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Evidence-based Health Promotion:
Resources for Planning
No. 2 Adolescent Health

Health Development Section
Public Health Division
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Evidence-based Health Promotion

The Victorian Government is committed to supporting evidence-based practice in the planning and implementation of effective health promotion action. The practical use of evidence promises better health outcomes by informing decision making by practitioners, program planners and funding bodies as they develop and select health promotion strategies, methods and activities.

The Public Health Division of the Department of Human Services, in cooperation with Statewide health advancement organisations, is working towards the provision of quality advice on health promotion practice. This involves preparing and facilitating access to systematic reviews of the effectiveness of different kinds of interventions.

Evidence-based reviews provide a method of identifying the most effective and efficacious interventions. They also provide information to help ensure efficient use of resources. The findings of these reviews are targeted to those who need to decide on the types of program to develop and implement; they do not tell practitioners how to deliver programs.

The advice provided by such reviews complements rather than replaces the practical experience and critical judgment of planners and practitioners. The recommendations need to be carefully considered against the context for implementation, so as to ensure a balanced and realistic application of the principles.

Significant logistical and methodological challenges are associated with reviewing the evidence-base for health promotion. The amount of available evidence is often limited, and the quality is highly varied. For these reasons, these reviews are a first step only, requiring ongoing enhancement and critical application.

This publication is part of a series initiated by the Public Health Division. The following four documents initiate the series:

- *Evidence-based Health Promotion. No. 1 Oral Health*
- *Evidence-based Health Promotion. No. 2 Adolescent Health*
- *Evidence-based Health Promotion. No. 3 Falls Prevention*(to be published in 2000)
- *Evidence-based Health Promotion. No. 4 Child Injury Prevention*(to be published in 2000).

These publications have been developed using current evidence in each field, and they contain a critical appraisal of the findings. Their recommendations for implementation will assist health promotion funders, planners and practitioners requiring an evidence base for their work. Summary assessments of individual programs evaluated as part of these reviews will be made available through a series of electronic Web-based databases.

The Public Health Division welcomes feedback on these publications and suggestions for further topics. (Contact the Health Development Section on 9637 4023.)

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Executive Summary

The purpose of this review was to ascertain the efficacy of health promotion interventions targeted at adolescents (defined as 12–18 year olds). Program evaluations were organised according to the health promotion *strategy* represented. Health promotional strategies identified in this review included parent training, family intervention, school-based health education, school organisation and management, mentorship, peer intervention, recreation, health service reorientation, community based education, employment and training, legislative reform and enforcement of legislation, social marketing and community mobilisation. Interventions included in the review addressed six adolescent health outcome areas: depression, suicidal behaviour, alcohol and drug use, tobacco use, anti-social behaviour and sexual risk-taking behaviour.

Published papers describing program evaluations were identified through electronic abstraction services, previous review work conducted by the study authors, and consultation with systematic review teams internationally. Articles were initially screened for key details, including their adolescent focus, relevance to the outcomes of interest and method. Studies were included only if they accorded with the highest level of evaluation evidence (that is, randomised allocation or matching of controls to intervention and longitudinal outcome evaluation in community settings). A few studies that did not conform to these standards were included because either they clearly indicated null intervention effects and thus did not require more elaborate designs, or they evaluated Australian intervention data using adequately controlled designs. The inclusion criteria left 178 studies, which the study team systematically reviewed and presented as Technical Summaries (available on request from the Health Development Section, Public Health Division, Department of Human Services).

The study team reviewed the 178 research articles according to three areas of evaluation: process evaluation (practical implementation), intermediary outcomes (the impact on risk and protective factors) and health outcomes (effectiveness). This report considers each of the articles with reference to the main health promotion strategy adopted and the adolescent health outcome targeted for prevention. The study team completed an integrative review, systematically exploring for each strategy the available evidence of practical implementation, outcome effectiveness and, where possible, dissemination and cost effectiveness. Key conclusions and recommendations following from the above process of research review are detailed in this report.

Recommendations for Investment in Adolescent Health Promotion Interventions

General Recommendations

Invest Strategically to Advance Evidence-based Practice

- Use Statewide dissemination for strategies such as legislative change and social marketing.
- Use regional funding to increase evidence-based practice through training and the targeted funding of programs that exhibit evidence of having impacts on regionally prioritised risk factors, protective factors, and youth health and behaviour outcomes.
- In preventive interventions, include evaluation requirements that are designed to advance the level of evidence for the selected health promotion strategy.

Invest in Strong Implementation

- Avoid weakly implemented interventions, which may show inconsistent or null effects.
- Check and ensure fidelity in implementation.

Request Behavioural Outcomes

- Expect impacts not just for risk factors, but also for relevant health outcomes. Funding for longer-term follow-up evaluation may be required to measure these outcomes.

Employ More than One Health Promotion Strategy

- Recognise that programs that employ more than one health promotion strategy appear to be more consistently effective.

Target Multiple Risk Factors

- Recognise that programs that target more than one risk factor may increase the likelihood of an effect.

Seek Sustained Intervention

- Aim to use investment in prevention to maintain a coordinated set of activities over an extended time frame.
- Use activities to address the developmental stage of youth and build on earlier program components.

Identify and Reward Evidence-based Practice

- Audit intervention strategies and program components currently delivered in Victoria to establish their congruence with an evidence-based approach.
- Acknowledge and reward evidence-based programs.

Specific Intervention Recommendations

School-based Health Education

- This cost-effective strategy can reduce alcohol and other drug problems, smoking rates in young people, sexual risk taking and anti-social behaviour.
- Dissemination with evaluation is recommended to encourage evidence-based health education integrated as a universal component within schools.
- Encouraging innovation may extend the application of this strategy into mental health promotion.

Parent Training and Family Intervention

- United States experience suggests promise for this strategy in preventing a variety of adolescent health and behaviour problems. Australian experience is relatively undeveloped.
- Dissemination for early intervention is recommended to prevent crime and alcohol and drug misuse.
- Funding targeted at implementation with rigorous evaluation may extend the application of this strategy to other outcomes.

Community Mobilisation

- Implementation with rigorous evaluation is recommended to assist the prevention of tobacco use, alcohol and drug use, and sexual risk taking.
- Funding of Statewide 'demonstration sites' and geographically based teams may help the coordination of activities within local communities.
- Funding targeted at innovation with evaluation may extend the application of this strategy to crime prevention and mental health targets.

Law, Regulation, Policing and Enforcement

- Investment in the dissemination of evidence-based tobacco control strategies is recommended to reduce tobacco sales to minors.
- Funding targeted at implementation with rigorous evaluation may encourage programs for reducing alcohol sales to minors, and for police diversion of illicit drug users.
- Funding targeted at rigorous evaluation may extend the application of policing strategies to attempts to reduce the transition of adolescent delinquency into serious offending.
- Implementing and evaluating the regulation of access to suicide means may be a useful component within a broader suicide prevention strategy.

Social Marketing

- This strategy has little impact as a stand-alone program, but greater potential when coordinated with other strategies that actively involve school-based health education, parents, legislation, etc.
- Implementation with rigorous evaluation may prevent tobacco use, alcohol and other drug problems and suicide.
- Funding targeted at innovation and evaluation may extend programs for the prevention of sexual risk-taking behaviour, crime prevention and mental health promotion.

School Organisation and Behaviour Management

- School behaviour management strategies can be effective for addressing behaviour problems. However, there may be some difficulties in resolving their implementation. Prior to investment in strategy dissemination, a systematic audit of existing Australian programs is recommended.
- School organisation strategies may be implemented with rigorous evaluation to better understand their application in preventing alcohol and drug misuse and in advancing mental health promotion.
- Further research investment may be warranted to understand better the potential of these approaches for preventing tobacco use and sexual risk taking.

Peer Intervention

- This strategy can be an effective strategy for promoting sexual health and safer sex.
- It may be implemented with rigorous evaluation as a tobacco control strategy.
- Funding targeted at innovation and evaluation may further extend the application of this field to other outcomes.
- Peer interventions targeting crime prevention should be carefully conceived and include rigorous evaluation.

Community-based Health Education

- Funding targeted at further implementation with rigorous evaluation may be warranted for the prevention of tobacco use, alcohol and other drug misuse, sexual risk taking and crime.
- Evidence of behavioural change and rigorous evaluation are needed.

Mentorship

- There are promising indications for this strategy as a substance abuse prevention strategy.
- Funding targeted at innovation and evaluation may extend the application of this field.

Health Service Reorientation

- Funding targeted at implementation with rigorous evaluation may prevent tobacco use, alcohol and drug use, and sexual risk-taking behaviour.
- Encouraging innovation and evaluation may encourage programs to address mental health promotion and youth suicide prevention.

Recreation

- Funding targeted at implementation with rigorous evaluation may assist tobacco control, the prevention of alcohol and drug misuse, and the prevention of sexual risk-taking behaviour.
- Funding targeted at innovation and evaluation may extend the application of this field.

Employment and Training

- Funding targeted at innovation and evaluation may extend the application of this field. Employment and training programs targeting crime prevention should be carefully conceived and include rigorous evaluation.

Table 1: Summary of Evidence Base for 13 Adolescent Health Promotion Strategies Targeting Six Adolescent Health Outcomes

Health Promotion Strategies	Tobacco	Alcohol and drugs	Sexual health	Anti-social behaviour	Depression	Suicide
Parent training	Ⓜ	★★	Ⓜ	★★★	Ⓜ	★ ^{1/1}
Family intervention	Ⓜ	★ ^{2/3}	★ ^{3/3}	★★	Ⓜ	Ⓜ
School-based health education	★★	★★★★	★★★★	★★	★ ^{1/2}	Ⓜ
School organisation and behaviour management	Ⓜ	★ ^{1/1}	Ⓜ	★★	★ ^{0/1}	★ ^{0/1}
Mentorship	Ⓜ	★ ^{1/1}	Ⓜ	★ ^{1/10}	Ⓜ	Ⓜ
Peer intervention and peer education	★ ^{2/2}	Ⓜ	★★	Ⓜ	Ⓜ	Ⓜ
Youth recreation	★ ^{0/1}	Ⓜ	★ ^{1/1}	Ⓜ	Ⓜ	Ⓜ
Health service reorientation	★ ^{1/3}	★ ^{1/1}	★ ^{2/7}	Ⓜ	Ⓜ	Ⓜ
Community-based health education	Ⓜ	★ ^{1/2}	★ ^{3/6}	★ ^{2/2}	Ⓜ	Ⓜ
Employment and training	Ⓜ	Ⓜ	Ⓜ	Ⓜ	Ⓜ	Ⓜ
Law, regulation, policing and enforcement	★★★★	★ ^{2/2}	Ⓜ	Ⓜ	Ⓜ	★★
Social marketing	★ ^{1/3}	★ ^{1/1}	Ⓜ	Ⓜ	★ ^{0/1}	★ ^{1/1}
Community mobilisation	★★	★★	★★	★ ^{0/4}	Ⓜ	Ⓜ

Ⓜ Limited investigation

Ⓜ Contra-indicative evidence

Ⓜ Further research warranted

★^{xy} Evidence of implementation (^{xy} = proportion of studies with positive effects)

★★ Evidence of outcome effectiveness

★★★★ Evidence of effective dissemination

Note: Appendix I contains this table and full definitions.

1. Introduction

1.1 The Importance of Adolescent Health Promotion

The past decade has been an active period in adolescent health research. Research teams internationally have trialed and evaluated a range of strategies aimed at protecting adolescent health and preventing the emergence of problems such as substance abuse, sexually transmitted disease and depression. With increasing demand in a range of community settings for effective adolescent health promotion interventions, combined with limitations on public health resources, there is a need for a strong evidence base to guide the planning and funding of adolescent health promotion interventions.

As a result, the Victorian Department of Human Services has a high level of commitment to evidence-based practice in adolescent health promotion. In 1998 the Public Health Division of the Department commissioned the Centre for Adolescent Health to review the efficacy of interventions promoting health in the adolescent population, so as to better inform State investment in evidence-based strategies.

Until recently, emotional and behavioural problems of adolescence have tended to be dismissed as part of the normal turbulence of adolescent development. One reason for the apparent neglect is that some measures have shown that young Australians appear to enjoy good health. Youth mortality rates have been low compared with those other age groups. Conspicuous morbidity in routine health statistics has, with a few exceptions (such as injury rates), also been relatively low. The failure to adopt a comprehensive strategy to address the health needs of adolescents was thus perhaps understandable.

Attitudes to adolescent health and health promotion have changed quickly, reflecting the influence of new epidemiological data in several areas. First, patterns of health risk in the Australian population have altered. Downward age trends in tobacco, alcohol and illicit drug use have made adolescents a major target for health promotion. Earlier commencement of sexual activity, high rates of teenage pregnancy and the threat of HIV have similarly focused attention on adolescents.

Second, both retrospective studies of adults with continuing health risk behaviours and prospective studies of adolescents followed into adulthood illustrate the strong continuities in health risk behaviours into young adulthood. Evidence also shows that the adolescent health experience can have a significant impact on the development of adult conditions. This evidence has challenged earlier notions that adolescents moving into adulthood 'mature out' of health risk behaviours and mental health problems. As a result, the promotion of health in adolescence has become an imperative.

Third, new areas of health priority arise partly through advances in our knowledge and practice. Advances in medical treatment have led to health needs in young people with disorders such as cystic fibrosis and childhood malignancy, where previously prospects of survival to adulthood were small. Around 10 per cent of adolescents have one or more chronic illnesses (such as asthma or diabetes), and these groups have particular health promotion issues.

Changes in family structures and opportunities for education, vocational training and employment have resulted in the formation of other risk groups (such as the young unemployed and homeless) that also have particular health needs. These changes underpin the need to develop and implement effective approaches to health promotion in adolescents.

Finally, many adolescent health problems have important *risk factors* in common (also called prospective predictors). Academic failure and school dropout are associated with the

development of anti-social behaviour, higher rates of substance abuse, tobacco use and emotional problems. Similarly, patterns of family attachment and conflict are associated with both important health outcomes and other established risk factors. In this context, there is growing evidence that effective health promotion interventions for a specific risk or *protective factor* (a prospectively identified mediator or moderator of a risk process) are likely to have direct effects on a range of health outcomes.

1.2 A Risk and Protective Factor Approach to Adolescent Health Promotion

This report reviews literature accumulated over the past decade relevant to the effectiveness of adolescent health promotion and prevention interventions. The focus of this review has been to identify the impact of preventive interventions on adolescent risk factors that contribute to, in the absence of intervention, adverse health outcomes and other problems. The definition and identification of risk and protective factors in the present investigation follow earlier work in the areas of drug abuse prevention (Hawkins et al., 1992; Institute of Medicine, 1994), anti-social behaviour (Brewer et al., 1995) and youth suicide (Patton and Burns, 1999).

Six key adolescent health outcomes were selected for examination — tobacco use, alcohol and drug use, sexual risk-taking behaviour, crime and anti-social behaviour, depression and suicidal behaviour — based on evidence of their emergence or escalation in adolescence (the ages 12–18 years). Evidence of co-occurrence of these health outcome areas supports the application of a number of the health promotion strategies to more than one outcome area.

In the evaluation of program outcomes, a distinction was made between two sets of outcome measures: *early initiation* and *persistence/escalation*. Early initiation refers to the incidence of first-time involvement in behaviours — for example, the first act of sexual intercourse, the first emergence of suicidal thoughts or self-harm in the trajectory towards suicide, and the first sign of symptoms for depression. The research articles' measurement of initiation was often indirect, relying on summary indicators such as any use or a low number of previous lifetime episodes.

The phenomena of persistence and escalation refers to prolonged involvement in problem behaviours of lower severity — for example, the continuation of sub-clinical depressive symptoms — or progression to more frequent, more severe or more problematic development of health and behaviour problems. Progression in terms of sexual risk taking may refer to the movement from first sexual intercourse to multiple sexual partners, more regular unprotected sex or pregnancy. In the case of mental health, escalation is indicated by more serious symptoms — for example, a suicide attempt or a diagnosed episode of depression. It may be desirable to prevent or delay the first initiation of adolescent problem behaviours, but it is important to document programs that may reduce the progression or escalation of problem behaviours.

The risk and protective factors identified in this report followed, as far as possible, the measurement framework developed by Professors Richard Catalano and David Hawkins from the University of Washington. The Catalano and Hawkins measurement framework includes a comprehensive range of risk factors identified from a review of the epidemiological and intervention literature on the determinants of substance abuse (Hawkins et al., 1992). The measurement framework has been supplemented to incorporate protective factors identified in an integrative theory of resiliency known as the Social Development Model (Catalano and Hawkins, 1996).

The supplemented framework has been successfully used within Victoria to assess youth perceptions of 23 risk factors and 10 protective factors (Bond et al., 1998). The current report is somewhat exploratory because it represents the first attempt, internationally, to extend the social development risk and protective framework to prevention activities targeting the prevention of sexual risk-taking behaviour, tobacco use, depression and youth suicide.

The study team further supplemented the social developmental risk and protective factors to incorporate the Australian harm reduction framework relevant to sexual risk-taking behaviours and alcohol and drug use. Harm reduction approaches attempt to reduce the harm from potentially health-compromising behaviour, while not necessarily altering the prevalence of the behaviour. Such practices are listed as protective factors in the present literature review, and include the use of condoms to prevent sexually transmitted disease and programs that reduce drink driving among alcohol users. Some labelling of risk and protective factors in this report differs considerably from the wording used in the original articles being reviewed. Table 2 provides examples of the risk and protective factors predicting drug abuse, delinquency and depression among adolescents.

Table 2: Risk and Protective Factors Predicting Drug Abuse, Delinquency and Depression

Risk and Protective Factors		Drug Abuse	Delinquency / Crime	Depression
<i>Community</i>				
	Low neighbourhood attachment	✓	✓	✓
	Community disorganisation	✓	✓	✓
	Personal transitions and mobility	✓	✓	
	Community transitions and mobility	✓	✓	
	Laws and norms favourable to drug use	✓		
	Perceived availability of drugs	✓		✓
P	Opportunities for pro-social involvement	✓	✓	✓
P	Rewards for pro-social involvement	✓	✓	✓
<i>Family</i>				
	Poor family management	✓	✓	
	Poor discipline	✓	✓	
	Family conflict	✓	✓	✓
	Family history of anti-social behaviour		✓	✓
	Parental attitudes that are favourable towards drug use	✓		
	Parental attitudes that are favourable towards anti-social behaviour	✓	✓	✓
P	Attachment	✓	✓	✓
P	Opportunities for pro-social involvement	✓	✓	
P	Rewards for pro-social involvement	✓	✓	✓
<i>School</i>				
	Academic failure	✓	✓	✓
	Low commitment to school	✓	✓	✓
P	Opportunities for pro-social involvement	✓	✓	
P	Rewards for pro-social involvement	✓	✓	✓
<i>Peer / individual</i>				
	Rebelliousness	✓	✓	✓
	Early initiation of problem behaviour	✓	✓	✓
	Impulsiveness	✓	✓	✓
	Anti-social behaviour	✓	✓	✓
	Attitudes that are favourable towards anti-social behaviour		✓	
	Attitudes that are favourable towards drug use	✓		
	Perceived risks of drug use	✓		✓
	Interaction with anti-social peers	✓	✓	✓
	Friends' use of drugs	✓	✓	✓
	Sensation seeking	✓	✓	✓
	Rewards for anti-social involvement		✓	✓
P	Religiosity	✓	✓	
P	Social skills	✓	✓	✓
P	Belief in moral values	✓	✓	

P = protective factors

1.3 Epidemiological Trends in Six Health Outcome Areas in Victoria

Australian research examining the epidemiology of adolescent health-compromising behaviours grew in volume and quality over the past decade. Until the mid-1990s cross-sectional research examining a single health outcome had been the general rule; longitudinal research examining a range of health behaviours has emerged only recently.

Time series prevalence data are most well developed in the areas of tobacco use and alcohol and drug use. Regular school surveys have been conducted in these areas for over a decade. The findings of these studies suggest that the prevalence of tobacco use, and more regular tobacco use, decreased until the early 1990s; throughout that decade the rates of tobacco use appeared to stabilise among Victorian youth. There exists some concern that rates of female tobacco use may have risen to approach those of male users in recent years (Department of Human Services, 1999).

Victorian adolescent rates of binge alcohol consumption and marijuana use appeared to increase in 1996 relative to results from earlier surveys in 1993 (Department of Human Services, 1999). Commonwealth household surveys have been regularly conducted since the beginning of the National Campaign against Drug Abuse in 1987. Unfortunately, these surveys do not cover the early and middle adolescent age groups. Findings from the National Household Surveys suggest that older adolescents have relatively high rates of both licit and illicit substance use compared with rates in other sections of the Australian population.

Time series data on sexual risk taking, anti-social behaviours, depression and youth suicide among Victorian adolescents are more difficult to locate. According to available data, completed youth suicide rates for males demonstrated a steady increase from the 1960s, then appeared to stabilise somewhat in recent years. Female youth suicide rates are lower than those for males, although recent evidence suggests female suicide rates may be increasing. There are high rates of self-harm among females.

Existing information reaffirms a high co-occurrence of the six health outcomes examined in the present study. The Adolescent Health Survey conducted by the Centre for Adolescent Health in 1992 was the first study to examine explicitly the co-occurrence of tobacco use, alcohol use, other drug use, anti-social behaviour, sexual risk-taking behaviour and depression within a representative sample of Victorian youth (Hibbert et al., 1996). The researchers observed a high co-occurrence between each of these behaviours.

1.4 Effectiveness in Adolescent Health Promotion

Effectiveness in adolescent health promotion encompasses a range of factors, including measures of biological or physiological health outcomes, such as morbidity and mortality; an increase or decrease in the level of knowledge about a risk factor; and a change in health behaviours. Program effectiveness is difficult to measure, because there are different opinions on what constitutes success (Department of Human Services, 1998). Whether a program is judged to be effective can depend on the judgment criteria; for example, if a program increases the population's knowledge of methods of sun protection, it may still be perceived as being ineffective if judged against criteria for a change in behaviour (Department of Human Services, 1998). Those reviewing and evaluating health promotion interventions must examine the aim of the intervention and the anticipated outcomes.

The key concern in the implementation of health promotion interventions is that health outcomes are improved. Health promotion strategies that are evidence based and result in positive health outcomes are achieving value for money. The Department of Human Services (1998) identifies the following defining factors for evidence-based health promotion strategies:

- They must be underpinned by the principles of best practice.

- They must incorporate satisfactory theoretical development.
- They must be effective and efficient for both the target group and the group implementing the intervention.
- They must be cost-effective.
- They must be both outcome and output focused.

Adhering to this framework will enable planners and funders of health promotion interventions to identify the most effective approach. Several groups and organisations in the community are involved at some level — as consumers, funders or providers — in the coordination and delivery of health promotion interventions that target the adolescent population.

The evidence base of health promotion interventions must reflect the changing needs of parents, school communities, health providers such as general practitioners and pharmacists, community health centres and hospitals. The rationale for health promotion interventions must also be clearly defined and specify whether it is appropriate to the capacity and infrastructure of the investing group.

1.5 Scope of the Current Review

The study team identified and reviewed 178 research articles fitting the review criteria. Table 3 presents the number of articles identified for each outcome domain. The allocation of articles into an outcome domain was based on the core analysis of the program and the title of the article.

Table 3: Number of Papers by Outcome Domain

Primary Outcome Domain	Number of Papers Reviewed
Tobacco use	57
Drug and alcohol use	39
Sexual risk-taking behaviour	52
Crime and anti-social behaviour	16
Depression	2
Suicidal behaviour	12

The study team reviewed a relatively small number of articles on depression, suicidal behaviour and anti-social behaviour, because team members recently conducted good-quality reviews on these outcomes (for example, Patton and Burns, 1999).

In overview, a number of randomised controlled trial (RCT) studies on the prevention of tobacco, alcohol and drug use, and sexual risk-taking behaviour have been published over the past 10 years. In contrast, fewer RCT studies on the prevention of anti-social behaviour, depression and suicidal behaviour have been published. For these latter studies, the study team adopted the standard of best available evidence (that is, other than RCT evidence).

2. Methods

2.1 Article Review Procedure

The project was conducted in three main stages:

- Information search and acquisition
- Information classification and analysis
- Intervention evaluation.

2.2 Information Search and Acquisition

The study team reviewed six health outcomes in the literature: tobacco use, alcohol and drug use, sexual risk-taking behaviour, anti-social behaviour, depression and suicidal behaviour. The information search aimed to find published literature of a suitable standard to help identify risk factors and protective factors. A risk factor is one that can increase the likelihood of a health outcome, and that may be called a predisposing factor; for example, a risk factor for drug abuse may be family conflict. A protective factor can prevent a risk factor from mediating or moderating a health outcome; for example, a protective factor for drug abuse may be good family attachment.

The first phase of this work involved the examination of epidemiological literature relevant to the prevalence of each of the outcomes in the defined population and appropriate sub-groups. The study team used online access services to search major sources, including Medline and PsychLit. It acquired additional literature by scanning available secondary sources such as review documents. Where possible, it also contacted Cochrane International Collaboration Review Sites, yielding further material of relevance.

The aim of the literature acquisition was to identify well-controlled intervention studies relevant to the reduction of risk factors, the enhancement of protective factors or the prevention of problematic outcomes. The study team took a 'levels of evidence' approach when screening research studies to include in the review. Where possible, it selected articles on interventions using longitudinal designs and randomised allocation to treatment and a control condition. This was not always possible, so the study team accepted different standards of evidence within particular combinations of the 13 health promotion strategies and the six outcome domains. For studies investigating attempts to regulate tobacco sales to minors, for example, the review includes some post-test-only studies because they provide unequivocal evidence that simply amending laws is not an effective method of preventing tobacco sales to minors.

Using information from abstraction services, the study team identified over 350 articles, of which 178 satisfied inclusion criteria and were retained for more extensive review. Studies were included only if they accorded with the highest level of evaluation evidence (that is, randomised allocation or matching of controls to intervention and longitudinal outcome evaluation in community settings). A minority of studies that did not conform to these standards were included because they either (a) clearly indicated null intervention effects and thus did not require sophisticated designs or (b) evaluated Australian interventions using adequately controlled designs.

Summary details of the articles examined appear as Technical Summaries on a Microsoft Access database comprising 27 fields (available from the Health Development Section of the Department of Human Services). Summary details include:

- The description of the intervention
- The resources required to conduct the intervention

- The evaluation design and details
- The findings of the evaluation
- The duration of the study
- The relevant economic aspects of the study
- The intervention requirements relevant to delivery settings, personnel requirements and the scale of resource requirements.

When the review process was complete, the senior members of the study team checked all reviews for internal consistency. They also checked a sample of summaries for accuracy against the published research records.

2.3 Information Classification and Analysis

The identification of specific behavioural targets in prevention research is somewhat artificial and conflicts with evidence for a generalised behavioural impact through developmental risk exposure. Notwithstanding these difficulties, prevention programs continue to be developed and evaluated against specific behavioural targets. The study team classified evidence on specific interventions according to the primary behaviour (for example, tobacco use) targeted for prevention within a specific research report. Where relevant, the study team identified secondary outcome targets too. It also recorded information relevant to the youth population target.

The study team classified the health promotion strategies examined by the socialisation domain they targeted and by the service delivery setting or jurisdiction responsible for their delivery. Thirteen classifications of health promotion strategy were found after a consideration of the program descriptions in the research articles. Table 4 defines these 13 health promotion strategies reviewed for this report. The study team's evaluation of each strategy relied on an integrative review of the separate program evaluation information in the research articles.

Table 4: Definitions of 13 Adolescent Health Promotion Strategies

Health Promotion Strategies (Delivery Settings)	Definitions
<i>Family setting ¾ family services</i>	
Parent training	One or more parents receiving information and/or a course of instruction aimed at advancing adolescent health
Family intervention	One or more parents, the adolescent and other family members together receiving information and/or a course of instruction aimed at advancing adolescent health
<i>School setting ¾ school services</i>	
School-based health education (curricula)	Delivering a structured adolescent health education curriculum within the school (usually by classroom teachers but sometimes by visiting outside professionals)
School organisation and behaviour management	Developing school discipline procedures, policies and practices, for example, to advance adolescent health
<i>Peer settings ¾ programs typically coordinated by non-government organisations</i>	
Peer intervention and peer education	Using youth peers of common identity to provide support or deliver a health message
Youth recreation programs	Providing or using recreational opportunities outside the school setting to advance adolescent health
Mentorship	Developing pro-social relationships between youth and functioning adults within the community
<i>Community setting ¾ locally coordinated programs</i>	
Community-based health education	Delivering adolescent health education curricula or information in a community setting other than schools
Community mobilisation	Running campaigns to initiate or strengthen an explicit strategy of coordinated community action to advance adolescent health. Typically, community mobilisation involves a number of the adolescent health promotion strategies described above, but almost all campaigns to date have included school-based health education as a central component.
<i>Community setting ¾ State or regionally coordinated programs</i>	
Health service reorientation	Extending existing health services into youth settings or adjusting services to better incorporate youth needs
Employment and training	Providing pre-employment assistance, employment experience, training or intervention, for example, in a post-school training setting to advance adolescent health
Law, regulation, policing and enforcement	Modifying legislation or regulations, enforcing law or regulations, and/or developing policing strategies to advance adolescent health
Social marketing	Using the mass media to promote a health message relevant to adolescents

2.4 Integration of Individual Program Evaluations

For each of the 13 health promotion strategies targeting the six health outcomes, the study team completed an integrative evaluation of the key health promotion features. The researchers developed six mutually exclusive categories to summarise the status of research evidence for each of the strategy-by-outcome combinations:

- Limited investigation
- Contra-indicative evidence
- Further research warranted
- Evidence of implementation
- Evidence of outcome effectiveness
- Evidence of effective dissemination.

See Appendix I for a complete description of these categories.

3. Adolescent Health Promotion Interventions in Six Health Outcome Areas

3.1 Tobacco Use

According to Victorian prevalence data, the use of tobacco among adolescents steadily declined until the early 1990s; rates stabilised throughout the 1990s, although the use of tobacco among females may have risen to equal that of males. Early attempts to influence adolescent smoking were based on health belief models of health education. Programs such as 'My Body' in the mid-1980s incorporated the notion that an improved understanding of the consequences of a health risk behaviour such as tobacco smoking would lead to the rational choice to avoid tobacco (Gillies and Wilcox, 1984). These programs appeared effective in changing knowledge and attitudes, but their effects were not sustained.

Further theories that underpinned intervention strategies in smoking prevention were derived from social learning theory. These theories included the use of role models, social resistance training and self-efficacy promotion. All attempted to inoculate youth socially against smoking uptake during the peak years (the mid-teens) of tobacco use onset. The sustainability of programs underpinned by this theory has been varied, and depends on the setting in which the program is implemented.

Of the approaches implemented to prevent tobacco smoking in the past ten years, school-based health education and community mobilisation demonstrated evidence of outcomes. School-based health education programs have been undertaken in the United States and Europe. A United States tobacco health education program, which was underpinned by social learning theory, incorporated life skills training (Botvin et al., 1990). The program addressed tobacco advertising and social resistance skills, managing anxiety, effective communication, developing personal relationships and asserting individual rights, with student guides, teacher manuals, professional development of teachers and a relaxation audiotape. Evaluation of a sample of almost 6000 year 7 students found that the prevalence of tobacco smoking had fallen 12 months after the completion of the program. Follow-up data collected six years later (from 60 per cent of the original sample) found significant reductions in the prevalence of smoking.

Two European studies on the prevention of tobacco smoking, which were also underpinned by social learning theory, also produced sustained effects. The Oslo Youth Study (Klepp et al., 1994) was based on the 'Know Your Body' risk factor assessment program, and the North Karelia Youth Project (Vartiainen et al., 1990) focused on social resistance skills in classroom sessions.

Two programs conducted in the United States used community mobilisation to have an impact on tobacco use. Perry et al. (1992) combined school health educational approaches with a community-wide approach to tobacco use and other risk factors for heart disease. MacKinnon et al. (1991) reported positive one-year impacts for a community mobilisation program that targeted tobacco and other drugs. Exposure to this intervention affected the risk factors associated with tobacco use norms.

There has been evidence of implementation for the strategy of youth recreation in the United Kingdom. The Grampian Smokebusters club, for example, ran a range of activities and had high community participation rates (van Teijlingen et al., 1996). Nevertheless, the program produced no effects on smoking rates after four years, and the authors indicated that a single approach of this kind was unlikely to be effective. There is also evidence of implementation of the strategies of social marketing, peer intervention and peer education, and health service reorientation aimed at preventing adolescent tobacco use. There is evidence of dissemination for a law, regulation, policing and enforcement approach.

Other strategies that have been employed include school organisation and behaviour management. The Gatehouse Project, conducted in Victoria, Australia, uses school organisation and other strategies to promote mental health (Glover et al., 1998); there is evidence of effectiveness in addressing anti-social behaviour, but further research is necessary to examine the strategies' efficacy in assisting tobacco control. Further research is also needed into the efficacy of parent training, family intervention, mentorship, community-based health education, and employment and training.

3.2 Alcohol and Drug Use

Potentially harmful alcohol use has become increasingly prevalent among Victorian youth. In 1996, 50 per cent of Victorian year 11 students reported binge drinking (the consumption of five or more standard drinks in one session) in the previous two weeks. Several injuries have been associated with binge drinking, including vehicle accidents, unplanned and unsafe sex, assault and aggressive behaviour, and social and psychological problems (Wechsler et al., 1995).

The use of cannabis also appears to be increasing in prevalence among Victorian adolescents. In 1996, the majority of year 12 students reported having tried cannabis. Victorian youth appear to perceive the use of cannabis as being relatively safe. This is a concern, particularly when youth expectancies of the risks and benefits of substance use are important predictors of future use. Evidence suggests that early adolescent substance use increases the risk of later substance abuse, including the use of heroin (Hawkins et al., 1992). There appears to be a co-occurrence between the use of cannabis, binge drinking, other substance use and health-compromising behaviour.

Substance abuse prevention programs conducted in Australia usually focus on harm reduction, whereas in the United States abstinence has received more prominence in the design of health promotion interventions. Health promotion strategies that have demonstrated evidence of outcomes in alcohol and drug use include community mobilisation and parent training.

Evidence demonstrates the importance of targeting a range of risk factors influencing youth alcohol and drug use. Community mobilisation approaches can potentially modify risk and protective factors across the different socialisation environments, including schools, families, community media and peers. Two United States programs using community mobilisation strategies reported positive findings. Project Northland used a multi-level, community-wide approach, including school curriculum, homework activities, peer-delivered materials, community activities and new laws for the sale of alcohol (Perry et al., 1996). Findings indicated that this community-level intervention program successfully influenced a range of risk and protective factors, and behavioural outcomes. The Midwest Prevention Program combined a school drug education program with a wider community mobilisation program (MacKinnon et al., 1991). It demonstrated positive impacts of varying degrees on mediating factors and on the use of tobacco, alcohol and marijuana.

An Australian program that adopts the strategy of parent training and targets parents with children is called 'Parenting Adolescents: A Creative Experience' (PACE) (Toumbourou and Gregg, 1999). This program incorporates facilitated groups that operate on an adult learning model. The groups include modules relevant to adolescent communication, conflict resolution and adolescent development (Jenkin and Bretherton, 1994). The program evaluation reported positive impacts, although the extent to which these will translate into long-term reductions in youth substance abuse will require further follow-up.

The program 'Preparing for the Drug Free Years' (PDFY) was evaluated in the United States. It demonstrated effectiveness in increasing the intention of young people to abstain from alcohol and enhance family bonding (Spath et al., 1996). It is unclear whether programs designed for the abstinence prevention framework in the United States would be culturally appropriate for

the Australian context of harm reduction. Nevertheless, a strong component of PDFY is the enhancement of the parent–adolescent attachment, and the positive effects of improving this attachment are likely to translate to other health behaviours.

Several programs adopting a family intervention strategy have been conducted in the United States. They have demonstrated evidence of implementation. A number of the programs incorporate family involvement in prevention programs that are run in schools or in community settings such as youth groups. Attempts to develop family-based programs for the prevention of youth substance abuse are relatively undeveloped in Victoria. The Department of Human Services' Drug Treatment Services Branch has commissioned a report examining parental involvement in youth substance abuse treatment.

Further strategies that have demonstrated evidence of implementation are law, regulation, policing and enforcement; health service reorientation; social marketing; school organisation and behaviour management; community-based health education; and mentorship.

Since the mid-1980s, harm minimisation has been the dominant approach for the prevention and management of alcohol and drug abuse in Australia (National Drug Strategy, 1993). Victoria has made a large investment in harm minimisation treatment and prevention strategies. School-based harm minimisation drug education is an important part of this approach, and has demonstrated evidence of dissemination. It also appears to be cost effective. Australian programs that warrant more extensive evaluation include Primary Steps (targeted at primary school students) and various programs targeted at adolescents, including Rethinking Drinking and Next Step (which address alcohol and illicit drug use respectively) (see Australian Drug Foundation resource catalogues).

Several programs in the United States have used school-based health education as a strategy for addressing alcohol and other drug use issues. They have also adopted a range of concepts, such as social learning theory and cognitive-behavioural approaches. In overview there is now clear evidence to suggest dissemination of school-based drug education can be an effective strategy for reducing youth drug and alcohol misuse. However, findings have been mixed, with some programs reporting degrees of success and others reporting minimal impact. Evaluations have indicated that program effectiveness can reflect the quality of implementation, program length and content, and the age at which youth receive programs. There may also be advantages from integrating more than one health promotion strategy.

Further research is required into the health promotion strategies of peer intervention and peer education; youth recreation; and employment and training.

3.3 Sexual Risk-taking Behaviour

Australia has a strong history of school-based sexual health education. The Australian community appears to accept sex education in schools, although other countries do not seem to support this strategy to the same degree. There are fears that providing adolescents with information about sexuality, reproduction and contraception will increase sexual activity, although there is no evidence to suggest this link.

Prevention of unwanted teenage pregnancy has been a prime focus for sexual health education. Nevertheless, with increasing concerns over the past decade about the high rate of sexually transmitted diseases in young people (especially HIV and AIDS), a range of intervention studies have been developed. Considering the co-occurrence between sexual risk-taking behaviour and other adolescent health behaviours, they may share underlying risk processes. Intervention strategies demonstrating success in affecting other adolescent health behaviours may therefore have a high chance of success in preventing sexual risk taking.

There is evidence of outcomes from adopting the strategies of community mobilisation and peer intervention and education. Programs that have used the strategy of community mobilisation have been conducted in the United States. These programs involve peer counsellors who discuss pregnancy and HIV/AIDS; theatrical presentations; presentations by young people who are HIV positive or who have been pregnant; sexual health discussions; surveys on condom availability and ease of purchase; and health columns in local newspapers (Philliber et al., 1992; Koo et al., 1994; Sellers et al., 1994). Programs adopting this strategy have achieved positive outcomes, although further dissemination in Australia is needed to establish their applicability.

The strategy of peer intervention and education has been used in the United States and Norway, and has demonstrated evidence of outcomes. The Mpowerment Project was a peer-led, community-based program in the United States that aimed to encourage young gay men to encourage each other to promote safe sex (Kegeles et al., 1996). The three components of the program included outreach, small groups and a media campaign. Peer education can also be an effective method of harm reduction in schools, as demonstrated by a program in Norway (Kvalem et al., 1996). The two-day program involved older peers teaching a formal curriculum to upper secondary school students. It is unclear whether such strategies translate to longer-term outcomes, such as a reduction in sexually transmitted diseases.

There is evidence of implementation of the strategy of health service reorientation to prevent sexual risk-taking behaviour. Several methods of health service reorientation have been adopted. In the United States, clinics on school campuses provide students with a range of primary health care services (Edwards et al., 1980). This appears to be a promising method of reducing adolescent pregnancy and birth rates. Other schools have made condoms available; some provide them through school-based clinics; some have trained teachers, counsellors or peer leaders to distribute them; and others have dispensing machines. Little evidence exists to support their effectiveness as a sole intervention. However, linking condom availability to a comprehensive sexual health education program is likely to increase the effectiveness of condom availability.

Health service interventions, such as educational interventions and outreach to at-risk groups, have demonstrated inconsistent impacts (Rotheram-Borus et al., 1991; Jemmott et al., 1992; Mansfield et al., 1993; Quirk et al., 1993; Orr et al., 1996). There is also evidence of implementation of the strategies of community-based health education, youth recreation and family intervention.

There is evidence of dissemination of school-based health education in the prevention of sexual risk-taking behaviour. A range of programs have focused on increasing knowledge, clarifying values and skills, emphasising the importance of abstinence from premarital sexual activity, and providing education on HIV/AIDS. Some programs are based on theoretical approaches with demonstrated effectiveness, such as social learning theory. An example is Reducing the Risk, a school-based curriculum program conducted in the United States (Kirby et al., 1991). Using social learning theory, teachers and classroom peers model socially desirable behaviour and students practise these behaviours through role play. The program also uses cognitive behaviour theory and social inoculation theory. The intervention was found to be effective at increasing knowledge and parent-child communication about abstinence and contraception (Kirby et al., 1991).

Further research is needed for the strategies of parent training; law, regulation, policing and enforcement; social marketing; school organisation and behaviour management; mentorship; and employment and training.

Despite research limitations in this area, evidence exists that some programs can reduce sexual risk-taking behaviour. Schools are clearly a promising location in which to reach adolescents. With limited resources for programs to prevent sexual risk-taking behaviour, spreading

resources too thinly by having a broad focus may not be useful. If the main aim of a program is to reduce the rates of adolescent pregnancy and sexually transmitted diseases (including HIV/AIDS), then it should focus on reducing unprotected sexual intercourse. Single programs that are comprehensive and include the issues of pregnancy and sexually transmitted diseases are also likely to be more effective.

3.4 Crime and Anti-social Behaviour

Early adolescence is the period within which public acts of delinquency and property offending reach their lifetime peak. More serious and violent offences reach their peak in mid to late adolescence. Anti-social behaviour includes youth engagement in crime, anti-social acts of violence, vandalism, assaults, bullying and general patterns of aggressive communication. Such behaviour imposes social costs via the policing, justice, corrections and health costs of assaults, accidents, injuries and trauma.

Anti-social behaviour represents a strong link to pre-adolescent predictors and demonstrates a strong continuity with externalising behaviour problems in childhood. There are therefore opportunities for pre-adolescent intervention in the crime prevention field. Nevertheless, some studies have found groups of youth engaged in anti-social behaviour who did not exhibit childhood behavioural problems. Adolescent onset of this behaviour may therefore arise through rebelliousness, parent-adolescent conflict, weak family attachment and anti-social behaviour among peers.

In the prevention of crime and anti-social behaviour, there is evidence of outcomes from the strategy of family intervention. Family intervention approaches share a focus on changing maladaptive patterns of family interaction and communication. Evidence suggests that family therapy approaches are cost effective and reduce re-offending among voluntary and court-mandated adolescent offenders. Although several family therapy programs operate in Australia, well-controlled evaluations are lacking. There appears to be an emerging tradition in Australia of innovative and egalitarian family therapy and a growing acceptance of its benefits.

There is evidence of outcomes from conflict resolution and violence prevention curricula as a strategy to prevent crime and anti-social behaviour. An Australian study in three Melbourne secondary schools tested the impact of a conflict resolution program called Dealing with Conflict (Bretherton et al., 1993). The curriculum consisted of activities to build participants' group cohesion, trust, respect for one another, self-esteem and self-disclosure. Students were less likely to perceive hypothetical social conflict situations in a hostile way or to self-report hostile behaviour. Nevertheless, Brewer et al. (1995) noted that several programs might have inadequately targeted attitudes. In general, although evidence suggests positive impacts, evaluation designs reported to date have not been methodologically strong. Prior to wider dissemination, further investment in rigorously controlled research is necessary to establish effectiveness and longer-term outcomes. There is also evidence of outcomes from the strategies of school organisation and behaviour management.

Evidence of implementation exists for the strategy of peer mediation in the prevention of crime and anti-social behaviour. Peer mediation programs aim to improve peer relationships and to discourage attitudes favourable to aggressive conflict resolution. They involve active efforts through counselling and other interventions to introduce non-violent techniques for resolving peer conflicts. Such programs have been effectively implemented within secondary school environments, although have shown no significant effects (Brewer et al., 1995). The lack of effects may be due to program implementation in relatively harmonious school environments. There is also evidence of implementation for the strategies of community-based health education, mentorship and community mobilisation.

There is evidence of dissemination for the strategy of parent training in the prevention of crime and anti-social behaviour. The 'Parenting Adolescents: A Creative Experience' (PACE)

program conducted in Australian secondary schools leads to reductions in adolescent family conflict and in feelings of detachment from the family (Toumbourou and Gregg, 1999).

Recent evidence suggests that the PACE program may also have an impact on transition into adolescent delinquency. Where parent–adolescent bonding can be maintained and parent–adolescent conflict can be decreased, adolescent involvement in anti-social behaviour and substance abuse appears to diminish. A study conducted in the United States reported the economic advantages of parent training using behavioural techniques: training investment averaging 44 hours of professional contact yielded estimated savings of over US\$100 000 (Bank et al., 1991).

Further research is required to determine the effectiveness in this area of the strategies of law, regulation, policing and enforcement; social marketing; and peer education. Evidence is contra-indicative for the strategy of employment and training.

3.5 Adolescent Depression

Adolescent depression has risk relationships with health risk behaviours such as suicidal behaviour, tobacco use, alcohol abuse and sexual risk-taking behaviour. This suggests that a health promotion strategy that reduces depressive symptomatology could have broad benefits on a range of adolescent health outcomes. The most common strategy for preventing adolescent depression has been to extend treatment approaches to young people already manifesting symptomatology (Jaycox et al., 1994). Such programs have involved questionnaire screening, identifying those who report higher levels of symptoms, and offering an intervention based on cognitive behavioural principles. Evidence of the effectiveness of this approach is weak.

There is evidence of implementation of the strategy of school-based health education to prevent adolescent depression. Programs have involved teacher (or post-graduate student) delivery of material on how to identify depression symptoms, how to increase pleasant experiences, and how to chart the relationship to mood, for example (Clarke et al., 1993; Rice and Meyer, 1994). Programs suggest that teachers have the capacity to deliver these materials, although the possibility of longer or more complex interventions remains unexplored. There was no evidence of outcomes from school-based health educational interventions.

There is evidence of the implementation of the strategy of school organisation and behaviour management. The Victorian Gatehouse Project is examining the effect of school organisational intervention on youth depression and mental health, although early evidence has not yet demonstrated an effect on mental health (Glover et al., 1998). There is evidence of the implementation of social marketing interventions such as media approaches. Self-reported reactions to a campaign about changing attitudes towards mental illness included trying new ways to tackle problems, talking to someone new about problems and trying new ways to cope with someone else's problems (Barker et al., 1993).

Some studies suggest the strategies of community mobilisation, parent training and family intervention may be promising in the prevention of adolescent depression, although this area warrants further research. There has been limited investigation of the strategies of peer intervention and education; community-based health education; mentorship; health service reorientation; recreation; and employment, training and post-school intervention.

3.6 Adolescent Suicidal Behaviour

Clinical approaches have dominated responses to adolescent suicidal behaviour, but the evidence of their effectiveness is minimal. Approaches have included the use of screening programs to identify at-risk adolescents for further intervention, the promotion of cognitive

skills relevant to dealing with emotional difficulties in suicide attempters, and the promotion of ongoing access to services for youth who have recently engaged in suicidal behaviour.

There is evidence of outcomes from the use of law, regulation, policing and enforcement in the prevention of adolescent suicide. Legislating restrictions on access to lethal means is a widely used preventive strategy for youth suicide. Outcomes from restrictions on different means have been studied, including those relating to firearms, self-poisoning and motor vehicle exhaust gas. Data collected following the introduction of more restrictive firearms legislation in South Australia in 1980 indicated a decrease in male suicides from firearms and an increase in the use of other methods (Snowdon and Harris, 1992). A study in Queensland reported similar findings (Cantor and Slater, 1995). Evidence of the effectiveness of firearms restriction in reducing overall suicide rates remains controversial, given the possible substitution of the other methods.

Rates of self-poisoning have risen following the increasing availability of sedative and anti-inflammatory drugs (Oliver and Hetzel, 1973; Whitlock, 1975; Hawton et al., 1996). Options for further research include the possibility of trials of the restriction of the availability of paracetamol, changes to pack sizes and the addition of methionine. The use of motor vehicle exhaust gas accounts for approximately one in eight suicides in young males and one in twelve in young females (Cantor et al., 1996).

Options for intervention include fitting catalytic converters, fitting sensors to detect carbon monoxide in cars, and modifying exhausts to ensure hose pipes cannot easily be fitted. The introduction of catalytic converters to all new Australian cars manufactured since 1986 was not accompanied by a fall in deaths from motor vehicle exhausts, despite these cars comprising 43 per cent of registered vehicles (Routley and Ozanne-Smith, 1998). However, international data have indicated an effect on rates of suicide by this method (Lester, 1989).

There is evidence of implementation of social marketing to prevent adolescent suicide. Media interventions may take two forms: guidelines on the reporting of suicide and media provision of mental health education. Media portrayals of youth suicide have been considered to be risk factors for suicidal behaviour (Collins, 1993); for example, railway suicides had been the subject of much media attention in Vienna until 1987, when media guidelines were introduced. The guidelines aim to ensure different ways of reporting suicide, such as providing few details about the method and removing the story from the front page. The suicide rate in Vienna has fallen dramatically as a result, although there is some evidence of method substitution.

Minimal data are available on the effectiveness of media guidelines, highlighting a need for further research. There is also evidence of implementation of the strategies of school organisation, and behaviour management and parent training.

The strategy of using school-based health education to prevent adolescent suicide warrants further research. Despite evidence of the implementation of several programs, there is no evidence of outcomes or cost effectiveness. Programs have involved classroom curricula, non-randomised controlled studies, short films and small group work. Simple brief suicide education does not appear to be an appropriate or effective intervention, and there is a move towards a universal intervention in which the suicide education component is incorporated with life skills education. This combination shows more consistent evidence of effect, although the efficacy of the suicide-specific element is unclear. Evidence from programs that focus on identifying high-risk students suggests these interventions are not effective. Thus, further research is needed into the intervention of school-based health education.

The strategy of health service reorientation for the prevention of youth suicide also warrants further research. There is considerable evidence that crisis lines can reach a high-risk population, although they appear to be less accessible for young males than for females. There is no available evidence that the introduction of suicide prevention centres and hotlines has

affected rates of suicide in any country. Further research into this strategy is necessary, perhaps including:

- An assessment of the extent to which medically serious suicide attempters have used or know how to access crisis lines.
- A test of access to crisis lines by serious attempters to evaluate the uptake of use in a high-risk group. Uptake and effectiveness could be assessed in a randomised trial.
- A test of the efficacy of different models of intervention (for example, telephone counselling alone versus telephone counselling plus follow-up appointments) in encouraging engagement with treatment services.

There has been limited investigation into the strategies of peer intervention and education; community-based health education; mentorship; recreation; and employment, training and post-school intervention. The strategies of family intervention and community mobilisation also warrant further research.

4. Recommendations and Conclusions

4.1 Recommendations for Implementing Adolescent Health Promotion Interventions

The preceding sections examined research findings for a variety of health promotion strategies in terms of evidence of their implementation, outcome effectiveness and, where possible, dissemination and cost effectiveness. There is clear evidence for particular health promotion strategies across the six health outcome areas of depression, suicidal behaviour, alcohol and drug use, tobacco use, anti-social behaviour and sexual risk-taking behaviour. Dissemination issues are discussed in this report, but several programs have undergone only limited evaluation, have not been completely evaluated, or are being evaluated and will require future review. The following recommendations on implementing health promotion strategies must be viewed in this context.

Recommendation 1: Invest Strategically to Advance Evidence-based Practice

The present report provides a basis for the strategic development of evidence-based approaches to adolescent health promotion. Strategic initiatives will need to be balanced, and to include both support for innovation and evaluation for particular strategies, and also rigorous pilot testing and evaluation of specific programs. Both Statewide services and regions have roles in such an endeavour. Statewide dissemination may be critical for strategies such as legislative change and social marketing. Regional funding may be most appropriate to increase expertise in programs with evidence of impacts on regionally prioritised risk factors, protective factors, and youth health and behaviour problems.

Preventive interventions should include evaluation requirements designed to advance the level of evidence for the selected health promotion strategy. To advance evidence for outcomes evaluation, contracts should be designed to enable randomised allocation to control conditions and longitudinal measurement. Strategies that have evidence for outcome or dissemination should include evaluations to ensure consumer approval and post-program impacts on targeted risk and protective factors.

Recommendation 2: Invest in Strong Implementation

The evidence is consistent across outcomes: weakly implemented interventions show inconsistent or null effects. Programs should be implemented with adequate training for those required to deliver them and with observational or other methods to check and ensure fidelity in implementation.

Recommendation 3: Request Behavioural Outcomes

Evidence suggests that health promotion interventions are delivering persistent behavioural effects. Program investment should be provided on the expectation of a positive change in health outcomes as well as risk factors. This approach requires funding for longer-term implementation and evaluation. Intermediate indicators (including indicators of social and organisational capacity) are needed to provide positive feedback and accountability to funders in the interim.

Recommendation 4: Employ More than One Health Promotion Strategy

Evidence suggests that health promotion interventions that incorporate more than one strategy — such as social marketing combined with school-based health education — are more

consistently effective than those that use a single approach. This appears true for programs that target tobacco use, alcohol misuse, sexual risk taking and anti-social behaviour.

Recommendation 5: Target Multiple Risk Factors

Programs that target more than one risk factor — such as parental bonding and peer influence — may have a better chance of producing a positive effect and a more consistent impact.

Recommendation 6: Seek Sustained Intervention

Single sessions or interventions for only one school year are less successful than interventions introduced and maintained over several years. Investment in health promotion should support a coordinated set of activities throughout childhood and adolescence, thereby addressing the developmental stage of youth and building on a solid foundation of health promotion activities. This will ensure sustainability of interventions.

Recommendation 7: Identify and Reward Evidence-based Practice

Health promotion programs being delivered in Victoria should be audited to establish the consistency among existing programs, and to determine whether they are congruent with an evidence-based approach. Those found to be evidence based should be acknowledged and rewarded.

4.2 Conclusions on Evidence-based Strategies for Adolescent Health Promotion Interventions

School-based Health Education

Health education has come a considerable distance since the early work of the 1970s. Reasonable evidence has accumulated to suggest that well-conducted health education programs can reduce alcohol and drug use, smoking, sexual risk taking and anti-social behaviour. These approaches appear to be cost effective.

An obvious question arises from this review — what is the potential for an integrated school-based health education curriculum? There is some evidence that such a curriculum can be effective across a variety of health outcomes. Investment in the dissemination of evidence-based drug education could focus on integrating this strategy as a universal component within school programs. Existing evidence from Botvin's group suggests that less intensive training may be as effective as intensive training. Interventions also need to span several of the early adolescent years. These approaches appear to require ongoing training, professional development of teachers and feedback from evaluation, and probably are not sustainable without this input. Well-conducted health education programs may offer some further advantages relevant to mental health promotion, but the existing evidence does not enable clear conclusions; thus, investment to encourage innovation in this area may be warranted.

Parent Training and Family Intervention

There is a growing body of evidence from the United States that parent training interventions may be useful either as a component of broader alcohol and drug prevention programs or as discreet drug prevention strategy. Funding to advance these strategies in Australia should be given some priority; it should emphasise implementation with rigorous evaluation. Both parent training and more intensive family intervention appear important as a selective intervention strategy for crime prevention through the adolescent years. The dissemination of these programs as an early intervention for crime prevention is recommended as a priority.

To improve understanding evaluations should investigate potential impacts on other outcomes. The Australian experience of adolescent family intervention is relatively undeveloped; thus, investment in demonstration projects should be considered, so as to encourage innovation, to develop and coordinate expertise, and to evaluate this strategy.

Community Mobilisation

Ambitious, large-scale community-mobilisation efforts are now being successfully conducted and evaluated with promising results. However, not all the evaluation evidence has been positive, so supporting the development of this area will require coordinated investment. Supporting a limited number of Statewide 'model demonstration sites' may be one strategy to encourage broader education and training. There may be scope for supporting geographically based teams to coordinate community mobilisation activities within local communities.

Community mobilisation strategies implemented with rigorous evaluation may be useful for preventing a range of adolescent health problems, including tobacco use, alcohol and drug use, and sexual risk taking. Funding to support innovation with evaluation should be provided to extend these programs to achieve crime prevention and mental health targets.

Law, Regulation, Policing and Enforcement

Evidence supports investment in the dissemination of evidence-based tobacco control strategies for enforcing laws that prohibit retail sales of tobacco to minors. Programs using this strategy may also be useful for reducing alcohol sales to minors, but would require community readiness. Victoria has pioneered approaches to the policing of illicit drug use, and rigorous evaluations of these programs should be completed and published.

Funding targeted at rigorous evaluation may lead to policing strategies being extended to programs that aim to reduce the transition of adolescent delinquency into serious offending. Further, the regulation of access to the means of suicide may be an important component in suicide prevention strategies, worthy of implementation and evaluation support.

Social Marketing

Mass media campaigns appear to have little impact on their own, but greater potential where they are coordinated with regional components that actively involve school health education and parents. Evidence supports the implementation of social marketing (with rigorous evaluation) to prevent tobacco use, alcohol and drug use, and suicide. Funding targeted at innovation and evaluation may extend the use of this strategy to programs that address adolescent sexual risk taking, crime prevention and mental health promotion.

School Organisation and Behaviour Management

Behaviour management strategies have demonstrated evidence of outcomes and application in wider dissemination where they have been delivered within schools to address behavioural problems. The implementation of these programs may create some difficulties; thus, while investment for wider dissemination in the Australian context would appear useful, it should be preceded by a systematic audit of the programs being delivered in Australia.

School organisation strategies could be implemented with rigorous evaluation, so as to improve our understanding of their application in preventing alcohol and drug misuse and promoting mental health. Further research investment may be warranted to better understand the potential of both school organisation and behaviour management for helping prevent tobacco use and sexual risk taking.

Peer Intervention

Peer education appears to be an increasingly popular strategy in Australia for promoting harm reduction relevant to youth drug use and sexual risk taking. Evidence suggests that approaches using the strategy can be implemented, and that professionals and consumers accept such approaches. Further dissemination of this strategy should be considered for promoting sexual health. Implementation with rigorous evaluation should be considered as a tobacco control strategy. Evaluations of the prevention of alcohol and drug use have produced mixed.

A possibly critical ingredient may be the extent to which programs are structured to increase exposure to pro-social adult values and behaviours. Funding targeted at innovation and evaluation may extend this field. However, some negative findings on the application of peer intervention to crime prevention programs suggests further support should be contingent on rigorous evaluation.

Community-based Health Education

The distribution of information within a community setting represents one of the most popular health promotion strategies used in Australia. It is perhaps not surprising that community education is being successfully implemented across a variety of outcome domains. Evaluations located through this review mainly reported findings on the more intensive application of community health education, involving formal curriculum delivered over sequenced sessions. Evaluations have not been particularly strong and often focus on simply increasing knowledge.

Funding further implementation with rigorous evaluation may be warranted for attempts to prevent tobacco use, alcohol and other drug misuse, sexual risk taking and crime. Evidence suggests that behavioural change is not an unreasonable target for these strategies. A demand for evaluation to provide evidence of behavioural could encourage further development in this field.

Health Service Reorientation

Some evidence suggests that appropriate reorientation of health services can offer advantages to adolescents in discouraging tobacco use and encouraging safer sexual behaviour and more moderate alcohol and drug use. Further implementation with rigorous evaluation is recommended. Funding targeted at innovation and evaluation could help determine the potential for this strategy to prevent suicide and promote mental health.

Recreation

Given the prominence of sport within Australian society, interventions located within sport and recreation settings may be particularly important to Australian youth. Funding implementation with rigorous evaluation could assist tobacco control, the prevention of alcohol and drug misuse, and the prevention of sexual risk-taking behaviour. Evaluations have been restricted to a limited range of outcomes, and further innovation is possible in this field. Funding targeted at innovation and evaluation could encourage efforts to extend this field.

Mentorship

Recent work by Michael Resnick and colleagues suggests connections with pro-social adults can be an important protective factor for young people at risk of depression or self-harm. Despite the availability of some research relevant to crime prevention, the study team was unable to locate studies that have evaluated the use of mentorship to prevent other adolescent outcomes. Funding targeted at innovation and evaluation could encourage efforts to extend this field.

Employment and Training

Funding targeted at innovation and evaluation may extend this field. Employment and training programs targeting crime prevention should be carefully conceived and include rigorous evaluation.

Appendix II summarises the evidence reviewed here that is relevant to the measured impact of adolescent health promotion strategies on a range of risk and protective factors. A range of family and school-based interventions demonstrated positive impacts on family-level risk factors. A smaller number of studies examined impacts on school-level risk factors. School organisation strategies provide some early evidence of impacts on school rewards (opportunities). The evidence suggests school-based health education can positively influence a range of risk and protective factors, including attitudes, skills, peer influence and sometimes harm reduction practices. Two strategies commonly used to promote harm reduction (community-based health education and health service reorientation) do not demonstrate consistent evidence of an impact on harm reduction practices. A salient point revealed by the table in Appendix II is the number of relationships that have not yet been adequately explored. There is now a considerable research on the effectiveness of intervention strategies for improving adolescent health. To follow up the present report, a more systematic audit of intervention strategies and program components being delivered in Victoria is recommended, so as to establish the extent of congruence between these programs and an evidence-based approach.

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Appendix I

Summary of Evidence Base for 13 Adolescent Health Promotion Strategies Targeting Six Adolescent Health Outcomes

Health Promotion Strategies	Tobacco	Alcohol and drugs	Sexual health	Anti-social behaviour	Depression	Suicide
Parent training	Ⓜ	★★	Ⓜ	★★★	Ⓜ	★ ^{1/1}
Family intervention	Ⓜ	★ ^{2/3}	★ ^{3/3}	★★	Ⓜ	Ⓜ
School-based health education	★★	★★★	★★★	★★	★ ^{1/2}	Ⓜ
School organisation and behaviour management	Ⓜ	★ ^{1/1}	Ⓜ	★★	★ ^{0/1}	★ ^{0/1}
Mentorship	Ⓜ	★ ^{1/1}	Ⓜ	★ ^{1/10}	Ⓜ	Ⓜ
Peer intervention and peer education	★ ^{2/2}	Ⓜ	★★	Ⓜ	Ⓜ	Ⓜ
Youth recreation	★ ^{0/1}	Ⓜ	★ ^{1/1}	Ⓜ	Ⓜ	Ⓜ
Health service reorientation	★ ^{1/3}	★ ^{1/1}	★ ^{2/7}	Ⓜ	Ⓜ	Ⓜ
Community-based health education	Ⓜ	★ ^{1/2}	★ ^{3/6}	★ ^{2/2}	Ⓜ	Ⓜ
Employment and training	Ⓜ	Ⓜ	Ⓜ	☒	Ⓜ	Ⓜ
Law, regulation, policing and enforcement	★★★	★ ^{2/2}	Ⓜ	Ⓜ	Ⓜ	★★
Social marketing	★ ^{1/3}	★ ^{1/1}	Ⓜ	Ⓜ	★ ^{0/1}	★ ^{1/1}
Community mobilisation	★★	★★	★★	★ ^{0/4}	Ⓜ	Ⓜ

- Ⓜ *Limited investigation.* No relevant effectiveness studies were located and there were no empirical or theoretical grounds for suggesting the intervention might potentially impact the outcome.
- ☒ *Contra-indicative evidence* that the use of this strategy would prevent the targeted outcome. This rating required consistent null or negative findings in well-controlled evaluation studies.
- Ⓜ *Further research warranted.* This rating was applied to strategies that appeared theoretically sound or had some promising evidence for their implementation or outcome, but in small scale or inadequately controlled studies. Programs using these strategies may be priority targets for future research funding.
- ★^{xy} *Evidence of implementation.* This rating was applied where published studies reported a sound theoretical rationale, acceptance within service delivery organisations, target population recruitment on a scale sufficient to contribute usefully to population health impacts, and adequate consumer approval measured using indicators such as program retention. ^{xy} = the proportion of positive demonstrations of impacts on risk factors, protective factors or outcome behaviours. Programs using these strategies may be supported for funding if the initial Australian implementation included rigorously controlled outcome evaluation.
- ★★ *Evidence of outcomes.* This rating was applied where positive outcomes were consistently published in well-controlled interventions. Interventions were required to be of sufficient scale to ensure outcomes within the constraints imposed by large-scale population health frameworks. Programs using these strategies may be carefully monitored for their impacts while being supported for wide-scale dissemination.
- ★★★ *Evidence of dissemination.* This rating required published reports of impacts where programs were delivered on a large scale, not by research teams, but by government auspice bodies or other service delivery agents. Evidence of dissemination was sought only for strategies demonstrating evidence for outcomes. Programs using these strategies

may be accorded some priority for dissemination in the Australian context. Initial Australian dissemination trials should monitor for impacts. Where possible, cost effectiveness has been considered for programs using these strategies.

Note: the criteria for 'evidence of outcomes' are congruent with definitions commonly used by the National Health and Medical Research Council, the Cochrane Collaboration and other review groups (that is, systematic review of randomised or well-controlled trials). The category 'evidence of dissemination' is an innovation that Professor George Patton developed for this research project to address the challenge of system change in the health promotion field.

Appendix II

Summary of Intervention Strategy Impacts on Risk and Protective Factors

	Parent Training	Family Intervention	School Health Education (to Year 6)	School Health Education (Years 7–8)	School Health Education (Years 9+)	School Organisation	Peer Intervention Peer Education	Health Service Re-orientation	Community-based Health Education	Law, Regulation, Policing and Enforcement	Social Marketing
Family											
Family attachment	✓ ^{2/2}	✓ ^{1/1}		# ^{2/4}	✓ ^{2/2}						
Family conflict	✓ ^{2/2}										
School											
School rewards (bonding)						✓ ^{2/2}					
School commitment				✗ ^{1/3}							
Community											
Availability of means to engage in the problem behaviour										✓ ^{9/13}	
Community laws and norms favourable to the problem behaviour			# ^{1/2}	✓ ^{2/3}				# ^{1/2}			
Community opportunities for pro-social involvement								✓ ^{4/4}			
Media portrayals favourable to the problem behaviour											✓ ^{2/2}
Peer											
Perceived peer involvement			✓ ^{4/5}	✓ ^{4/8}	✓ ^{3/3}						✓ ^{4/4}
Individual											
Favourable attitudes to the problem behaviour			✗ ^{3/8}	✓ ^{10/16}	✓ ^{5/7}			✓ ^{2/3}	✓ ^{5/7}		✓ ^{3/3}
Harm reduction			# ^{2/4}	# ^{1/2}	✓ ^{4/4}	✓ ^{2/2}	✓ ^{3/3}	✗ ^{2/5}	✗ ^{1/5}		
Social skills		# ^{1/2}	✓ ^{10/12}	# ^{8/16}	✓ ^{4/5}				✓ ^{3/3}		

✓ Two or more studies were conducted and the majority reported a positive impact. (^y = proportion of studies with positive impacts)

✗ Two or more studies were conducted and the majority reported a non-significant or negative impact. (^y = proportion of studies with positive impacts)

Proportion of positive findings was equally divided. (^y = proportion of studies with positive impacts)

Blank cells = fewer than two studies examined the impact.