent the progression of drug use and involvement among adolescents already using tobacco, alcohol, or marijuana, and who were considered at risk for school dropout (e.g., low GPA, absenteeism), teachers implemented a “Personal Growth Class” curriculum to foster group support, friendship development, and school bonding (Eggert et al., 1994). Skill development which focussed on self-esteem enhancement, decision making, personal control, and communication was also a program component. It was expected that the program would lead to decreased drug involvement (i.e., abstaining from “hard” illicit drugs, more control over current drug use, and less adverse drug-related consequences) and increased school performance. Results at 10-months follow-up indicated that, compared to a control group, the experimental group showed improvements in school performance, school bonding, peer

bonding, and self-esteem. Also significant were reductions in problems of controlling drug use and in adverse consequences. The aim of preventing the progression of drug use toward “harder” drugs, however, was not fully realized. Thus, this example of a indicated program supports the notion that abstinence may not be a realistic goal among current users, whereas harm reduction is feasible. Another example of a school-based program with a harm-reduction orientation showing some success is the Opening Doors program, discussed earlier.

Harm-reduction approaches have been applied more widely to prevent drinking problems in university-age youth populations, although there are relatively few well-designed evaluations. Marlatt and colleagues (Marlatt et al., 1995; Marlatt & Baer, 1997), randomly assigned a high-risk sample of adolescents who were entering college (average age of 19) to an intervention aimed to reduce the harm of heavy alcohol use and prevent the development of alcohol dependence. “High-risk” was defined as those who drank frequently and consumed at least five drinks on one occasion in the past month, or reported experiencing at least three alcohol-related problems on three to five occasions. The intervention consisted of brief motivational interviewing, including feedback about how to reduce risk. Results at two-year follow-up indicated that those who received the intervention showed greater reductions in drinking over time compared to a high-risk control group. Further, the intervention group reported experiencing less alcohol-related problems. Other studies have also showed reductions in heavy drinking and/or alcohol-related problems among college/university students using similar interventions (Darkes & Goldman, 1993; Kivlahan, Marlatt, Fromme, Coppel, & Williams, 1990).

Harm reduction programs can also be implemented on a community-wide scale. In a comprehensive community program aimed at reducing drinking and driving among youth as well as adults, six communities in Massachusetts introduced a variety of initiatives, among which were: media campaigns, report hotlines, awareness days, peer-led high-school education, Students Against Drunk Driving chapters, alcohol-free prom nights, and college prevention programs (Hingson et al., 1996). Results after the 5-year program showed that the number of fatal crashes involving 15- to 25-year-old drivers declined by 39% relative to the rest of the state. Further, there was a 40% relative decline in the proportion of 16- to 19-year-olds who reported driving after drinking during the previous month.

In addition to direct interventions, there are other less apparent harm reduction initiatives that change the environment or provide some type of option which can reduce the potential for immediate personal or social harm when intoxicated. Examples of these are safe graduation parties, first-aid services at rock concerts, and the Quebec “nez rouge” and other programs to offer drives home to the intoxicated. While these practical prevention interventions are widespread, formal evaluations of their impact in preventing problems for youth are uncommon.

## **5. Commentary & Analysis**

### *Program Goals Revisited*

Anyone contemplating a prevention program for youth is well advised to give serious consideration to the intended goals of the program. One basic goal is to prevent any future use of a drug by the targeted youth. This is a goal that is likely to be popular at first sight among parents and authorities. But a program aimed at this goal is likely to have little relevance for a adolescent

who nevertheless uses substances. At the other end of the spectrum, a program might seek to prevent harm from use of a drug by teaching low-risk ways of using. For some, this has the obvious drawback that it will appear to condone the use of the drug. Somewhere in between are programs that seek to delay use of a drug, or to control its use. Though it is rarely an explicit goal, the effect of some interventions may be not be so much on the fact of use, as on reducing the frequency or intensity of use (i.e., preventing abuse).

Goals may well vary between different drugs. The standard public health aim for cigarette smoking in recent decades has been to prevent all use on a lifetime basis. Recently, in the U.S. and in some Canadian provinces, more sustained efforts have been made to at least enforce a delay in initiating cigarette use by prohibiting sales to those under 18 or 19. Thus far, little attention has been given to efforts to reduce harm among youthful tobacco users, although it has been argued that the popularity of packaged snuff among Swedish boys, for example, has reduced their risks stemming from tobacco use (Ramstrom, 1997). At the general level of social policy, and at the intimate level of the family, harm reduction or delay are most often the de-facto goals. For instance, only 31% of Ontario respondents over the age of 25 responded “never” when asked, “How old do you think a male/female should be before it is OK for him/her to smoke a cigarette?” (Paglia & Room, forthcoming). The average age given among respondents willing to give an age as to when smoking becomes acceptable was 18 -- one year below the legal minimum age for purchasing cigarettes in Ontario.

The legal status of marijuana, of course, reflects a goal of abstinence. A school curriculum that accepted the possibility of marijuana use would be scandalous in much of Canada and the U.S., and for that matter in many other places. Interestingly, however, only a bare majority (52%) of Ontarians over the age of 25 responded that it was “never OK” when asked for an age when marijuana use is acceptable; the mean age given by those offering an acceptable age was 18.8 years.

The public health message regarding alcohol use is nowadays more complex. Frequent light drinking, at least by those middle-aged and older, is on balance protective of health in societies like ours (Ashley, Ferrence, Room, Bondy, Rehm, & Single, 1997). The official aim in North America, reflected in drinking-age laws, is to delay the onset of alcohol use -- until 21 in the U.S., and until 18 or 19 in Canada. Only 4% of Ontarians over 25 stated that it was “never OK” to have a drink of beer; the average acceptable age for drinking a beer -- 18.8 years -- was very similar to the legal drinking age for Ontario (age 19).

For marijuana, tobacco and alcohol, both the official goals and the wishes of adults must be set against the realities of growing up in the current era. Substantial minorities of youth use tobacco and marijuana, and a majority drinks alcohol. Youth in Ontario typically initiate both drinking and smoking at around age twelve, and marijuana use at around age fourteen (Adlaf et al., 1996). Abstinence-oriented prevention programs for youthful marijuana, tobacco or alcohol use thus have goals which are very distant from the social realities they try to influence.

For other drugs, there is a greater social consensus, among youth as well as adults, against recreational use. By the same token, such use of these drugs is much rarer among youth. Targeting “harder” drug use by prevention programs is also more uncommon, perhaps because of the lower prevalence, but perhaps also because of concerns that paying too much attention to such drugs may actually increase use of them. “Backfire” or negative effects have been found in

the school-based prevention literature (Moskovitz, 1989).

The official goals for the different drugs exist in somewhat different social circumstances, in ways which are likely to affect youthful attitudes to them. Abstaining from tobacco smoking can be presented as a quite progressive and oppositional course of behaviour: tobacco companies do not have a positive public image these days; local restrictions on smoking tend to have been seen as part of “progressive” politics; and anti-smoking campaigns have often focused on all smokers, not singling out youth. Anti-marijuana campaigns, on the other hand, tend to have focused on youth; legalizing marijuana is often seen as a “progressive” cause; and there are no visible big businesses publicly promoting use. Lifelong abstention from alcohol might be viewed by many youth as impossibly old-fashioned, but otherwise alcohol tends to fall between tobacco and marijuana in terms of its cultural politics.

The different social location of prevention goals for the different drugs implies that the effects of the same preventive intervention may differ, depending on the drug. In particular, when tobacco is the target, it should not be assumed that the effects also apply to marijuana and alcohol. Many of the most promising results in the youthful prevention literature concern tobacco and come from studies done in North America during the 1980s. This was an era in which adult tobacco smoking rates were falling, in which few adult smokers were willing to say they were glad they smoked, and in which campaigns for smoking restrictions had achieved only small successes and thus were not easily portrayed as repressive. Such factors may have created an especially receptive climate among youth for anti-smoking initiatives -- a climate not easily duplicated in other eras or for other drugs.

### *Theoretical Assumptions Revisited*

Any preventive intervention has a theory of action, explicit or tacit, linking the intervention to the program’s goals. Imparting knowledge, for instance, usually involves the tacit theory that doing this will affect behaviour in the desired direction. The typical model that has been adopted in this case is that knowledge affects attitudes, which then affect behaviour (K-A-B model). As another example, criminalizing under-age purchase attempts involves the tacit theory that this step will deter youths from making such attempts. In much of the prevention evaluation literature, the theories of action are more explicit. Much of the literature is based in academic social and developmental psychology, and it is an article of faith of these literatures that prevention programs should be theory-based.

Theories of the development of drug use and problems tend to focus on the individual’s lifecourse development, and start from a tacit assumption that “bad leads to bad,” with the drug use or problems as the bad outcome. Social deprivation, abuse or neglect as a young child, and genetic deficits are examples of the kinds of factors identified as bad causes. The theoretical framing of prevention programs coming from this tradition tends to be that the link between bad cause and bad outcome can be broken either by removing or transforming the bad cause, or by interposing a remedial measure to break the link -- a measure such as teaching coping or mastery skills, providing positive experiences to boost self-esteem, or strengthening “protective factors.”

Theoretical frames with more of a social and interactional bent expand the range of bad causes to include bad “peer influences” and other aspects of the subject’s immediate environment. Again, preventive approaches derived from this frame seek to counteract the bad influences,

sometimes with environmental approaches as well as individual training.

These theoretical frames, however, are often far from the reality of young lives. Bad beginnings do not always have bad ends; the discovery of “resiliency” in recent years might be seen as a recognition of this. The assumption sometimes fails even at a correlational level; the correlation between “good” prior states and drug use is not always negative.

Beyond this, the prevention literature fails to recognize how the phenomena of drug use appear to youth themselves. If we view prevention as something to be sold to youth, those selling it often fail to understand the market. One great failing is a lack of recognition of the “fun” side of drug use. From the perspective of youth themselves, the primary reason the majority of them - and the majority of adults, for that matter -- take drugs is because they enjoy the experience (Warner et al., 1997). The youth prevention literature, on the other hand, often assumes that drugs are used mainly to assuage the troubles in one’s life.

The prevention literature also pays too little attention to the collective and symbolic aspects of drug use. Drinking, marijuana use or using ecstasy are predominantly done in groups, and there is often a collective aspect, too, to cigarette smoking and other drug use. Very often the drug use is incidental to another social activity, such as dancing, clubbing, partying, or following a particular style of music (Thornton, 1995). “Peer influence” is often more a matter of the attraction of a particular social group for the teenager than it is a matter of pressure from anyone specifically to use drugs.

Drug use, particularly as a social activity, is highly infused with symbolism. To light a cigarette is to make a statement about oneself; to share a marijuana joint in a small group is to make a statement of who is included and who excluded. In the course of a life-stage marked by experiments with identity and identification, choices about drug use (which drug and brand-name, as well as when and whether to use) are potent ways of identifying with a cultural style (Polhemus, 1994), of marking a symbolic distinction from those who are outside the circle or “too young,” of performing for an audience of other youth -- and sometimes of adults (Room, 1994). In a life-stage of graduated emancipations from the constraints of childhood, drug use also symbolizes a claim on adult status, with different drugs at slightly different timings on the “social clock” of when such claims are allowed (Paglia & Room, forthcoming). For legal drugs, this symbolism is only accentuated by minimum-age laws.

Theoretical frames for youth prevention efforts need to be recast to recognize that youthful drug use is not necessarily part of a negative downward spiral, that from the point of view of the user drug use usually has a positive valuation, and that drug use is usually a social and highly symbolic activity. In fact, from this perspective, the psychoactive effect of the drug may actually not be the main point for the user.

### *Effect Sizes and Cost-Effectiveness*

We have noted above that there are very large discrepancies between actual behaviour and the official goals of youth prevention programs for alcohol, tobacco and marijuana. In this sense, youth prevention programs do not have a very restrictive upper bound on their success -- their goals will not easily be fully attained. On the other hand, our review of the evaluative literature shows that even the most successful programs fall short of attaining their official goals. Where the programs can show successes, it tends to be in terms of latent and more realistic goals.

Given the political constraints represented by the official goals, the evaluation literature tends to have aimed simply to find some statistically significant differences between intervention groups and control groups. In pursuing this evaluative aim, the literature has often taken maximum advantage of the fact that, given a sufficient number of comparisons, some “statistically significant” findings are bound to occur. Gorman (1998) observes that:

theory testing in the field of drug prevention has been conducted using an inductive methodology, in which the function of research is to accumulate “confirming instances” of program effectiveness.... This task is easily achieved as evaluations can be structured so as to ensure positive results by, for example, measuring numerous outcome variables.

Alternatively, in the face of nonsupportive evidence, data sets can be modified (e.g., by focusing on specific subsamples of subjects) or the criteria for success altered (e.g., from behavior change to change in attitudes or knowledge (p. 141).

However, in an era of limited resources and competing priorities, general public policy decisions on program implementation are increasingly made on a very different level -- in terms of effectiveness and cost-effectiveness. There is a substantial gap between a program showing statistically significant effects and the program demonstrating its cost-effectiveness. Firstly, at a technical level, significance tests in most prevention demonstration projects, at least until recent years, are typically computed on a questionable basis. For example, if a teacher implements a curriculum in a class of twenty pupils, this does not represent twenty independent tests of the program; but until recently most prevention evaluations have computed significance tests as if it did. The more appropriate approach is to use statistical methods that recognize that the unit of analysis is the school/class (i.e., the teacher’s delivery of the curriculum), and so the sample size is in fact one (see Moskowitz, 1993 for a review of problems in analyzing and reporting prevention research results) .

Secondly, statistical significance is not the same as substantive importance. With a large enough sample, even a tiny difference in results will be significantly different from a chance result; but a program that shows only a tiny positive difference is probably not worth diffusing and implementing. That drug prevention programs have been able to show significant results more often in recent years than formerly is sometimes attributed to firmer grounding in research and theory. But a greater focus on statistical power in design, and the availability of larger budgets for prevention trials have probably been substantial factors in this improvement as well. The advent of meta-analytic methods, which allow combining data from many small studies, has also increased the possibility of finding statistically significant results.

Thirdly, prevention demonstration projects typically do not collect and make available data which would allow for a proper consideration of the policy importance of their findings. This is an area where meta-analyses can shed light, by yielding better estimates of the size of the effect of a type of program. For example, Rooney and Murray (1996) conducted a meta-analysis on studies of the impact of social influence programs on smoking among youth, conducted between 1974 and 1991. After adjusting for study design and unit of analysis, they found the relative reduction in smoking to be only about 5%. Although quite low, this magnitude may actually represent the “best case scenario” given that smoking prevention studies have usually produced the strongest results, and that the studies are from an era in which smoking was on the decline among adults.

Policy decisions about implementing programs in the health field are increasingly based on considerations of relative cost-effectiveness. A cost-effectiveness analysis looks beyond issues of statistical significance to examine the size of program effects, and to attach costing data both to the intervention itself and to its target behaviour. For instance, one study adopted a cost-accounting model to estimate the cost of implementing a school-based program relative to the reduction in tobacco use found among students, and concluded that it cost the community approximately \$5,320 per heavy/problem tobacco user avoided (Marshman, Torrance, Boyle, Walker, Cordingley, & Dini, 1995). This may be seen as a small price to pay, compared to the enormous eventual health-care costs of heavy smoking. The cost-effectiveness revolution in standards for policy decisions has yet to hit the prevention field. When it does, we may expect it to pose new challenges for youth drug prevention programs to prove themselves.

## **6. Recommendations**

1. The main goal of any drug prevention program for youth should be to reduce levels of drug-related harm -- harm to the user, as well as harm to others. The means to this end may be preventing drug use altogether, or limiting or shaping it, or buffering the drug use from harm. Whatever means the program adopts, the program should be designed on the basis of an assessment of the dimensions of drug-related harm (taking into account delayed harm) in the target population, and measurement of changes in drug-related harm should be included in the evaluation.

2. There are few examples, indeed, of school-based drug education programs with substantial and lasting effects. But whatever the evaluation literature may conclude, school-based drug education will continue. In this circumstance, drug education curricula might well be based on general educational principles, rather than framed by ideology on drug use. Students are citizens and potential future consumers, and with respect to these roles it is appropriate to provide them with biological and social science information about tobacco, alcohol and drug use and problems (including for prescription drugs), and to encourage discussion of the intellectual, practical and ethical issues these problems raise.

3. Educational and persuasion material should be matched to its target audience. In particular, information aimed at limiting harm from use is usually most appropriately targeted at youth who are already users. On the other hand, education and persuasion campaigns need to be sensitive to the surrounding environment of messages. In the case of mass media, this environment includes public health messages to adults, program or editorial content, and advertising and other promotions from alcohol and tobacco marketers.

Studies have shown that children are attentive to alcohol advertisements, for instance, and a fair proportion see them as a source of information on real life (Wyllie, Fang, Zhang, & Casswell, 1998). Product marketing is often attractive to children; a recent U.S. marketing study found that beer commercials featuring frogs and other animals ranked first among all ads when children were asked to name their favourite TV ads (Hays, 1998).

4. Though the material on them lies largely outside the formal evaluation literature, there have been major social movements and shifts in popular sentiment which have greatly affected rates and patterns of drug use and problems. These shifts among adults are usually reflected in changing rates and patterns among youth. Programs to prevent youthful drug problems are well

advised to try to hitch their approach and framing of the issues to current trends among adults and in youth cultures. Put another way, it is extraordinarily difficult for a demonstration program to achieve change in the opposite direction to prevailing trends in the population.

5. Some selective programs, directing interventions at high-risk youth, have shown early indications of being modestly effective at least in delaying initiation of drug use. Relatively intensive family-based programs for high-risk youth also hold some promise, with positive effects on family functioning and children's behaviour, although outcomes in terms of actual drug use and problems are as yet unmeasured.

6. Regulatory approaches to drug markets have shown considerable success in limiting and shaping youthful drug use when there is a legal market in the drug. In this circumstance, regulatory authorities can efficiently enforce limits on youth access as a condition of licences to sell. However, the success of such regulatory approaches is dependent on a popular consensus supporting them. Maintaining this consensus may require efforts at public persuasion.

Saltz et al. (1995) note that policy and other environmental approaches to prevention enjoy some natural advantages. Such approaches are not dependent on persuading individuals; and their effects may not decay over time. Moreover, policies work directly and indirectly by reflecting social norms and reflecting what is and is not acceptable. The positive impact of policies on consumption as well as subsequent harm is supported by consistent scientific evidence, especially in the case of alcohol.

7. Initiatives which combine policy and environmental measures with educational or persuasional approaches seem more likely to succeed than initiatives taking only one of the approaches. However, evidence is still lacking of lasting effects from such combined community approaches.

8. There is a substantial need for well-evaluated trials of approaches which acknowledge the reality of youthful drug use, and either attempt to shape the use so as to minimize the risk of harm, or attempt to shape the social and physical environment of use to insulate the use from harm. There will be a need for an accompanying campaign to explain to adults the rationale for these harm reduction initiatives.

9. Drug prevention has been a rubric that has made it possible to do good things in the community which, in an age of government downsizing, would otherwise not have received public funds. The fact that many of these interventions did not have much impact on rates of drug use does not imply that they did not make any positive differences, and are not worthwhile, on other grounds. It is also possible that the broad application of diverse prevention programs in a population may have a cumulative positive effect (Mann & Smart, 1997), though this may not be apparent in the evaluation of any specific program.

10. Evaluated prevention demonstration projects are inherently difficult to mount successfully, requiring staff with different orientations and skills to work together. For many interventions, a true experiment is impossible or unethical. There is a need to take maximum advantage of "natural experiments" and other quasi-experimental designs if we are to reach an adequate knowledge base across the whole range of preventive interventions. If preventive interventions are to perform well in a cost-effectiveness analysis, they must set realistic goals and give attention to containing the costs of the intervention.

11. The analysis and findings of this report are not surprising or newsworthy for



researchers who have been involved in the literature on preventing drug problems among youth. But they may be surprising or even shocking to the general adult public. To the extent this is true, progress in implementing effective prevention programs may require an educational effort aimed at adults concerning the realities of youthful drug use and of mounting effective prevention initiatives.

### References

- Addiction Research Foundation. (1991). Alcohol and drug policies: A guide for school boards (2nd ed.). Toronto: Addiction Research Foundation.
- Addiction Research Foundation. (1995). Opening Doors: A personal and social skills program. Toronto: Addiction Research Foundation.
- Addiction Research Foundation. (1997). Cannabis, health and public policy. Toronto: Addiction Research Foundation.
- Adlaf, E. M., & Bondy, S. J. (1996). Smoking behaviour. In S. Stephens & M. Morin (Eds.), Youth Smoking Survey, 1994: Technical Report (pp. 37-58). Ottawa: Minister of Supply and Services Canada.
- Adlaf, E. M., DePeuter, E. C., Karioja, K. L., & Nalezty, L. (1998). Northwestern Ontario Student Drug Use Survey, 1997. Toronto: Addiction Research Foundation, Thunder Bay District Health Unit, Northwestern Health Unit, District Health Councils, and District School Boards of Northwestern Ontario.
- Adlaf, E. M., Ivis, F. J., & Smart, R. G. (1997). Ontario Student Drug Use Survey: 1977-1997. (Addiction Research Foundation Research Document No. 136). Toronto: Addiction Research Foundation.
- Adlaf, E. M., Ivis, F. J., Smart, R. G., & Walsh, G. W. (1995). The Ontario Student Drug Use Survey: 1977-1995. Toronto: Addiction Research Foundation.
- Adlaf, E. M., Ivis, F. J., Smart, R. G., & Walsh, G. W. (1996). Enduring resurgence or statistical blip? Recent trends from the Ontario Student Drug Use Survey. Canadian Journal of Public Health, 87, 189-192.
- Adlaf, E. M., Zdanowicz, Y. M., & Smart, R. G. (1996). Alcohol and other drug use among street-involved youth in Toronto. Addiction Research, 4, 11-24.
- Aktan, G. B., Kumpfer, K. L., & Turner, C. W. (1996). Effectiveness of a family skills training program for substance use prevention with inner city African-American families. Substance Use and Misuse, 31, 157-175.
- Altman, D. G., Rasenick-Douss, L., Foster, V., & Tye, J. B. (1991). Sustained effects of an educational program to reduce sales of cigarettes to minors. American Journal of Public Health, 81, 891-893.
- Amos, A., Gray, D., Currie, C., & Elton, R. (1997). Healthy or druggy? Self-image, ideal image and smoking behaviour among young people. Social Science and Medicine, 45, 847-858.
- Arnett, J. (1992). Reckless behavior in adolescence: A developmental perspective. Developmental Review, 12, 339-373.
- Ashley, M. J., Ferrence, R., Room, R., Bondy, S., Rehm, J. & Single, E. (1997). Moderate drinking and health: Implications for recent evidence. Canadian Family Physician, 43, 687-694.

- Bachman, J. G., Johnston, L. D., & O'Malley, P. O. (1991). How changes in drug use are linked to perceived risks and disapproval: Evidence from national studies that youth and young adults respond to information about the consequences of drug use. In L. Donohew, H. E. Sypher, & W. J. Bukoski (Eds.), Persuasive communication and drug abuse prevention (pp. 133-155). Hillsdale, NJ: Erlbaum.
- Bachman, J. G., Wadsworth, K. N., O'Malley, P. M., Johnston, L. D., & Schulenberg, J. E. (1997). Smoking, drinking, and drug use in young adulthood: The impacts of new freedoms and new responsibilities. Mahwah, NJ: Lawrence Erlbaum Associates.
- Banwell, C. L., & Young, D. (1993). Rites of passage: Smoking and the construction of social identity. Drug and Alcohol Review, *12*, 377-385.
- Bauman, K. E., LaPrelle, J., Brown, J. D., Koch, G. G., & Padget, C. A. (1991). The influence of three mass media campaigns on variables related to adolescent cigarette smoking: Results of a field experiment. American Journal of Public Health, *81*, 597-604.
- Beck, J. (1998). 100 years of "just say no" versus "just say know". Evaluation Review, *22*, 15-45.
- Blaze-Temple, D., & Lo, S. K. (1992). Stages of drug use: A community survey of Perth teenagers. British Journal of Addiction, *87*, 215-225.
- Botvin, G. J. (1995). Principles of prevention. In R. H. Coombs & D. Ziedonis (Eds.), Handbook on drug abuse prevention: A comprehensive strategy to prevent the abuse of alcohol and other drugs (pp. 19-44). Boston: Allyn and Bacon.
- Botvin, G. J., Baker, E., Dusenbury, L., Botvin, E. M., & Diaz, T. (1995). Long-term follow-up results of a randomized drug abuse prevention trial in a White middle-class population. Journal of the American Medical Association, *273*, 1106-1112.
- Botvin, G. J., Baker, E., Dusenbury, L., Tortu, S., & Botvin, E. M. (1990). Preventing adolescent drug abuse through a multi-modal cognitive-behavioral approach: Results of a 3-year study. Journal of Consulting and Clinical Psychology, *58*, 437-446.
- Botvin, G. J., & Dusenbury, L. (1989). Substance abuse prevention and the promotion of competence. In G. W. Albee & J. M. Joffe (Eds.), Primary Prevention of Psychopathology (vol. XII). Newbury Park, CA: Sage.
- Brown, J. H., D'Emidio-Caston, M., & Pollard, J. A. (1997). Students and substances: Social power in drug education. Educational Evaluation and Policy Analysis, *19*, 65-82.
- Brown, J. H., & Kreft, I. G. (1998). Zero effects of drug prevention programs: Issues and solutions. Evaluation Review, *22*, 3-14.
- Brown, K. S., Taylor, T. E., Madill, C. L., & Cameron, R. (1996). The relationship between the tobacco tax decrease and smoking among youth: Results of a survey in south-western Ontario. (OTRU Working Paper Series No. 14). Toronto: Ontario Tobacco Research Unit.
- Bruun, K. (1971) Implications of legislation relating to alcoholism and drug dependence. In L. G. Kiloh & D. S. Bell (Eds.), Proceedings, 29th International Congress on Alcoholism and Drug Dependence (pp. 173-181). Australia: Butterworths.
- Carmona, M. & Stewart, K. (1996). A review of alternative activities and alternatives programs in youth-oriented prevention. (CSAP Technical Report No. 13). Rockville, MD: Center for Substance Abuse Prevention.
- Casswell, S., Gilmore, L., Maguire, V., & Ransom, R. (1989). Changes in public support for

- alcohol policies following a community-based campaign. British Journal of Addiction, *84*, 515-522.
- Catalano, R. F., Haggerty, K. P., Gainey, R. R., & Hoppe, M. J. (1997). Reducing parental risk factors for children's substance misuse: Preliminary outcomes with opiate-addicted parents. Substance Use and Misuse, *32*, 699-721.
- Chaloupka, F. J., Saffer, H., & Grossman, M. (1993). Alcohol control policies and motor vehicle fatalities. Journal of Legal Studies, *22*, 161-186.
- Chen, K., & Kandel, D. B. (1995). The natural history of drug use from adolescence to the mid-thirties in a general population sample. American Journal of Public Health, *85*, 41-47.
- Clarke, V., White, V., Hill, D., & Borland, R. (1994). School structural and policy variables associated with student smoking. Tobacco Control, *3*, 339-346.
- Clayton, R. R., Cattarello, A. M., & Johnstone, B. M. (1996). The effectiveness of Drug Abuse Resistance Education (Project DARE): Five year follow-up results. Preventive Medicine, *25*, 307-318.
- Clayton, R. R., Leukefeld, C. G., Grant Harrington, N., & Cattarello, A. (1996). DARE (Drug Abuse Resistance Education): Very popular but not very effective. In C. B. McCoy, L. R. Metsch, & J. A. Inciardi (Eds.), Intervening with drug-involved youth (pp. 101-109). Thousand Oaks, CA: Sage.
- Coffield, F., & Gofton, L. (1994). Drugs and young people. London: Institute for Public Policy Research.
- Coggans, N., & McKellar, S. (1994). Drug use amongst peers: Peer pressure or peer preference. Drugs: Education, Prevention and Policy, *1*, 15-24.
- Cohen, D. A., & Linton, K. L. (1995). Parent participation in an adolescent drug abuse prevention program. Journal of Drug Education, *25*, 159-169.
- Darkes, J., & Goldman, M. (1993). Expectancy challenge and drinking reduction experimental evidence for a mediational process. Journal of Clinical and Consulting Psychology, *61*, 344-353.
- DeMarsh, J. P., & Kumpfer, K. L. (1986). Family-oriented interventions for the prevention of chemical dependency in children and adolescents. In S. Griswold-Ezekoye, K. L. Kumpfer, & W. Bukoski (Eds.), Childhood and chemical abuse: Prevention and intervention (pp. 117-151). New York: Haworth Press.
- D'Emidio-Caston, M., & Brown, J. H. (1998). The other side of the story: Student narratives on the California Drug, Alcohol, and Tobacco Education Programs. Evaluation Review, *22*, 95-117.
- Department of Finance Canada. (1993). Tobacco taxes and consumption. Ottawa: Department of Finance Canada.
- DeWit, D. J., Braun, K., Steep, B., Ellis, K., Rye, B. J., Silverman, G., Smythe, C., & Stevens-Lavigne, A. (1997). Evaluation of an in-school drug prevention program for at-risk youth. Manuscript submitted for publication.
- DeWit, D. J., Offord, D. R., & Wong, M. (1997). Patterns of onset and cessation of drug use over the early part of the life course. Health Education and Behavior, *24*, 746-758.
- DiFranza, J. R., Carlson, R. P., & Caisse, R. E. (1992). Reducing youth access to tobacco. Tobacco Control, *1*, 58.

- Donaldson, S. I., Graham, J. W., & Hansen, W. B. (1994). Testing the generalizability of intervening mechanism theories: Understanding the effects of adolescent drug use prevention interventions. Journal of Behavioral Medicine, *17*, 195-216.
- Donaldson, S. I., Graham, J. W., Piccinin, A. M., & Hansen, W. B. (1995). Resistance-skills training and onset of alcohol use: Evidence for beneficial and potentially harmful effects in public schools and in private Catholic schools. Health Psychology, *14*, 291-300.
- Ellickson, P. L. (1995). Schools. In R. H. Coombs & D. Ziedonis (Eds.), Handbook on drug abuse prevention: A comprehensive strategy to prevent the abuse of alcohol and other drugs (pp. 93-120). Boston: Allyn and Bacon.
- Eggert, L. L., Thompson, E. A., Herting, J. R., Nicholas, L. J., & Garii Dicker, B. (1994). Preventing adolescent drug abuse and high school dropout through an intensive school-based social network development program. American Journal of Health Promotion, *8*, 202-215.
- Ennett, S., Tobler, N., Ringwalt, C., & Flewelling, R. (1994). How effective is drug abuse education? A meta-analysis of Project DARE outcome evaluations. American Journal of Public Health, *84*, 1394-1401.
- Feighery, E., Altman, D. G., & Shaffer, G. (1991). The effects of combining education and enforcement to reduce tobacco sales to minors: A study of four northern California communities. Journal of the American Medical Association, *266*, 3168-3171.
- Ferrence, R. G., Garcia, J. M., Sykora, K., Collishaw, N. E., & Farinon, L. (1991). Effects of pricing on cigarette use among teenagers and adults in Canada 1980-1989. Toronto: Addiction Research Foundation.
- Flay, B. R., & Sobel, J. L. (1983). The role of mass media in preventing adolescent drug abuse. In T. J. Glynn, C. G. Leukefeld, & J. P. Lundford (Eds.), Preventing adolescent drug abuse: Intervention strategies (pp. 5-35). Rockville, MD: National Institute on Drug Abuse.
- Flynn, B. S., Worden, J. K., Secker-Walker, R. H., Badger, G. J., & Geller, B. M. (1995). Cigarette smoking prevention effects of mass media and school interventions targeted to gender and age groups. Journal of Health Education, *26 (Suppl.)*, 45-51.
- Flynn, B. S., Worden, J. K., Secker-Walker, R. H., Badger, G. J., Geller, B. M., & Costanza, M. C. (1992). Prevention of cigarette smoking through mass media intervention and school programs. American Journal of Public Health, *82*, 827-834.
- Franzkowiak, P. (1987). Risk-taking and adolescent development: The functions of smoking and alcohol consumption in adolescence and its consequences for prevention. Health Promotion, *2*, 51-61.
- Glantz, M. D., & Pickens, R. W. (1992). Vulnerability to drug abuse: Introduction and overview. In M. D. Glantz & R. W. Pickens (Eds.), Vulnerability to drug abuse (pp. 1-14). Washington, DC: American Psychological Association.
- Gliksman, L., Adlaf, E., Allison, K., & Newton-Taylor, B. (1992). School board drug policies and student drug use: A test of impact. Paper presented at the 36th International Congress on Alcohol and Drug Dependence, Glasgow, Scotland.
- Golub, A., & Johnson, B. D. (1994). The shifting importance of alcohol and marijuana as gateway substances among serious drug abusers. Journal of Studies on Alcohol, *55*, 607-614.
- Goodstadt, M. S. (1989). Substance abuse curricula vs. school drug policies. Journal of School

- Health, 59, 246-250.
- Gordon, R. (1987). An operational classification of disease prevention. In J. A. Steinberg & M. M. Silverman (Eds.), Preventing mental disorders (pp. 20-26). Rockville, MD: Department of Health and Human Services.
- Gorman, D. M. (1998). The irrelevance of evidence in the development of school-based drug prevention policy, 1986-1996. Evaluation Review, 22, 118-146.
- Grossman, M., Chaloupka, F. J., Saffer, H., & Laixuthai, A. (1994). Effects of alcohol price policy on youth: A summary of economic research. In G. M. Boyd, J. Howard, & R. A. Zucker (Eds.), Alcohol problems among adolescents: Current directions in prevention research (pp. 225-242). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Grube, J. W. (1997). Preventing sales of alcohol to minors: Results from a community trial. Addiction, 92 (Suppl. 2), S251-S260.
- Hafstad, A., Aaro, L. E., Engeland, A., Andersen, F., Langmark, F., & Stray-Pedersen, B. (1997). Provocative appeals in anti-smoking mass media campaigns targeting adolescents -- the accumulated effect of multiple exposure. Health Education Research: Theory and Practice, 12, 227-236.
- Hafstad, A., Aaro, L. E., & Langmark, F. (1996). Evaluation of an anti-smoking mass media campaign targeting adolescents: The role of affective responses and interpersonal communication. Health Education Research: Theory and Practice, 11, 29-38.
- Hall, W., Room, R., & Bondy, S. (1998). Comparing the health and psychological effects of alcohol, cannabis, nicotine and opiate use. In W. Corrigall, W. Hall, H. Kalant, & R. Smart (Eds.), Cannabis and health. Toronto: Addiction Research Foundation.
- Hamilton, V. H., Levinton, C., St. Pierre, Y., & Grimard, F. (1997). The effect of tobacco tax cuts on cigarette smoking in Canada. Canadian Medical Association Journal, 156, 187-191.
- Harris, J. E. (1987). The 1983 increase in the federal cigarette excise tax. In L. H. Summers (Ed.), Tax policy and the economy (Vol. 1). Cambridge, MA: MIT Press.
- Hawkins, J. D., Catalano, R. E., & Miller, J. Y. (1992). Risk and protective factors for alcohol and other drug problems in adolescence and early adulthood: Implications for substance abuse prevention. Psychological Bulletin, 112, 64-105.
- Hawkins, J. D., Graham, J. W., Maguin, E., Abbott, R., Hill, K. G., Catalano, R. F. (1997). Exploring the effects of age of alcohol use initiation and psychosocial risk factors on subsequent alcohol misuse. Journal of Studies on Alcohol, 58, 280-290.
- Hawthorne, G., Garrard, J., & Dunt, D. (1995). Does Life Education's drug education programme have a public health benefit? Addiction, 90, 205-215.
- Hayes, C. L. (1998). Spots for adults appeal to children. New York Times (national edition), March 26, p. C5.
- Hinds, M. W. (1992). Impact of a local ordinance banning tobacco sales to minors. Public Health Reports, 107, 355-358.
- Hingson, R., Berson, J., & Dowley, K. (1997). Interventions to reduce college student drinking and related health and social problems. In M. Plant, E. Single, & T. Stockwell (Eds.), Alcohol: Minimising the harm. What works? (pp. 143-170). London: Free Association.
- Hingson, R., Heeren, T., & Winter, M. (1994). Lower legal blood alcohol limits for young

- drivers. Public Health Reports, 109, 738-744.
- Hingson, R., McGovern, T., Howland, J., Heeren, T., Winter, M., & Zakocs, R. (1996). Reducing alcohol-impaired driving in Massachusetts: The Saving Lives Program. American Journal of Public Health, 86, 791-797.
- Hobbs, F., Pickett, W., Brown, S. K., Madill, C., & Ferrence, R. (December, 1997). Monitoring the Ontario Tobacco Strategy. Youth and tobacco in Ontario, 1997: A cause for concern. Toronto: Ontario Tobacco Research Unit.
- Holder, H. D., Saltz, R. F., Grube, J. W., Voas, R. B., Gruenewald, P. J., & Treno, A. J. (1997). A community prevention trial to reduce alcohol-involved accidental injury and death: Overview. Addiction, 92 (Suppl. 2), S155-S171.
- Howard, J. (1997). Psychoactive substance use and adolescence (part I): Prevention. Journal of Substance Misuse, 2, 17-23.
- Igra, V. & Irwin, C. E. (1997). Theories of adolescent risk-taking behavior. In R. J. DiClemente, W. B. Hansen, & L. E. Ponton (Eds.), Handbook of adolescent health risk behavior (pp. 35-52). New York: Plenum.
- Jason, L. A., Ji, P. Y., Anes, M. D., & Birkhead, S. H. (1991). Active enforcement of cigarette control laws in the prevention of cigarette sales to minors. Journal of the American Medical Association, 266, 3159-3161.
- Jessor, R. (1992). Risk behavior in adolescence: A psychosocial framework for understanding and action. Developmental Review, 12, 374-390.
- Jessor, R. & Jessor, S. L. (1977). Problem behavior and psychosocial development: A longitudinal study of youth. New York: Academic Press.
- Johnson, C. A., Pentz, M. A., Weber, M. D., Dwyer, J. H., Baer, N., MacKinnon, D. P., Hansen, W. B., & Flay, B. R. (1990). Relative effectiveness of comprehensive community programming for drug abuse prevention with high-risk and low-risk adolescents. Journal of Consulting and Clinical Psychology, 58, 447-457.
- Jones, N., Pieper, C. F., & Robertson, L. J. (1992). The effect of legal drinking age on fatal injuries of adolescents and young adults. American Journal of Public Health, 82, 112-115.
- Kandel, D. B., & Logan, J. A. (1984). Patterns of drug use from adolescence to young adulthood: I. Periods of risk for initiation, continued use, and discontinuation. American Journal of Public Health, 74, 660-666.
- Kandel, D. B., Yamaguchi, K., & Chen, K. (1992). Stages of progression in drug involvement from adolescence to adulthood: Further evidence for the gateway theory. Journal of Studies on Alcohol, 53, 447-457.
- Keay, K. D., Woodruff, S. I., Wildey, M. B., & Kenney, E. M. (1993). Effect of retailer intervention on cigarette sales to minors in San Diego County, California. Tobacco Control, 2, 145-151.
- Kivlahan, D., Marlatt, A., Fromme, K., Coppel, D., & Williams, E. (1990). Secondary prevention with college drinkers: Evaluation of an alcohol skills training program. Journal of Clinical and Consulting Psychology, 58, 805-810.
- Klepp, K. I., Schmid, L. A., & Murray, D. M. (1996). Effects of the increased minimum drinking age law on drinking and driving behavior among adolescents. Addiction Research, 4, 237-244.

- Klitzner, M., Fisher, D., Moskowitz, J., Stewart, K., & Gilbert, S. (1991). Report to the Robert Wood Johnson Foundation on strategies to prevent the onset and use of addictive and abusable substances among children and early adolescents. Washington, DC: Robert Wood Johnson Foundation.
- Kochis, D. S. (1995). The effectiveness of Project DARE: Does it work? Journal of Alcohol and Drug Education, *40*, 40-47.
- Kumpfer, K. L., & Alvarado, R. (1995). Strengthening families to prevent drug use in multiethnic youth. In G. J. Botvin, S. Schinke, & M. A. Orlandi (Eds.), Drug abuse prevention with multiethnic youth (pp. 225-294). Thousand Oaks, CA: Sage.
- Kumpfer, K. L., & Baxley, G. B. (1997). Drug abuse prevention: What works? Rockville, MD: National Institute on Drug Abuse.
- Kumpfer, K. L., DeMarsh, J. P., & Child, W. (1989). Strengthening Families Program: Children's skills training curriculum manual. Prevention services to children of substance-abusing parents. Salt Lake City, UT: Social Research Institute, University of Utah.
- Kumpfer, K. L., Molgaard, V., & Spoth, R. (1996). Family interventions for the prevention of delinquency and drug use in special populations. In R. Peters & R. McMahon (Eds.), Preventing childhood disorders, substance abuse, and delinquency (pp. 241-267). Thousand Oaks, CA: Sage.
- Kumpfer, K. L., Williams, M. K., & Baxley, G. B. (1997). Drug abuse prevention for at-risk groups. Rockville, MD: National Institute on Drug Abuse.
- Langlely, J. D., Wagenaar, A. C., & Begg, D. J. (1996). An evaluation of the New Zealand graduated driver licensing system. Accident Analysis and Prevention, *28*, 139-146.
- Lewit, E. M., Coate, D., & Grossman, M. (1981). The effects of government regulation on teenage smoking. Journal of Law and Economics, *24*, 545-569.
- Liquor Control Board of Ontario. (1997). LCBO annual report 1996-1997. We've bettered our best. Toronto: Liquor Control Board of Ontario.
- Lupton, D. (1994). Consumerism, commodity culture and health promotion. Health Promotion International, *9*, 111-118.
- Mackesy-Amiti, M. E., Fendrich, M., & Goldstein, P. J. (1997). Sequence of drug use among serious drug users: Typical vs atypical progression. Drug and Alcohol Dependence, *45*, 185-196.
- MacKinnon, D. P., Anderson Johnson, C., Pentz, M. A., Dwyer, J. H., Hansen, W. B., Flay, B. R., & Wang, E. Y. (1991). Mediating mechanisms in a school-based drug prevention program: First-year effects of the Midwestern Prevention Project. Health Psychology, *10*, 164-172.
- Malouff, J., Schutte, N., Frohardt, M., Deming, W., & Mantelli, D. (1992). Preventing smoking: Evaluating the potential effectiveness of cigarette warnings. The Journal of Psychology, *126*, 371-383.
- Mann, R. E., & Smart, R. G. (1997). Can school alcohol education programmes contribute to declines in drinking among students? Drugs: Education, Prevention, and Policy, *4*, 131-137.
- Mann, R. E., Stoduto, G., Anglin, L., Pavic, B., Fallon, F., Lauzon, R., & Amitay, O. A. (1997). Graduated licensing in Ontario: Impact of the 0 BAL provision on adolescents' drinking-

- driving. In C. Mercier Guyon (Ed.), Alcohol, drug and traffic safety - T'97 (pp. 1055-1060). Annecy, France: Centre d'Etudes et de Recherche en Medecine du Traffic, Annecy.
- Marlatt, G. A., & Baer, J. S. (1997). Harm reduction and alcohol abuse: A brief intervention for college-student binge drinking. In P. G. Erikson, D. M. Riley, Y. W. Cheung, & P. A. O'Hare (Eds.), Harm reduction: A new direction for drug policies and programs (pp. 245-262). Toronto: University of Toronto Press.
- Marlatt, G. A., Baer, J. S., & Larimer, M. (1995). Preventing alcohol abuse in college students: A harm-reduction approach. In G. M. Boyd, J. Howard, & R. A. Zucker (Eds.), Alcohol problems among adolescents: Current directions in prevention research (pp. 147-172). Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.
- Marshman, J. A., Torrance, G. W., Boyle, M., Walker, D., Cordingley, J., & Dini, C. (1995). Economic evaluation of a substance abuse secondary prevention project (NHRDP Project No. 6606-4868-62). Ottawa: Health Canada.
- Mayhew, D. R., & Simpson, H. M. (1990). New to the road. Young drivers and novice drivers: Similar problems and solutions? Ottawa: Traffic Injury Research Foundation of Canada.
- McCracken, G. (1992). "Got a smoke?": A cultural account of tobacco in the lives of contemporary teens. Research Report. Toronto: Ontario Ministry of Health.
- Michell, L., & West, P. (1996). Peer pressure to smoke: The meaning depends on the method. Health Education Research: Theory and Practice, *11*, 39-49.
- Mirzaee, E., Kingery, P. M., Pruitt, B. E., Heuberger, G., & Hurley, R. S. (1991). Sources of drug information among adolescent students. Journal of Drug Education, *21*, 95-106.
- Moore, M. H., & Gerstein, D. R. (Eds.). (1981). Alcohol and public policy: Beyond the shadow of prohibition. Washington DC: National Academy Press.
- Moskowitz, J. M. (1989). The primary prevention of alcohol problems: A critical review of the research literature. Journal of Studies on Alcohol, *50*, 54-88.
- Moskowitz, J. M. (1993). Why reports of outcome evaluations are often biased or uninterpretable: Examples from evaluations of drug abuse prevention programs. Evaluation and Program Planning, *16*, 1-9.
- Murray, C. J. L., & Lopez, A. D. (1996) Quantifying the burden of disease and injury attributable to ten major risk factors. In C. J. L. Murray & A. D. Lopez (Eds.), The global burden of disease: A comprehensive assessment of mortality and disability from diseases, injuries, and risk factors in 1990 and projected to 2020 (pp. 295-324). Cambridge, MA: Harvard School of Public Health.
- Murray, D. M., Prokhorov, A. V., & Harty, K. C. (1994). Effects of a statewide antismoking campaign on mass media messages and smoking beliefs. Preventive Medicine, *23*, 54-60.
- Nelson-Simley, K., & Erickson, L. (1995). The Nebraska "Network of Drug-Free Youth" program. Journal of School Health, *65*, 49-53.
- Newcomb, M. D., & Bentler, P. M. (1988). Impact of adolescent drug use and social support on problems of young adults: A longitudinal study. Journal of Abnormal Psychology, *97*, 64-75.
- Norman, E., Turner, S., Zunz, S. J., & Stillson, K. (1997). Prevention programs reviewed: What works? In E. Norman (Ed.), Drug-free youth: A compendium for prevention specialists (pp. 22-45). New York: Garland Publishing.



- O'Malley, P. M., & Wagenaar, A. C. (1991). Effects of minimum drinking age laws on alcohol use, related behaviors, and traffic crash involvement among American youth: 1976-1987. Journal of Studies on Alcohol, *52*, 478-491.
- Orlandi, M. O. (1996). Prevention technologies for drug-involved youth. In C. B. McCoy, L. R. Metsch, & J. A. Inciardi (Eds.), Intervening with drug-involved youth (pp. 81-100). Thousand Oaks, CA: Sage.
- Paglia, A., de Groh, M., & Pederson, L. L. (1996). Beliefs and attitudes. In S. Stephens & M. Morin (Eds.), Youth smoking survey, 1994: Technical report (pp. 93-119). Ottawa: Minister of Supply and Services Canada.
- Paglia, A., de Groh, M., Rehm, J., & Ferrence, R. (1996). Knowledge of health risks. In S. Stephens & M. Morin (Eds.), Youth smoking survey, 1994: Technical report (pp. 121-151). Ottawa: Minister of Supply and Services Canada.
- Paglia, A., & Room, R. (forthcoming). How unthinkable and at what age? Adult opinions about the "social clock" of contested behaviours by teenagers. Journal of Youth Studies.
- Peele, S. & Brodsky, A. (1997). Gateway to nowhere: How alcohol came to be scapegoated for drug abuse. Addiction Research, *5*, 419-426.
- Pentz, M. A. (1986). Community organizations and school liaisons: How to get programs started. Journal of School Health, *56*, 382-388.
- Pentz, M. A. (1995). Local government and community organization. In R. H. Coombs & D. Ziedonis (Eds.), Handbook on drug abuse prevention: A comprehensive strategy to prevent the abuse of alcohol and other drugs (pp. 69-120). Boston: Allyn and Bacon.
- Pentz, M. A., Brannon, B. R., Charlin, V. L., Barrett, E. J., MacKinnon, D. P., & Flay, B. R. (1989). The power of policy: The relationship of smoking policy to adolescent smoking. American Journal of Public Health, *79*, 857-862.
- Pentz, M. A., Dwyer, J. H., MacKinnon, D. P., Flay, B. R., Hansen, W. B., Wang, E. Y. I., & Johnson, C. A. (1989). A multicomunity trial for primary prevention of adolescent drug abuse. Journal of the American Medical Association, *261*, 3259-3266.
- Perry, C. L., & Grant, M. (1988). Comparing peer-led to teacher-led youth alcohol education in four countries. Alcohol Health and Research World, *12*, 322-326.
- Perry, C. L., & Kelder, S. H. (1992). Models for effective prevention. Journal of Adolescent Health, *13*, 355-363.
- Perry, C. L., Williams, C. L., Forster, J. L., Wolfson, M., Wagenaar, A. C., Finnegan, J. R., McGovern, P. G., Veblen-Mortenson, S., Komro, K. A., & Anstine, P. S. (1993). Background, conceptualization, and design of a community-wide research program on adolescent alcohol use: Project Northland. Health Education Research: Theory and Practice, *8*, 125-136.
- Perry, C. L., Williams, C. L., Komro, K. A., Veblen-Mortenson, S., Forster, J. L., Bernstein-Lachter, R., Pratt, L. K., Munson, K. A., & Farbaksh, K. (February, 1998). Project Northland -- Phase II: Community action to reduce adolescent alcohol use. Paper presented at the Fourth Symposium on Community Action Research and the Prevention of Alcohol and Other Drug Problems: A Kettil Bruun Society Thematic Meeting, Russell, New Zealand.
- Perry, C. L., Williams, C. L., Veblen-Mortenson, S., Toomey, T. L., Komro, K. A., Anstine, P.

- S., McGovern, P. G., Finnegan, J. R., Forster, J. L., Wagenaar, A. C., & Wolfson, M. (1996). Project Northland: Outcomes of a communitywide alcohol use prevention program during early adolescence. American Journal of Public Health, *86*, 956-965.
- Polhemus, T. (1994). Street style: From sidewalk to catwalk. London: Thames and Hudson.
- Popham, W. J., Potter, L. D., Hetrick, M. A., Muthen, L. K., Duerr, J. M., & Johnson, M. D. (1994). Effectiveness of the California 1990-1991 Tobacco Education Media Campaign. American Journal of Preventive Medicine, *10*, 319-326.
- Poulin, C. (1996). Nova Scotia student drug use 1996: Technical report. Halifax, NS: Nova Scotia Department of Health and Dalhousie University.
- Ramstrom, L. M. (March, 1997). Nicotine delivery systems: Snuff. Paper presented at the Alternative Nicotine Delivery Systems: Harm Reduction and Public Health Workshop, Toronto, Canada.
- Poulin, C., & Elliott, D. (1997). Alcohol, tobacco and cannabis use among Nova Scotia adolescents: Implications for prevention and harm reduction. Canadian Medical Association Journal, *156*, 1387-1393.
- Redman, S., Spencer, E. A., & Sanson-Fisher, W. (1990). The role of mass media in changing health-related behaviour: A critical appraisal of two models. Health Promotion International, *5*, 85-101.
- Rigotti, N. A., DiFranza, J. R., Chang, Y., Tisdale, T., Kemp, B., & Singer, D. E. (1997). The effect of enforcing tobacco-sales laws on adolescents' access to tobacco and smoking behavior. New England Journal of Medicine, *337*, 1044-1051.
- Room, R. (1974). Minimizing alcohol problems. Alcohol Health and Research World, preview issue, 12-17.
- Room, R. (1990). Community action and alcohol problems: the demonstration project as unstable mixture. In N. Giesbrecht et al., (Eds.), Research, action and the community: Experiences in the prevention of alcohol and other drug problems (OSAP Prevention Monograph No. 4, pp. 1-25). Rockville, MD: Office of Substance Abuse Prevention.
- Room, R. (1994). Adolescent drinking as collective behavior and performance. In R. Zucker, G. Boyd, & J. Howard (Eds.), The development of alcohol problems: Exploring the biopsychosocial matrix of risk (NIAAA Research Monograph No. 26, pp. 205-208). Rockville, MD: U.S. Department of Health and Human Services.
- Rooney, B. L., & Murray, D. M. (1996). A meta-analysis of smoking prevention programs after adjustment for errors in the unit of analysis. Health Education Quarterly, *23*, 48-64.
- Ross, J. G., Einhou, K. E., Hohenemser, L. K., Greene, B. Z., Kann, L., & Gold, R. S. (1995). School health policies prohibiting tobacco use, alcohol and other drug use, and violence. Journal of School Health, *65*, 333-338.
- Saffer, H., & Grossman, M. (1987). Beer taxes, the legal drinking age, and youth motor vehicle fatalities. Journal of Legal Studies, *16*, 351-374.
- Saltz, R. F., Holder, H. D., Grube, J. W., Gruenewald, P. J., & Voas, R. B. (1995). Prevention strategies for reducing alcohol problems including alcohol-related trauma. In R. R. Watson (Ed.), Drug and Alcohol Abuse Reviews: No. 7. Alcohol, cocaine, and accidents (pp. 57-83). Totowa, NJ: Humana Press.
- Schroeder, D. S., Laflin, M. T., & Weis, D. L. (1993). Is there a relationship between self-esteem

- and drug use? Methodological and statistical limitations of the research. Journal of Drug Issues, *23*, 645-665.
- Schulenberg, J., O'Malley, P. M., Bachman, J. G., Wadsworth, K., & Johnston, L. D. (1996). Getting drunk and growing up: Trajectories of frequent binge drinking during the transition to young adulthood. Journal of Studies on Alcohol, *57*, 289-304.
- Shedler, J., & Block, J. (1990). Adolescent drug use and psychological health: A longitudinal inquiry. American Psychologist, *45*, 612-630.
- St. Pierre, T. L., Mark, M. M., Kaltreider, D. L., & Aikin, K. J. (1997). Involving parents of high-risk youth in drug prevention: A three-year longitudinal study in Boys & Girls Clubs. Journal of Early Adolescence, *17*, 21-50.
- Sweanor, D. T., Martial, L. R., & Dossetor, J. B. (1993). The Canadian tobacco tax experience: A case study. Ottawa: The Non-Smokers' Rights Association and The Smoking and Health Action Foundation.
- Sweedler, B. M., & Stewart, K. (1993). Comprehensive program needed to reduce youth DWI. In H. D. Utzelmann, G. Berghaus, & G. Kroj (Eds.), Alcohol, drugs and traffic safety - T'92 (pp. 1161-1166). Cologne: Verlag TUV Rheinland.
- Thornton, S. (1995). Club cultures: Music, media and subcultural capital. Cambridge, UK: Polity.
- Tobler, N. S. (1986). Meta-analysis of 143 adolescent drug prevention programs: Quantitative outcome results of program participants compared to a control or comparison group. Journal of Drug Issues, *16*, 537-567.
- Tobler, N. S. (1992). Drug prevention programs can work: Research findings. Journal of Addictive Diseases, *11*, 1-28.
- Tobler, N. S. & Stratton, H. H. (1997). Effectiveness of school-based drug prevention programs: A meta-analysis of the research. The Journal of Primary Prevention, *18*, 71-128.
- U.S. Department of Health and Human Services. (1994). Preventing tobacco use among young people: A report of the Surgeon General. Washington, DC: Public Health Services.
- Wagenaar, A. C. (1993). Minimum drinking age and alcohol availability to youth: Issues and research needs. In M. E. Hilton & B. Bloss (Eds.), Economics and the prevention of alcohol-related problems. (NIAAA Research Monograph No. 25, pp. 175-200). Rockville, MD: U. S. Department of Health and Human Services.
- Wagenaar, A. C., Gehan, J. P., Jones-Webb, R., Wolfson, M., Toomey, T. L., Forster, J. L., & Murray, D. M. (February, 1998). Communities mobilizing for change on alcohol: Experiences and outcomes from a randomized community trial. Paper presented at the Fourth Symposium on Community Action Research and the Prevention of Alcohol and Other Drug Problems: A Kettil Bruun Society Thematic Meeting, Russell, New Zealand.
- Wagenaar, A. C., Murray, D. M., Wolfson, M., Forster, J. L., & Finnegan, J. R. (1994). Communities mobilizing for change on alcohol: Design of a randomized community trial. Journal of Community Psychology, (CSAP Special Issue), 79-101.
- Warner, J., Adlaf, E., & Room, R. (1997). What the numbers don't show: How high-school students set limits on their use of marijuana. Manuscript submitted for publication.
- Wilks, J. (1992). Adolescent views on risky and illegal alcohol use. Drug and Alcohol Review, *11*, 137-143.
- Windle, M., Thatcher Shope, J., & Bukstein, O. (1996). Alcohol use. In R. J. DiClemente, W. B.

- Hansen, & L. E. Ponton (Eds.), Handbook of adolescent health risk behavior (pp. 115-159). New York: Plenum.
- Wyllie, A., Zhang, J. F., & Casswell, S. (1998). Responses to televised alcohol advertisements associated with drinking behaviour of 10-17-year-olds. Addiction, *93*, 361-371.
- Xie, X., Rehm, J., Single, E., & Robson, L. (1996). The economic costs of alcohol, tobacco and illicit drug abuse in Ontario: 1992. (Research Document No. 127). Toronto: Addiction Research Foundation.
- Yamaguchi, K., & Kandel, D. B. (1984a). Patterns of drug use from adolescence to young adulthood: II. Sequences of progression. American Journal of Public Health, *74*, 668-672.
- Yamaguchi, K., & Kandel, D. B. (1984b). Patterns of drug use from adolescence to young adulthood: III. Predictors of progression. American Journal of Public Health, *74*, 673-681.
- Zunz, S. J. (1997). School climate and community norm change. In E. Norman (Ed.), Drug-free youth: A compendium for prevention specialists (pp. 47-94). New York: Garland Publishing.

Table 1. Indicators of health harm from alcohol, tobacco and drugs for youth in Ontario, 1992: Days of hospital stay, and person-years of life lost (Xie et al., 1996).

	Aged 10-19			Aged 20-24			All Ages		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
	<b>Days of Hospital Stay:</b>								
Alcohol	6,506	4,093	10,599	9,461	3,986	13,447	225,847	109,184	335,031
Tobacco	1,397	1,932	3,329	1,841	3,837	5,678	596,414	411,233	1,007,647
Illicit Drugs	1,156	292	1,448	1,994	864	2,858	11,258	6,906	18,164
	<b>Person-Years of Life Lost from Deaths in the Age Group:</b>								
Alcohol	3,999	1,485	5,484	4,643	1,088	5,731	44,942	16,805	61,747
Tobacco	182	73	255	230	202	432	109,801	61,642	171,443
Illicit Drugs	321	115	436	483	80	563	7,752	1,532	9,284

Table 2. A summary of adverse effects on health for heavy users of the most harmful common form of each of four drugs (Hall et al., 1998).

	Marijuana	Alcohol	Tobacco	Heroin
Traffic and other accidents	*	**		*
Violence and suicide		**		
Overdose death		*		**
HIV and liver infections		*		**
Liver cirrhosis		**		
Heart disease		*	**	
Respiratory diseases	*		**	
Cancers	*	*	**	
Mental illness	*	**		
Dependence/Addiction	**	**	**	**
Lasting effects on the fetus	*	**	*	*

\*\* = important effect

\* = less common or less well-established effect