Effectiveness of School-Based Interventions in Reducing Adolescent Risk Behaviour: A Systematic Review of Reviews

Chronic Diseases & Injuries
Chronic Disease Prevention
Injury Prevention Including Substance Abuse Prevention

Family Health
Sexual Health

Infectious Diseases
Sexually Transmitted Diseases (STDs) including HIV/AIDS

March 1999
Effective Public Health Practice Project

Effectiveness of School-Based Interventions in Reducing Adolescent Risk Behaviour: A Systematic Review of Reviews

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8. Brant County Health Unit
To determine the effectiveness of interventions included in the Mandatory Health Programs and Services Guidelines (MHPSSG), the following systematic reviews were completed and funded by the Public Health Research, Education and Development (PHRED) Program of the Public Health Branch, Ontario Ministry of Health.

1998 – 1999

- Health Hazard Investigation
  - Emergency Response to Acute Environmental Hazards
  - Strategies to Enhance Public Awareness of Environmental Risks

- Chronic Diseases and Injuries
  - Chronic Disease Prevention
    - Community interventions to Enhance Fruit and Vegetable Consumption
    - Use of Coalitions in Heart Health, Tobacco Use Reduction and Injury Prevention
    - Community-Based Heart Health Programs
    - School-Based Adolescent Risk Behaviour Prevention Programs

- Family Health
  - Sexual Health
    - Adolescent Pregnancy Prevention Strategies
  - Child Health
    - Professionally Led Parenting Groups
    - Peer/Paraprofessional 1:1 Interventions in Improving Maternal/Child Health
    - Public Health Nurse Home Visiting
    - Curriculum Suicide Prevention Programs for Adolescents

- Infectious Diseases
  - Day Care Centre Infection Control Interventions
  - Adolescent STD Prevention Strategies

1999 – 2000

- Chronic Diseases and Injuries
  - Chronic Disease Prevention
    - Postpartum Smoking
    - Relapse Prevention Strategies
    - Cervical Cancer Screening Interventions

- Injury Prevention
  - Anticipatory Care Interventions with Community Dwelling Elderly

- Family Health
  - Sexual Health
    - Youth to Youth Peer Health Promotion
  - Child Health
    - Healthy Feeding in Infants Under One Year of Age
    - Injury Prevention in Children & Adolescents

- Infectious Diseases
  - Needle Exchange Programs
  - Online Computer Support Groups for Adults

The conclusions of the reviews are based on the available evidence. They do not necessarily represent the views of the Public Health Branch, Ontario Ministry of Health. This report may be copied for circulation as appropriate. Please ensure that the PHRED Program, Public Health Branch, Ontario Ministry of Health is acknowledged.
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Lydia Napper’s commitment to completion of the formatting of this paper and vigilance over a myriad of details has been outstanding and truly appreciated.
The Public Health Branch of the Ontario Ministry of Health released new Mandatory Health Programs and Services Guidelines (MHPSG) in December 1997. Although the MHPSG provide guidelines for a wide range of public health practices in Ontario, the strength of evidence for many of the guidelines has not been summarized in a systematic way.

In 1998-1999, the Public Health Branch provided funding for the Effective Public Health Practice Project. The mandate of the project was to complete 15 summary statements based upon systematic reviews of the effectiveness of specific requirements of the MHPSG. Each review was linked to one of the three general standards or three program standards. The reviews summarize the best available research evidence for public health practice in these areas. Research evidence is one piece of information needed to inform decision making in public health. Other factors, such as the local environment, local priorities, and available resources are also important.

The reviews were completed by review groups composed of members of the Ontario Public Health Research, Education and Development (PHRED) Program Health Units as well as representatives from other Health Units around the province. The PHRED Provincial Steering Committee has overseen the project.

Potential review topics were initially identified through a survey of public health practitioners and managers across Ontario. Each review group followed a systematic approach that included comprehensive search strategies and quality assessment of each primary research study selected for inclusion in the review.

One of the primary objectives in completing this work was to ensure that it is relevant to public health practitioners in the field. We contacted all Medical Officers of Health and asked for volunteer experts. The response was tremendous and more than 100 practitioners and managers from over 90% of health units across Ontario agreed to take on the role of peer reviewers for the draft reports.

This project already has had many benefits. Public Health professionals have developed skills in completing systematic reviews and have increased awareness of the importance and feasibility of evidence-based practice. Through this project, we have established new links with the Cochrane Collaboration. We hope that several reviews will be registered with the various Cochrane Review Groups, making them accessible to the international public health community. Finally, the process of completing this project has contributed to the development of a strong province-wide network of public health professionals.
Using School-Based Programs to Reduce Adolescent Risk Behaviour

Public Health Mandate
Through the Mandatory Health Programs and Services Guidelines (1997), Public Health Units are responsible for reducing/eliminating adolescent risk behaviours including smoking, alcohol and other drug abuse, and unsafe sexual activity.

Background
Although overall smoking rates have declined among Canadian youth, they have declined more rapidly among males than females. By age 19 years, 21% of youth smoke. Among those 15-19 years of age, 22% report drinking one to seven drinks a week. Pregnancy rates that were declining in this population have recently started to increase. In 1995, the rate for pregnancy among 15-19 year olds was 49/1,000. Rates of chlamydia among females in particular are also increasing. At ages 15-19 years 1210/100,00 females and 190/100,000 males were diagnosed with chlamydia.

Issue
The greatest threat to adolescent health results from short and long term consequences of adolescent risk behaviours. Because these lifestyle behaviours, begun in adolescence, tend to continue into adulthood, they pose serious threats to adult health. These behaviours tend to cluster within particular adolescents or groups of adolescents.

Finding the Answers
Recently, a systematic review of published reviews over the last ten years was completed. The authors summarized the results of the 18 strong reviews identified. Of these, eight are related to smoking/drug use prevention, six are related to sexual risk behaviour prevention, and four are related to emotional/behavioural problem prevention.

What’s the Evidence?
- Drug use prevention programs and sexual risk reduction programs have been more comprehensively evaluated than emotional/behavioural problem prevention programs.
• Knowledge based didactic programs have no effect on behaviour.
• Interactive programs are more effective than non-interactive ones.
• Interactive programs based on social learning theory, including developmental, social norms and social reinforcement are most effective.
• Results are modest.
• Some programs work for some subgroups of youth (e.g. programs focused on delaying initiation of sexual activity among the uninitiated).

Implications for Practice and Research
• Successful programs should be implemented.
• Timing of program implementation is important. Programs seem to work best for those who are not yet engaging in the behaviours or for very high-risk adolescents.
• The role of booster sessions after program completion appears important, although the timing and frequency to produce positive effects is unclear.
• When moving programs from a research project to school programming, assuring the integrity of the program is important, if it is to continue to be effective. This requires adequate training and monitoring of those delivering it. Public Health practitioners have the knowledge and group facilitation skills to deliver these programs.
• Programs should not be implemented without the resources to adequately conduct them.
• The effectiveness of interactive programs compared with interactive programs plus community-wide programs needs to be assessed.
• Because the successful programs do not focus on the behaviour per se, but on skill development to resist the activity, generic programs that address all risk behaviours could be developed (including sections related to the specific behaviours) and evaluated. This would streamline current programs and free up school time.
• Strategies to focus on high-risk youth need to be developed and evaluated.
• Agencies funding research should collaborate in funding projects to address adolescent risk in general.
• Future research should focus on behaviour change, not on knowledge acquisition or attitude change.
• Only projects with rigorous scientific methodology should be funded.

More Sources of Information


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Public Health Mandate
Through the Mandatory Health Programs and Services Guidelines (1997), Public Health Units are responsible for reducing/eliminating adolescent risk behaviours including smoking, alcohol and other drug abuse, and unsafe sexual activity.

What’s the Evidence?
- Some programs are effective, even though the results are modest.
- Knowledge-based didactic programs have no effect on behaviour.
- Interactive programs are more effective than non-interactive ones.

Implications
- Effective programs should be implemented, provided adequate resources are available.
- When moving programs from a research project to school programming, assuring the integrity of the program is important, if it is to continue to be effective. This requires adequate training and monitoring of those delivering it. Public Health practitioners have the knowledge and group facilitation skills to deliver these programs.
• Because the successful programs do not focus on the behaviour per se, but on skill development to resist the activity, generic programs that address all risk behaviours could be developed (with sections related to the specific behaviour) and evaluated. This would streamline current programs and free up school time.
• Agencies funding research should reduce funding by risk behaviour and collaborate in funding projects to address adolescent risk in general.
• Only projects with rigorous scientific methodology should be funded.

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ABSTRACT

Objectives
There were two objectives of this systematic review of reviews. The first objective was to determine the effectiveness of school-based prevention programs in reducing adolescent risk behaviours (i.e. smoking, alcohol and other drug abuse, sexual risk behaviours and emotional/behavioural problems). The second objective was to make recommendations for public health practice based on results.

Methods
Seven electronic databases were searched from 1987-1998. Seven relevant peer reviewed journals (1994-1997) were hand searched. All relevant references from the articles were also retrieved. Standardized pretested tools were used by two reviewers to independently rate each review for relevance and quality assessment. Data extraction was also completed independently by two people using a standardized form.

Results
The results of 18 methodologically strong reviews are presented. Drug use prevention programs and sexual risk reduction programs have been more comprehensively evaluated than emotional/behavioural problem prevention programs. Didactic, knowledge-based programs have no effect on behaviour. Interactive programs are more effective in changing behaviour than non-interactive ones. Interactive programs based on social learning theory, including developmental, social norms and social reinforcement are most effective. Some programs work for some subgroups of youth. Overall, the effective programs result in modest changes.

Conclusions
Successful programs should be implemented, provided adequate resources are available to adequately train and monitor those delivering them. Generic programs that address all risk behaviours could be developed (including sections related to the specific behaviours) and evaluated. Strategies focused on high-risk youth need to be developed and evaluated. Future research in these areas should use rigorous scientific methodology and should focus on behaviour change, not on knowledge acquisition or attitude change.
BACKGROUND

Introduction

The greatest threat to adolescent health results from short or long-term consequences of what have been labelled risk behaviours (e.g. smoking, alcohol abuse, illicit drug use, unprotected sex, and delinquency). There is a growing body of empirical literature indicating that these risk behaviours do not occur independently, but tend to cluster within particular adolescents or groups of adolescents (Allison, 1992; Pate et al., 1996; Tubman et al., 1996). As well, several theoretical frameworks have been developed to explain this clustering phenomena (Arnett, 1992; Graber et al., 1995; Jessor, 1991; Petraitis et al., 1995).

Results from an American study comparing the overlap of delinquency, alcohol/drug use, and sexual activity in Denver, indicated that among youths 13-17 years, 25.7% of males and 15.3% of non-pregnant females and 54.3% of pregnant females engaged in all three activities (Huizinga et al., 1993). Among males, 18.5% engaged in none of the activities. For females the rate of non-engagement was 25.8%. Higher rates for males than females for engaging in delinquency and sexual activity were also reported. Females reported higher rates of engaging in alcohol/drug use and sexual activity than males (Huizinga et al., 1993). No comparable Canadian data for this age group were located. However, results of the Ontario Health Survey among 15-24 year olds indicate that 49% of individuals who reported using tobacco also use one or more other drugs (i.e., alcohol, marijuana, illegal drugs), 60.3% who used alcohol used one or more other drugs, 81% who used marijuana used other drugs, and 92% of those using other illegal drugs used one or more of the others (Ontario Ministry of Health, 1992).

Smoking tobacco and alcohol consumption among youth have been extensively studied. Over the last decade, smoking rates have declined among Canadian youth. Interestingly, they have declined more rapidly among males than females. Smoking rates among females aged 15 years (18%) are higher than among males (13%). By 19 years of age the smoking rates are equal between females and males (21%) (Hanvey et al., 1994). Alcohol continues to be the most commonly used substance among adolescents. Twenty-two per cent of Canadian males and 16% of females between 15-19 years of age reported drinking one to seven drinks a week. Males drink more than females in that they reported an average of 5.8 drinks per week compared to 1.8 for females. Among adolescents as young as 13 years of age, 14% of males and 7% of females reported having been drunk at least once (Hanvey et al., 1994).

Among those 15 to 19 years of age, 57% of females reported at least one experience of sexual intercourse in 1990 (Thomas et al., 1997). It is disturbing to note that, in spite of the vast resources directed to educational and other programs, 26% of young women continued to report not using any form of protection during intercourse. Since 1988, pregnancy rates among Ontario females 15-19 years of age have been increasing. In 1995, the rate was 48.7 pregnancies per 1,000. Of these, 46.1% resulted in live births and 50.8% were terminated by abortion. The remaining 3.1% were fetal losses including stillbirths and miscarriages (Kim, 1998).

As well, rates of sexually transmitted diseases (STDs) among female adolescents are climbing. According to Canadian statistics for 1994, rates of chlamydia (the most common STD) were three times higher among females than among males (Statistics
Canada, 1996). The higher rates among females are likely due to the fact that more females than males are screened for the disease. Among those 10-14 years of age, the rates were 30.7 per 100,000. At ages 15-19 years, the rates were 1210.8 per 100,000 for females and 190.3 per 100,000 for males (Statistics Canada, 1996).

Another risk behaviour in which adolescents engage is delinquency. The most reliable source of rates of Canadian delinquent behaviour is a study carried out by the Department of Justice (Hung et al., 1993). Most of the reported crimes are committed by males. Almost one in ten came into contact with the police for violations of the Criminal Code and other federal statutes. Most crimes were against property. Although there is a great deal of public discussion about the increase in violent crime among youth, the statistics do not bear this out. Violent crime is decreasing among this age group.

School bullying and other forms of confrontation appear to be increasing, but no reliable national data were located.

There is vast peer-reviewed literature about the effectiveness of interventions within the scope of public health practice that address adolescent risk behaviour. Public Health Units have tried to incorporate the relevant literature into their practice. However, this is challenging, given the variety of target populations, interventions and outcomes described. Recently a number of systematic reviews or meta-analyses of the intervention literature have appeared. Although the methodologies differ somewhat and there is some on-going discussion about the limitations of this type of summary, they have advantages. They employ several strategies to minimize the bias of the results: clearly state the question; report the process used to comprehensively identify the relevant literature; explicitly state the criteria for study inclusion, often including only studies that have comparison groups; assess the validity of the primary studies using preset criteria; analyze the variation in the findings of the relevant studies; combine the findings appropriately; and, assure that the reviewers' conclusions are supported by the data (Oxman et al., 1988; Robinson, 1995). When the target populations, interventions and outcomes are similar, the results may be combined statistically to produce a single estimate of effectiveness called an effect size. This process is known as a meta-analysis. If combining the results numerically does not seem sensible, or numbers are not available, results are integrated into a systematic review (Sackett, 1997).

**Review Questions**

Through a systematic review of reviews of school-based prevention programs, this paper will answer the following questions:

1. Are school-based prevention programs effective in reducing adolescent risk behaviours (i.e., smoking, alcohol and other drug abuse, sexual risk behaviours and emotional/behavioural problems)?

2. Based on the results of this review, what recommendations can be made for future public health practice?

This work was completed by ten Program Managers in Child and Adolescent Health from seven Central West Health Units in collaboration with a Public Health Research, Education and Development (PHRED) consultant and a staff member from the Hamilton-Wentworth Public Health Effectiveness Project.
METHODS

Search Strategy
The following computer databases were searched from 1987-1998: MEDLINE; CINAHL; ERIC; PSYCHINFO; SOC. SCIENCE INDEX; DISSERTATION ABSTRACTS and, the Public Health Effectiveness Project (n>4500 articles) maintained by our research group. An example of the terms used in the electronic searching (MEDLINE) is displayed in Table 1. Only English articles were retrieved. Seven relevant peer-reviewed journals (1994 – 1997) were hand searched (Table 2). Reference lists in all retrieved articles were reviewed and the relevant citations were retrieved.

Relevance and Quality Assessment Testing
Four relevance criteria were developed and pretested by the group to reflect the topic and the scope of public health practice. They included:

- the article is a review (narrative, systematic, meta-analysis);
- school-age youth or adolescents are the population of the review;
- risk behaviours targeted in the review include one or more of smoking, alcohol use/abuse, early or unprotected sexual activity, poor nutrition, limited/inappropriate exercise, drug use/abuse, violence/conduct disorder, suicide attempts, depressive behaviour, poor school achievement/drop-out; and
- one or more of a number of specific interventions (i.e., consumer participation, community development, consumer advocacy, health education, sex education, health promotion, primary prevention, use of peer groups led by peers, professionals or trained volunteers, and school health services) were described.

Articles were considered relevant if they met all four of the criteria. Following the guidelines set out by Sackett (Sackett et al., 1991) and others (DuRant, 1994), a quality assessment tool was developed and pretested. The six criteria for quality assessment were:

- Did the authors describe the search strategy?
- Was the search comprehensive (at least two databases and a reference list)?
- Did the authors describe the level of evidence in the primary studies?
- Did the authors assess the primary studies beyond the level of evidence?
- Did the quality assessment of primary studies include at least four of the nine predetermined criteria?
- Does the review integrate the findings beyond describing or listing primary study results?
- Are the reported data adequate to support the conclusions?
Ten Program Managers were involved in rating the articles. At the outset, after the development of the tools, all Program Managers independently rated five articles and met to discuss the ratings. Subsequently, all articles were rated independently by two readers. Discrepancies in ratings were discussed and resolved by consensus. If the readers could not agree, a third independent reader (HT) rated the articles. Relevant articles were assessed for quality assessment and rated *strong* if they met six or seven of the criteria, *moderate* if they met four or five, and *weak* if they scored three or less.

**Data Extraction**

A standardized instrument for data extraction was developed and pretested by three members of the group. It was based on knowledge of the information available and information necessary to answer the research question. It included the years for which the data were collected, the number of primary studies included, the type of review, the target population, the setting of the interventions, and the outcomes. Theoretical orientation(s) of the programs, which were adapted from the work of several of the authors were also noted (Bruvold, 1990; Tobler et al., 1997). The program orientations included knowledge (lectures focused on the risk behaviour), social influences/social norms (e.g., peers, family, media, resistance skills, and behavioural norms), social skills programs (e.g., problem solving, anger control, coping skills, social skills, and assertiveness skills), and an ‘other’ category. The topics included were the same as those listed in the third relevance criteria outlined earlier. Intervention strategies that reflected those found in the literature and relevant to public health practice were also included (fourth relevance criteria, page 11). Outcome measures included academic performance, attitudes, behaviour intentions, knowledge, mental health change, risk behaviour change, and social competence. Finally, results and recommendations were summarized.

Data were extracted independently by two people from all the *strong* reviews. The results from the *moderate* and *weak* reviews were not included because they had several limitations. The most common weaknesses were incomplete or missing search strategies and failure to assess the quality of the primary studies contained within the reviews.

**RESULTS**

The results of the search activities and the relevance and quality assessment are displayed in Figure 1. Two hundred and eighty two articles were retrieved. Of these, 120 met the relevance criteria. Quality rating resulted in 18 strong, 28 moderate, and 74 weak review articles.

Only the details of the 18 strong reviews are reported here (Table 3). The methodological strength of the studies included in the reviews varied. The review by Stout and Rivara (1989) did not include any randomized controlled trials (RCTs). Those by Kim et al. (1997) and Ploeg et al. (1996) included both RCTs, non-randomized trials and cohort studies. Of the strong reviews, 72% were completed by Americans, and the remainder by Canadians. All three types of reviews were found: 50% were meta-analyses; 39% were systematic reviews; and the remainder were narrative summaries. The number of primary studies included in each strong review ranged from 3-120, with an average of 41 per review. The length of time used to identify studies for inclusion in the reviews ranged from four to 29 years, with half covering at least ten years. All of the
reviews but four included only studies that targeted either elementary or secondary students or both. Two included college students, and two included both schools and youth in the community. Program sessions were led by a variety of professionals (e.g., nurses, psychologists, trained graduate nursing or psychology students, and trained teachers) or peers with professional support. The outcomes measured in the reviews varied and included combinations of attitude change, increased knowledge and actual behaviour change related to the target behaviour(s).

The studies have been divided into three sections. The first section, drug use prevention, includes all the reviews (n=8) of interventions related to smoking, alcohol use, and other drug use. The second section, sexual risk behaviour prevention (n=6), includes reviews of interventions to reduce sexual risk behaviours that lead to unintended pregnancy, sexually transmitted diseases and/or AIDS. One review of programs to reduce second pregnancy rates and other negative outcomes among adolescent mothers is also included here. The final section entitled, emotional/behavioural problem prevention (n=4) includes one review of suicide prevention programs, two reviews of strategies to improve child/adolescent social skills and peer relations, and one review of strategies to reduce conduct disorder.

**Drug Use Prevention**

Among the drug use prevention programs, some consistent results emerged. Although rational programs led to greater increases in knowledge than other types, they had the least impact on attitudes and behaviour change. Interactive programs using combinations of the other three approaches led to statistically significant reductions in alcohol, smoking and illicit drug use both immediately post-intervention and in long-term follow-up. However, the impact of all of the programs was reduced at long-term follow-up (e.g., one year). Smoking behaviour seemed the most difficult behaviour to change. In a meta-analysis of smoking prevention programs, Rooney & Murray (1996) concluded that overall effect sizes were modest and would result in approximately a five per cent reduction in smoking. When programs delivered early (i.e., sixth grade), using same-age peers in delivery, and part of a comprehensive health program with "booster" sessions in subsequent years were analyzed separately, they resulted in effect sizes of 0.50-0.80. This would be equal to 19%-29% reduction in smoking. Analyses of DARE (Drug Abuse Resistance Education), a well-developed, widely disseminated and currently used program indicated that it resulted in smaller changes in attitude and knowledge than interactive programs, but greater than non-interactive ones. Although it also improved social skills, it had no impact on the use of alcohol, tobacco or marijuana (Ennett et al., 1994).

**Sexual Risk Behaviour Reduction**

Programs focused on reducing sexual risk behaviour showed mixed results. Of the three effective programs identified by Oakley et al. (1995), the only one that measured behaviour change was not school-based. It involved adolescent runaways who were at high risk for HIV/AIDS.

Two programs positively impacted on knowledge and attitudes, but did not result in behaviour change. The only harmful program was one focused on abstinence. Results indicated that more males receiving the program initiated sexual activity by the end of the program. Using a different group of studies and slightly different methods to evaluate them, Kirby et al. (1994) concluded that none of the programs reviewed hastened sexual
activity. Nor did they reduce it among those who were already sexually active. All four of the RCTs reviewed by Kim et al. (1997) related to AIDS risk reduction, resulted in increased condom use at six and 12 month follow-up. O’Sullivan (1991) found that the short-term effectiveness of programs to reduce second pregnancies disappeared over the long-term.

**Emotional/Behavioural Problem Prevention**

The four reviews examining emotional/behavioural problem prevention included fewer studies than those in the other two sections. The review of the suicide prevention studies concluded that since most school-based prevention and postvention studies have been poorly evaluated and some had negative outcomes for males, more research is required before implementation of these programs (Ploeg et al., 1996). In the review of peer mediation/conflict resolution programs, Powell et al. (1995) could not locate any RCTs. The results of the three before/after studies and one case control study indicated some evidence that these programs can positively change attitudes towards violence, reduce the number of school disciplinary problems and reduce both teacher and student absenteeism. Schneider (1992) found that social skills training programs improved social skills and maintained this improvement over one year post-program follow-up. He recommended that because the interventions were very different, more research is required before these programs should be implemented. The review of conduct disorder programs (Offord et al., 1994) included only tertiary prevention programs targeting high risk groups who already had significant behaviour problems. These programs have been successful in improving peer interaction and decreasing aggression. Primary prevention programs in this area are underway and their results will hopefully appear soon in the peer-reviewed literature (Offord et al., 1994).

**DISCUSSION**

One of the issues in relation to public health practice is what constitutes an effective health promotion program. Although improving knowledge and changing attitudes are important, successful health promotion programs change behaviour. All programs related to the three risk behaviour areas improved knowledge. Changes in attitudes and behaviour were more difficult to achieve. One result of this review is the clear evidence of the lack of relationship between improved knowledge and behaviour change (Rundall et al., 1988). Since rational programs lead to the most improvement in knowledge and the least change in attitudes or behaviour, these are not effective health promotion strategies.

Social Learning Theory was the theoretical underpinning of the interventions used in most of the studies in the reviews. Most investigators used some method to classify programs. Bruvold (1993) provided a succinct framework for these classifications. He includes four classifications of the programs. Rational programs have as their predominant focus improving knowledge and then expecting students to change their behaviour accordingly. These programs usually consist of lectures, questions and answers, and displays of substances. Developmental programs focus on improving self-esteem and development of decision-making and interpersonal skills. Intervention strategies used in these programs include discussion, group problem solving, as well as lectures. They include little or no focus on drug use, except for the experiential exercises used to practice developing skills. Social norm programs focus on reducing boredom and alienation, and improving self-esteem. The additional strategies of participation in
community projects, vocational training, tutoring and recreational activities are incorporated with those used in developmental programs. Social reinforcement programs try to reduce social pressure through strategies which develop abilities to recognize it, developing resistance skills and identifying immediate social and physical consequences of the risk behaviour. These strategies include discussion, behaviour modeling, role playing, extended practice, and commitment not to engage in the behaviour (Bruvold, 1993). Tobler & Stratton (1997) divided programs into two types: interactive and non-interactive. Using Bruvold’s classification (1993), traditional, rational programs are non-interactive and all others (since many use overlapping strategies) are interactive.

School-based programs for drug use prevention and sexual risk behaviour prevention have been much more comprehensively evaluated than those for prevention of emotional/behavioural problems. At best, the results of the reviews for both drug use prevention and sexual risk behaviour prevention indicate that some strategies have positive short and long-term results with some groups. Interactive programs based on social learning theory have the largest effects (Bangert-Drowns, 1988; Bruvold, 1993; Rundall et al., 1988; Tobler et al., 1997).

Implementation of such programs could lead to reduced rates of the risk behaviours. Based on the evidence, Kirby et al. (1994), Tobler & Stratton (1997), and Bruvold (1993) agree that effective drug use prevention and sexual risk behaviour prevention programs have several attributes. They are based on Social Learning Theory. Although they all provide some knowledge regarding the risk behaviour, they provide it in an experiential manner that is meaningful to adolescents. They address developmental, social norms and social reinforcement by providing skills necessary to assess risk and avoid/resist the behaviours. They are implemented through a variety of interactive strategies.

The fact that many programs have larger effects with high risk groups or other subgroups adds credibility to the idea that youth are not a homogeneous group and that different prevention strategies are required with different groups. For example, some population-based strategies (e.g., knowledge about risks of engaging in the behaviour for the uninitiated) may be sufficient for low risk groups, but others may require more intense, sustained interventions. Programs directed at youth at different levels of risk need to be developed and rigorously evaluated.

Timing of program implementation is important. Sexual risk behaviour programs that tried to delay initiation of sexual activity were successful with those who were uninitiated (Kirby et al., 1994). Delaying the onset of smoking beyond 18 years of age has been shown to be one of the major predictors of adult non-smoking. Given this evidence, programs should begin at grade six or seven with boosters in later years.

To date, most of the research funding and focus of prevention program development has been on specific risk behaviours (i.e., one of smoking, alcohol abuse, and reducing sexual risk behaviours). The results of this review indicate that effective programs relating to many adolescent risk behaviours are based on skills development and recognizing and constructively dealing with social norms and pressures. It may be possible to develop and evaluate effective generic programs that could be used to reduce all risk behaviours. This would involve collaboration of the various agencies now developing single behaviour prevention programs. The potential increased efficiency of this initiative could result in directing resources to ensure the integrity of program implementation.
implementation in the ‘real’ world. One danger of moving programs from research projects that are adequately funded to the ‘real’ world is that they may be implemented in so many different ways that their integrity is not maintained. This could result in ineffective results. Another issue related to program integrity is the adequate training and supervision of professionals delivering the programs. This would be more efficient if the programs were targeting all behaviours instead of the current situation where different professionals deliver different programs. Public health practitioners could play a variety of roles in these programs. Given their skills, they could be the facilitators of groups with students, and the consultants to teachers as they develop the necessary knowledge and skills to implement programs. As well, they could play a meaningful role in developing and implementing rigorous evaluation programs. Finally, the burden on school health curriculum would be reduced if these programs had multiple foci, instead of the current situation where time is provided for all the risk behaviours independently.

In the area of emotional/behavioural problems, several interventions appear promising, although they have not been implemented or rigorously evaluated within a community population. This should be completed before they are implemented. School-based suicide prevention programs require demonstrated effectiveness through rigorous evaluation before they are widely implemented.

All of the reviewers commented on the lack of methodological rigour in many of the studies. Several areas need to be improved. First, RCT designs should be used to evaluate the effectiveness of programs. Second, pre-intervention baseline data must be collected using reliable and valid tools. Third, adequate follow-up for five to ten years is required to answer the questions about program effectiveness. Fourth, since most positive behaviour changes diminished over time, the question about the impact of the frequency and intensity of Abooster@essions remains to be answered. Fifth, programs must focus on behavioural outcomes and not on attitude and knowledge changes.

One investigator has suggested that increased program effects for smoking rates may be related not only to the programs, but to the anti-smoking messages in society and the increasing barriers to smoking for youth (Rundall et al., 1988). This would be consistent with Jessor’s framework about adolescent risk behaviour (Jessor, 1991). The effectiveness of interactive programs compared with interactive programs plus community-wide programs needs to be assessed.

This project involving personnel from the Central West health units was valuable for several reasons other than the completion of the review. It led to improved understanding of the value of evaluating the literature when considering programs. As well, it allowed discussion about existing programs and their relative merits in view of the findings. Program Managers agreed that it had been a valuable, although time consuming experience.

This review of reviews of studies related to prevention of a variety of adolescent risk behaviours has demonstrated both strengths and limitations within the work to date. Some successful programs have been identified, but there is much more to be learned about how to effectively reduce adolescent risk behaviour.
REFERENCES


FIGURE 1: Search Results

282 Articles Retrieved

Relevance Rating

120 relevant

162 not relevant

Quality Assessment Rating

18 strong

28 moderate

74 weak

Data extraction
TABLE(S)

Table 1: Search Strategy for MEDLINE
Table 2: Journals Hand-Searched
Table 3: Result of the Strong Reviews
<table>
<thead>
<tr>
<th>#</th>
<th>Search Term</th>
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<tbody>
<tr>
<td>#1</td>
<td>child or adolescent</td>
</tr>
<tr>
<td>#2</td>
<td>#1 and [(review in pt) or (meta-analysis in pt)]</td>
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<tr>
<td>#3</td>
<td>health education</td>
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<td>#4</td>
<td>health promotion</td>
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<td>#5</td>
<td>school health services</td>
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<td>#6</td>
<td>voluntary workers/education</td>
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<td>#7</td>
<td>peer group</td>
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<td>#8</td>
<td>primary prevention</td>
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<td>#9</td>
<td>outreach</td>
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<td>consumer participation</td>
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<td>#11</td>
<td>consumer advocacy</td>
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<td>#12</td>
<td>community development</td>
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<td>#13</td>
<td>sex education</td>
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<td>#14</td>
<td>#2 and (#3 or #4 or #5 or #6 or #7 or #8 or #9 or #10 or #11 or #12 or #13)</td>
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<td>#15</td>
<td>English in la</td>
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<td>#16</td>
<td>#14 and (English in la)</td>
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Table 2: Journals Hand-Searched

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<th>Journal</th>
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<tr>
<td>American Journal of Public Health</td>
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<td>Canadian Journal of Public Health</td>
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<td>Health Education</td>
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<tr>
<td>Journal of Adolescence</td>
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<td>Journal of Adolescent Health</td>
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<td>Journal of Adolescent Health Care</td>
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<tr>
<td>Journal of Adolescent Research</td>
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<tr>
<td>Journal of School Health</td>
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### Table 3: Results of the Strong Reviews

<table>
<thead>
<tr>
<th>Topic Author</th>
<th>Number of Studies Included (N)</th>
<th>Time Span (TS)</th>
<th>Orientations of Programs</th>
<th>Intervention Strategies</th>
<th>Outcomes</th>
<th>Results/Comments (ES = Effect Size) (Confidence Intervals not Available)</th>
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</thead>
<tbody>
<tr>
<td>Alcohol misuse reduction/prevention Foxcroft et al. (1997)</td>
<td>N=33 studies (48 papers)</td>
<td>TS=1966-1995</td>
<td>Can’t tell</td>
<td>Can’t tell</td>
<td>Behaviour change</td>
<td>Short-term post-intervention follow-up (&lt;1 yr): 16 studies reported partial effectiveness, 12 reported ineffective, 6 had a negative effect</td>
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<td><strong>DRUG USE PREVENTION</strong></td>
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<tr>
<td>Alcohol, drug, tobacco, primary or secondary prevention and/or early intervention</td>
<td>N=120</td>
<td>TS=1978-1990</td>
<td>Knowledge, Social influences/social norms, Social skills, Comprehensive life skills</td>
<td>Class series, Lectures, Group discussion, Peer-led interventions, Teacher-led interventions, Interactive vs. non-interactive (4 types)</td>
<td>Attitudes, Knowledge, Social competence, Self-reported drug use</td>
<td>Programs coded for 7 major domains of content, 2 types of programs: interactive and non-interactive, Overall ES=0.20, 45 non-interactive programs (ES=.035), 75 interactive programs (ES=.30), In 56 high quality programs, interactive ones had much higher ES than non-interactive: social influences (ES=.10), comprehensive life skills (ES=.24), others (ES=.23), High quality programs resulted in statistically significant ES for alcohol (.21), marijuana (.14), illicit drugs (.17), but not tobacco (.18); both at immediate post-test and over time</td>
</tr>
<tr>
<td>Tobacco use prevention (Rooney et al., 1996)</td>
<td>N=90</td>
<td>TS=1991-1995</td>
<td>Social influences, Generic social skills</td>
<td>Class series, Peer-led interventions, Teacher-led interventions</td>
<td>Behaviour change</td>
<td>Included studies focused on tobacco only and on tobacco plus other substances: only reported on tobacco use, All types of programs entered the model, Behaviour change for tobacco use (ES=0.10) equals a 5% relative reduction in smoking</td>
</tr>
<tr>
<td>Topic</td>
<td>Number of Studies Included (N)</td>
<td>Orientations of Programs</td>
<td>Intervention Strategies</td>
<td>Outcomes</td>
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<tr>
<td>Drug use prevention (alcohol, tobacco,</td>
<td>N=8</td>
<td>Knowledge</td>
<td>Lecture</td>
<td>Attitude change</td>
<td>Immediate post-test results used to</td>
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<tr>
<td>marijuana) (DARE programs (N=9)</td>
<td>TS=1986-1993</td>
<td>Social influences/social norms</td>
<td>Group discussion</td>
<td>Improved knowledge</td>
<td>calculate ES</td>
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<tr>
<td>Ennett et al. (1994)</td>
<td></td>
<td>General/social skills programs</td>
<td>Interactive approach</td>
<td>Drug use</td>
<td>Knowledge (ES=.42), attitude</td>
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<td></td>
<td></td>
<td></td>
<td>Class series</td>
<td>Behaviour change</td>
<td>(ES=.11), social skills (ES=.10) all</td>
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<td></td>
<td></td>
<td></td>
<td>Role playing</td>
<td>Self esteem</td>
<td>statistically significant</td>
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<tr>
<td>Alcohol, tobacco use prevention</td>
<td>N=8</td>
<td>Rational</td>
<td>See Bruvold, 1993</td>
<td>Attitude</td>
<td>Drug use (ES=.06) non-significant</td>
<td></td>
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<tr>
<td>Bruvold, (1990)</td>
<td>TS=can’t tell</td>
<td>Developmental</td>
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<td>Knowledge</td>
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<tr>
<td>Alcohol and drug use prevention</td>
<td>N=33</td>
<td>Information only</td>
<td>Lecture only</td>
<td>Attitudes</td>
<td>Programs with developmental</td>
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<tr>
<td>Bangert-Drowns, (1988)</td>
<td>TS=1968-1986</td>
<td>Affective (values, clarification, role playing) only</td>
<td>Lecture plus group discussion</td>
<td>Drug-related knowledge</td>
<td>orientation (N=2) associated with</td>
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<td></td>
<td></td>
<td>Mixed</td>
<td>Peer-led programs</td>
<td>Drug use</td>
<td>larger attitude and larger behavioural</td>
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<td>Teacher/adult led programs</td>
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<td>ES compared to programs with</td>
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<td>rational orientation (N=6) which have</td>
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<td>larger knowledge ES</td>
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<td>Results similar to Bruvold &amp; Rundall,</td>
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<td>1988; Bangert-Drowns, 1988</td>
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<th>Intervention Strategies</th>
<th>Outcomes</th>
<th>Results/Comments</th>
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</thead>
<tbody>
<tr>
<td>DRUG USE PREVENTION</td>
<td>N=76</td>
<td>TS=1970-1987</td>
<td>• Knowledge</td>
<td>• Lecture</td>
<td>• Attitudes</td>
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<tr>
<td>Alcohol and tobacco use reduction or prevention programs</td>
<td></td>
<td></td>
<td>• Social influences/social norms</td>
<td>• Class series</td>
<td>• Knowledge</td>
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<tr>
<td>Rundall et al. (1988)</td>
<td></td>
<td></td>
<td>• Social skills programs</td>
<td>• Interactive approach</td>
<td>• Behaviour change</td>
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<td></td>
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<td></td>
<td>• Developmental</td>
<td>• Peer-led interventions</td>
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<td>• Teacher-led interventions</td>
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<td></td>
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<td></td>
<td></td>
<td>• Compared ES of methodologically strong studies (n=19) with overall sample of studies (n=57): results consistent</td>
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<td>• Alcohol prevention programs have less effect on all outcomes: at post-test 3 months or more post-program, behaviour change (ES=.12) compared with ES for smoking (ES=.34), knowledge change alcohol programs, (ES=.38) vs. smoking programs (ES=.56), attitude change alcohol programs (ES=.23) vs. smoking programs (ES=.13)</td>
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<td>• Traditional (non-interactive, knowledge-based) programs have lower ES, and less effect on alcohol use behaviour and smoking behaviour than innovative (e.g. social skills, social influences, developmental) programs</td>
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<tr>
<td>Topic</td>
<td>Number of Studies Included (N)</td>
<td>Time Span (TS)</td>
<td>Orientations of Programs</td>
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<td>DRUG USE PREVENTION</td>
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<tr>
<td>Smoking prevention</td>
<td>N=84</td>
<td>TS=can’t tell</td>
<td>• Rational</td>
<td>• Lectures, questions</td>
<td>• Attitude</td>
<td>• Results from better methodological studies only summarized here (n=38)</td>
</tr>
<tr>
<td>Bruvold, (1993)</td>
<td></td>
<td></td>
<td></td>
<td>and answers</td>
<td>• Knowledge</td>
<td>• Programs using all orientations improve knowledge</td>
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<td></td>
<td></td>
<td></td>
<td>• Developmental</td>
<td>• Lecture, discussion,</td>
<td>• Smoking</td>
<td>• Rational orientation had no significant impact on behaviour</td>
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<td></td>
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<td>group problem-solving,</td>
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<td>• Social reinforcement programs resulted in greatest attitude change</td>
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<td>minimal role</td>
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<td>(ES=.59, p&lt;.05)</td>
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<td>playing</td>
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<td>• Social reinforcement programs resulted in most behaviour change</td>
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<td></td>
<td>• Social norms</td>
<td>• Participation in</td>
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<td>(ES=.32, p&lt;.05 at post-test to ES=.27, p&lt;.05 at 3rd follow-up) and</td>
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<td>community projects,</td>
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<td>social norm programs (ES=.29, p&lt;.05 at post-test to ES=.36, p&lt;.05 at 2nd</td>
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<td>vocational training</td>
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<td>follow-up)</td>
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<td>tutoring, recreational</td>
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<td>• In junior high, attitude was related to behaviour change, knowledge was not</td>
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<td>activities</td>
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<td>Number of Studies Included (N)</td>
<td>Time Span (TS)</td>
<td>Orientations of Programs</td>
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<tr>
<td>Sexual risk behaviours Oakley et al. (1995)</td>
<td>N=65</td>
<td>TS=1982-1994</td>
<td>• Knowledge</td>
<td>• Series of class lectures</td>
<td>• Knowledge • Attitude • Behaviour</td>
<td>• 12 methodologically sound studies found • 3 effective interventions; 4 partially effective interventions; 2 ineffective interventions; 2 interventions with unclear effects; 1 harmful intervention</td>
</tr>
<tr>
<td>Sexual risk behaviours Kirby et al. (1994)</td>
<td>N=23</td>
<td>TS=1980-1993</td>
<td>• Social learning theory • Knowledge</td>
<td>• For National Surveys: any sex education received in school and reported by the students</td>
<td>• Behaviour - reduced sexual activity, increased frequency of condom use, pregnancy rates, birth rates or STD rates</td>
<td>• Studies reviewed included: 7 based on national surveys of youth; 16 based on experimental/quasi-experimental studies of sex education and HIV education programs • Comments/results based on experimental studies • Methodological weaknesses in evaluation of abstinence programs make it impossible to assess their effectiveness • Programs (N=2) focused on delaying intercourse among sexually inexperienced students were successful for 12-18 months post-intervention • No programs reduced the frequency of sexual activity among those who were already sexually active • Impact of programs on contraceptive use was mixed: 2 increased use among all participants and 2 others increased use among specific subgroups • Lists 5 characteristics of effective programs</td>
</tr>
<tr>
<td>Topic</td>
<td>Author</td>
<td>Number of Studies Included (N)</td>
<td>Time Span (TS)</td>
<td>Orientations of Programs</td>
<td>Interventions Strategies</td>
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<td>SEXUAL RISK BEHAVIOUR PREVENTION</td>
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<tr>
<td>Sexual risk behaviours</td>
<td>Stout et al. (1989)</td>
<td>N=5 TS=1980-1987</td>
<td>• Can’t tell</td>
<td>• Behaviour: sexual activity</td>
<td>• Behaviour: sexual activity</td>
<td>• Methodologically weak studies, view results with caution</td>
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<tr>
<td></td>
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<td>• Contraceptive behaviour</td>
<td>Report includes 3 cross-sectional surveys, 1 longitudinal cohort and 1 case-control study</td>
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<td></td>
<td>• Pregnancy rates</td>
<td>Contraceptive behaviour: little effect; 1 subgroup within 1 study</td>
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<td>Pregnancy rates: no clear effect</td>
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<td>Sexual activity; mixed results: 3 studies, no effect; 1 study, decreased rate; 1 study, increased rate</td>
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<td></td>
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<td></td>
<td>Sexual activity; mixed results: 3 studies, no effect; 1 study, decreased rate; 1 study, increased rate</td>
</tr>
<tr>
<td>Interventions with adolescent mothers</td>
<td>O’Sullivan, (1991)</td>
<td>N=6 TS=1985-1989</td>
<td>• Can’t tell</td>
<td>• Medical, psychosocial and nutritional services for mothers and children</td>
<td>• Medical, psychosocial and nutritional services for mothers and children</td>
<td>• Community-based studies vs. school-based</td>
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<td>• Education regarding contraception and infant health</td>
<td>Different program offered different combinations of services</td>
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<td>• Social services</td>
<td>RCTs and controlled trials included</td>
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<td>• Parent training</td>
<td>High attrition rates over time (e.g., 2 years – 25% - 60%)</td>
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<td>• Job training</td>
<td>Samples may not be representative; between group differences in education; currently enrolled in school and SES not taken into account in analysis in some studies</td>
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<td>• Individual peer and group sessions</td>
<td>Although most studies showed some short-term significant differences, these diminished with time</td>
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<td>Results must be viewed with caution, more methodologically rigorous evaluation necessary</td>
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</table>

Table 3: Results of the Strong Reviews
<table>
<thead>
<tr>
<th>Topic Author</th>
<th>Number of Studies Included (N) Time Span (TS)</th>
<th>Orientations of Programs</th>
<th>Intervention Strategies</th>
<th>Outcomes</th>
<th>Results/comments (ES = Effect Size) (Confidence Intervals not Available)</th>
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<tbody>
<tr>
<td>SEXUAL RISK BEHAVIOUR PREVENTION</td>
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<td>Sexually transmitted diseases Kalichman et al. (1996)</td>
<td>N=12 TS=1989-1995</td>
<td>• Social Learning Theory: knowledge • Social influences/social norms • Social skills/self-efficacy</td>
<td>Class series: • Facilitator-led • Role-playing • Skills practice • Interactive</td>
<td>• Number of partners • Use of condoms • Frequency of condom use • Number of protected and unprotected occasions of oral, anal and vaginal intercourse • Engaging in sex with a high risk partner</td>
<td>Only results of studies involving youth 15-19 years are reported here (n=6) • All but one study focuses on community samples of high-risk youth • Statistically significant (p&lt;.05) ES for reduction in all risk behaviours in 5 of the 6 studies: ES .43, .32, .32, .53, .19 • Non-significant differences in sample from a job training program • Smallest ES with secondary school sample • Intervention success tended to decrease with time over a 6 month period post-intervention</td>
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<tr>
<td>AIDS – risk reduction Kim et al. (1997)</td>
<td>N=40 TS=1983-1995</td>
<td>• Social Learning Theory: Health belief model • Theory of reasoned action</td>
<td>Not addressed</td>
<td>• Attitudes • Intentions • Knowledge • Behaviour change</td>
<td>Criteria for study inclusion: presented empirical data from an intervention; conducted in the US; included participants 10-18 years of age • Mixed results for all outcomes • Positive results obtained more frequently in non-RCTs vs. RCTs • Pooled results of the 4 RCTs included statistically significant increase in use of condoms at last sexual encounter among experimental groups at 6 and 12 month follow-up</td>
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<tr>
<td>Topic Author, Date</td>
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<td><strong>EMOTIONAL/ BEHAVIOURAL PROBLEM PREVENTION</strong></td>
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<td>Suicide prevention Ploeg et al. (1996)</td>
<td>N=11</td>
<td>Ts=1980-1995</td>
<td>• Social skills program lecture</td>
<td>• Series of class lectures</td>
<td>• Attitude • Intentions • Knowledge • Mental health status • Suicide risk</td>
</tr>
<tr>
<td>Topic</td>
<td>Author, Date</td>
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<tr>
<td>EMOTIONAL/BEHAVIOURAL PROBLEM PREVENTION</td>
<td>Conflict resolution and peer mediation Powell et al. (1995)</td>
<td>N=4</td>
<td>TS=1991-1993</td>
<td>- Cognitive-behavioural training</td>
<td>- Classroom discussions</td>
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<td>- Social skills training</td>
<td>- Role playing</td>
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<td>- Stories</td>
<td>- Workbook</td>
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<td>- Mock mediations</td>
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<th>Results/comments</th>
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<tbody>
<tr>
<td>Emotional/Behavioural Problem Prevention</td>
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<tr>
<td>Conduct disorder intervention Offord et al. (1994)</td>
<td>N=5</td>
<td>TS=can’t tell</td>
<td>Social skills Training</td>
<td>Can’t tell</td>
<td>Academic achievement • Reading • Self-esteem • Improved peer relations</td>
<td>Only peer and school-based interventions reported here • RCTs and matched comparison group studies • Little evidence for effectiveness on a population basis; primary prevention studies are not complete • Long-term outcomes not available • Programs appear effective in the short-term among groups already experiencing significant behaviour problems</td>
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<td>Enhancing child peer relations Schneider, (1992)</td>
<td>N=79</td>
<td>TS=1960-1987</td>
<td>Social-cognitive</td>
<td>Modeling Coaching Role play Homework assignments Problem-solving</td>
<td>Social behaviour • Peer acceptance • Social cognition • Aggression</td>
<td>ES=.47 overall immediately post-intervention • One year follow-up for 6 studies indicated ES=.25 (moderate range) • Modeling and coaching had larger effect sizes than social-cognitive interventions</td>
</tr>
</tbody>
</table>