AN EVIDENCE-BASED APPROACH TO AN EVALUATION OF A HEALTH PROMOTING SCHOOLS INTERVENTION.

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I hereby certify that the work embodied in this thesis is the result of original research and has not been submitted for a higher degree to any other University or Institution.

Signed:
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SYNOPSIS

It is now widely accepted that schools are ideal settings for health promotion initiatives which target health and health risk behaviour of school-aged children.\textsuperscript{1-3} The current approach to school-based health promotion, known as the \textit{Health Promoting Schools} (HPS) approach, embraces the principles of the Ottawa Charter\textsuperscript{4} and focuses on opportunities for action on: the formal school curriculum; the school environment (or informal curriculum); and links with the home and wider community.\textsuperscript{5} Acceptance and endorsement of the approach has come from several leading international and Australian health promotion organisations.\textsuperscript{1, 6, 7} Despite the large amount of interest and enthusiasm generated, there remain a number of significant gaps in knowledge and research evidence, particularly that which addresses the efficacy and effectiveness of the HPS approach. The recent drive by influential bodies\textsuperscript{8-10} for evidence-based health promotion further supports the need for the application of a systematic framework to the development and evaluation of HPS interventions. This thesis, therefore, describes the application of the \textit{Staged Approach to health promotion practice and research} model\textsuperscript{11} to the development and evaluation of a HPS intervention program which aims to reduce three priority health risk behaviours (smoking, unsafe alcohol use and inadequate sun protection) among a cohort sample of Australian adolescents.

\textbf{Chapter One} of this thesis provides the background to the development of the HPS approach, identifies the key gaps in knowledge and research evidence, and outlines the stages of the \textit{Staged Approach} model and its application to the development and evaluation of a HPS intervention. \textbf{Chapter Two} describes an audit of published literature over an 18-year period to provide an overall picture of the quantity of available evidence within each of the stages of health promotion practice. \textbf{Chapter Three} first identifies health issues which are appropriate to target in school-based
health promotion, then applies Stages I and II of the Staged Approach by reviewing the available evidence on adequacy of measures and current prevalence, determinants and target groups. The design, methods and development of a measurement tool for a descriptive, baseline study on the prevalence and determinants of three health risk behaviours among young adolescents in the Hunter Region is outlined in Chapter Four, with the findings from this study described in Chapter Five.

A critical review of school-based programs and HPS trials implemented to date is described in Chapter Six, as the first step in evaluating the efficacy and acceptability of interventions (Stage III of the Staged Approach). The review considers the extent to which the HPS approach has been conducted in trials, as well as issues regarding study design, outcomes and quality of available research. Chapter Seven describes a randomised controlled trial of a HPS intervention program which aimed to reduce the prevalence of three health risk behaviours among young adolescents in the Hunter region. The model of implementation and specific strategies are outlined, as well as the acceptability and degree of implementation as a process evaluation of the program. Chapter Eight reports on the impact/outcome evaluation of the program concerning its effectiveness in reducing the prevalence of three health risk behaviours and their determinants. Finally, Chapter Nine draws conclusions regarding the effectiveness of the HPS approach, provides recommendations for the implementation of future school-based health promotion initiatives and addresses issues of dissemination and wider adoption of HPS programs as indicated by the final stages of the Staged Approach model.
References for Synopsis


Chapter One

Introduction to an Evidence-Based Approach to Health Promoting Schools

Parts of this chapter have been published in the following paper:

Schools as Settings for Health Promotion

Key international health organisations have identified schools as institutions which potentially play an important role in influencing the present and future health and lifestyles of young people.¹-³ The school is where children spend a large proportion of their waking life,⁴ including the developmental years in which health risk behaviours are often adopted as lifetime habits. Schools are recognised places of learning with existing structures and systems that provide opportunities for the integration of new knowledge and skills into the regular curriculum in a way that is both acceptable and cost-effective.⁵ Further, it has been recognised that the informal or 'hidden' curriculum of a school can significantly influence students' attitudes and behaviour. The messages conveyed in the classroom can be reinforced or completely undermined by what occurs outside the classroom.¹

Schools have the potential for access to nearly the entire population of young people, including minority and disadvantaged groups. Data from the 1991 Australian Census indicate that there were 3,069,259 persons in attendance at either pre-school, primary or secondary schools in the same year that there were approximately 3.2 million children aged 5 to 17 years.⁶ Teachers can be perceived as role models for students and are central to a school's functioning, therefore interventions targeting students may potentially change the health risk behaviour of teachers. Finally, schools also provide a valuable link with parents and the community. Involvement of parents, care-givers and local community members can act as a strong reinforcement and support for strategies implemented in schools.

At the 1991 Geneva Consultation Conference held by the World Health Conference (WHO), United Nation’s Educational, Scientific and Cultural Organisation (UNESCO) and United Nation’s Children’s Fund (UNICEF),⁷ experts argued that greater emphasis should be given to child and adolescent health, and they identified schools as a key setting for the task. In schools, both health and education sectors can jointly take action and act
as partners in improving the health of young people. In Australia, this argument was supported by a series of reports prepared by the Commonwealth Department of Health, Housing and Community Services which identified schools as settings for health promotion.\textsuperscript{1} The capacity of schools to act as sites for health promotion activity is bolstered by "the presence of a skilled and caring work force"; "the legitimacy conferred on schools as places for health advancement"; student involvement in school councils and representative groups; parental involvement; links with health agencies; and the existence of a compulsory health curriculum and teaching guidelines.\textsuperscript{8}

In 1996, the National Health and Medical Research Council (NHMRC) of Australia also strongly advocated the role that schools can play in health promotion activity targeted at young people.\textsuperscript{9} This is consistent with the 'settings based' approach to health promotion intervention and the 'new public health movement' endorsed by both the WHO in the Jakarta Declaration on Health Promotion into the 21\textsuperscript{st} Century,\textsuperscript{10} and the International Union for Health Promotion and Education (IUHPE) in their report to the European Commission (EC) on the evidence of health promotion effectiveness.\textsuperscript{11} Schools are therefore an ideal setting for health promotion interventions which target health and health risk behaviour of school-aged children.

The history of school-based health promotion

For many years, school-based health promotion programs were implemented in the form of traditional health education through school curricula. Typically, teachers would present packages of information about health risk behaviours in the hope that it would provide children with the necessary knowledge to influence their behaviour. However, this approach
was not based on any sound theoretical framework and produced little change in health behaviour.\textsuperscript{12-14}

In the early 1980s, attention focused on attempts to rationalise health education by grounding programs in some appropriate model which recognised the influence of parents, siblings and peers on adolescent behaviour. The result was the development of a number of school-based health education programs that incorporated innovative methods for developing skills and attitudes among students to assist them in making healthy lifestyle choices.\textsuperscript{15-17} The majority of these programs targeted drug abuse prevention in young adolescents and were based on theories of Social Learning\textsuperscript{18} and the Health Belief Model.\textsuperscript{19} Components of such programs included: awareness of social influences (eg. peers, media, parents); training in refusal skills; interpersonal/communication skills; problem-solving; assertiveness training; and enhancement of self-control and self-esteem. Programs incorporating traditional health education and Social Learning Theory methods did show improvements in health-related knowledge, attitude and skills.\textsuperscript{4,20} Evidence, while inconsistent, indicated some immediate improvements in health behaviour,\textsuperscript{4,21} particularly in the area of short-term decreases in drug use among students.\textsuperscript{15-17}

However, subsequent research indicated that any positive effects had largely disappeared by four or five years of follow-up.\textsuperscript{22-24} For example, in a large-scale randomised trial of the social influences approach to smoking prevention in 22 Canadian schools, students who received a social influences curriculum in grade six were less likely to start experimenting with smoking up to the end of grade eight but were no different from control students at grade twelve, indicating that program effects on experimental smoking had completely decayed within six years of the intervention.\textsuperscript{22}

The realisation that health education and/or social skills training were having little-to-no long-term impact on the health behaviour of school-aged children forced practitioners to look beyond the existing models and develop a new
approach to school health promotion. The Declaration of Alma Ata in 1978 recognised that education is only one strategy for improving health status, and argued for a more holistic view of health behaviour which takes into account the environment and community in which one lives. This view was affirmed in 1983 by a WHO Expert Committee which also stressed the need to involve the health sector in health education in schools. Recognition of the need to direct attention to these other significant influences on children's lifestyles, and a series of publications by the WHO and WHO/UNESCO, led to the development of 'comprehensive school health' programs.

Comprehensive School Health

Originally, the term 'comprehensive school health' was conceived as including three components: school health services, school health education and the school health environment. The three components provided a structure for the planning and organisation of school health programs, and were seen to provide a cohesive and integrated approach to health promotion in schools. The purpose of this new 'comprehensive' approach was to "provide each student, from the time of entrance into the school system, with planned, systematic, and ongoing learning opportunities designed to maximise the prospect that each student will be able to make health-enhancing decisions that promote personal growth throughout life". Emphasis was placed on improving and maintaining the health, positive health attitudes and behaviours of all school children. In the United States (US), national criteria were established to assist schools in the assessment and prescription of the comprehensiveness of their health programs, and practical steps provided for school health educators to follow in achieving comprehensive school health programs.
While the original trilogy of school health education, services and environment remains relevant today, it was soon realised that the definition of 'comprehensiveness' had to be expanded to include greater recognition of family and community links and their influences on children's health. These factors are included as important components in Nader's 'School Health Model for the 1990s' which proposes that a child's health status and educational achievements are at the apex of family, school and community systems. In an extended model of comprehensive school health, Allensworth and Kolbe's 'School Health Promotion Components and Outcomes' framework identifies eight distinct program components requiring a team approach to address target health behaviours. These eight components are: school health services; health education; school health environment; integrated school and community health promotion efforts; school physical education; school food services; school counseling; and school site health promotion programs for staff. Allensworth and Kolbe's model also proposes inter-relationships between program components and student health behaviour and health status outcomes.

Complementary to the work of both Nader and Allensworth and Kolbe is the ACCESS model which views comprehensive school health promotion as being comprised of five major keystones: Administration; Community; Curricula; Environment; and School Services. This model differs from the other two in that it includes a focus on school administrative support and structure. The five associated keystones or principles are seen as necessary for the "broad-based organisational structure for planning, implementing, and evaluating of school health promotion programs". The Administration and Community keystones are viewed as requiring development first to provide the structure and support base for other areas. The Environment keystone is the next most important area to focus attention on, followed by the Curricula and School Services which can only function at optimal levels when the messages conveyed in the classroom
are supported and reinforced by what occurs outside in the other keystone areas.\textsuperscript{38}

These three models, the 'School Health Model for the 1990s',\textsuperscript{34} 'School Health Promotion Components and Outcomes'\textsuperscript{37} and the 'ACCESS model',\textsuperscript{38} were developed as consensus grew regarding the need for comprehensive school health promotion programs. Their slight differences in foci and specific program components are overshadowed by their commonality, that is, taking a multi-component approach to school health promotion. As argued by a number of authors, multi-component school-based programs offer the greatest potential for having a positive impact on children's health-related knowledge, attitudes and behaviour.\textsuperscript{39-41} Numerous publications document support for this new approach\textsuperscript{for example 31, 34, 37-50} and comprehensive school health programs have been implemented in schools both overseas\textsuperscript{5,51-58} and in Australia.\textsuperscript{59-63} These programs involved multiple component interventions that attempted to target many of the known determinants on children's health. For example, the \textit{Midfield High School Safety Belt Incentive Program} incorporated classroom-based education, social skills training, community-wide education and parental participation components in an effort to increase seat-belt use among children.\textsuperscript{57} As another example, Western Australia's \textit{School Development in Health Education Project (SDHE)} encouraged the involvement of teaching and non-teaching staff (school nurses, student counselors), parents, families and local community members in training workshops, then held reflection meetings for participants to review teaching practices, plan school health promotion initiatives and develop school health policies, in an attempt to reduce drug abuse.\textsuperscript{63}

Studies over the years have shown impressive gains in student health knowledge and attitude change as a result of exposure to comprehensive school health education, but the important evidence of impact on actual health behaviour has been more elusive.\textsuperscript{31} There is a growing pool of
literature which documents that both immediate\(^{53-57,64-67}\) and long-term\(^{54,55,64}\) behavioural effects can be achieved with soundly implemented comprehensive school health promotion programs. For instance, the *Midfield High School Safety Belt Incentive Program* described above was successful in producing an increase in seat-belt use among high school students, from a baseline rate of 26% to a 38% rate at final observation.\(^{57}\)

The question of effectiveness of comprehensive school health programs will be explored in greater detail in Chapter Five of this thesis.

While acceptance and support for comprehensive school health programs grew rapidly in the US, a similar shift in philosophy and direction in school-based health promotion was underway in other parts of the world. This new direction has become known as the *health promoting school* approach.

**The Health Promoting School approach**

The health promoting school (HPS) approach originally emerged from the United Kingdom (UK) and then more widely in Europe during the late 1980s with significant support from the European Office of the WHO.\(^{68,69}\) In essence, a HPS is conceived as one which attempts to balance the health curriculum and classroom teaching with an approach that involves structural, organisational and economic or political change for improved health.\(^{69,70}\) The concept of the HPS indicates opportunities for action directed at enhancing the school's policies and environment, and improving links with the family and wider community to maximise its potential to contribute to better health.\(^{69,70}\) The approach is now internationally accepted and supported by initiatives, such as the European Network of Health Promoting Schools, and others in Europe, Canada, North America and Australia.\(^{68,69,71-74}\)

The HPS approach has been defined in two slightly different forms, both of which are holistic in nature and are congruent with the emergence of the
new public health movement.75 The first of these proposes that attention be directed toward three elements: the school curriculum; the school environment (or hidden curriculum); and the school interaction with the home and the wider community.68, 69 A HPS "looks at the whole school environment and all aspects of school life... healthy school communities are those in which the practices in the three spheres of learning - the classroom, the whole school atmosphere, and the home/school/community relationship - consistently reinforce caring about health and well-being."76 A similar framework was adopted by Australia's Commonwealth Department of Health, Housing and Community Services (DHHCS) in its report 'Goals and Targets for Australia's Health in the Year 2000 and Beyond' which defined HPS as involving activities focused on:

- the school curriculum;
- the school environment;
- the interface between school and community; and
- links with health and welfare services.1

The second form of the HPS approach embraces the principles of the Ottawa Charter27 as a process of enabling school communities to improve the health status of their members.77 The application of these principles to the school setting proposes that school communities can have a positive effect on children's lives by:-

- creating a safe and healthy school environment;
- addressing school policies relevant to health issues;
- involving parents, families and local community groups in activities and the sharing of resources;
improving the health-related knowledge, attitudes and skills of students and staff; and

re-orienting health and school services to provide adequate care and healthier choices.

These five principles are supported by the WHO and the Australian Network for Healthy School Communities as necessary conditions for a HPS.

Health Promoting Schools Activity in Australia

Within Australia, The National Network of Healthy School Communities and the Australian Education Council have both produced guidelines for developing HPS. The Australian Health Promoting Schools Association was formed in 1992 to forge and utilise links between education, health, parents and other key stakeholders. A report to Australia's NHMRC Health Advancement Standing Committee's Health Promotive Environments Working Party in 1996 further endorsed the potential of the HPS approach as a strategy for health advancement. In an effort to enhance the expansion of the HPS approach through policy development, a National Health Promoting School Initiative (NHPSI) was carried out in 1997.

At a state level, there appears to have been an equal amount of enthusiasm, mostly driven by the local health sector and area health departments, as indicated by the formation of state-based HPS associations and other initiatives such as Victoria's Health in Primary Schools (HIPS) and Western Australia's School Health (WASH) projects. A number of other projects have been, and are currently being, implemented in all states and territories of Australia. Intersectoral collaborations are also operating in a number of states. For example, in New South Wales, the Departments of Health, School Education, Catholic Education Commission and the
Association for Independent Schools joined forces to produce guidelines on how to work *Towards a health promoting school*.  

**Gaps in Knowledge and Research**

The HPS approach has generated a great amount of interest and activity in both the health and education sectors, and though this appears to be evidence of a clear philosophical shift at international, national and state levels, it is less clear to what degree this approach is being adopted at the school level. There have been some attempts to gauge the status of health promotion in Australian schools.  

For example, a 1997 audit involving case study interviews, key informant meetings and questionnaires, found that nearly 40% of schools were unfamiliar with the HPS concept, and only 20% reported past involvement in a HPS initiative. Similar results were found in another study which showed that teachers had received limited training in health issues and mainly viewed school health in terms of the curriculum, with little understanding of how the other areas, such as community partnerships, could be utilised. It appears that Australian school teachers generally have a poor understanding of the HPS concept, and this has been a hindrance to gaining a clear picture of current policies and practices.

Another barrier to the monitoring of the HPS approach in schools has been the absence of valid and reliable measurement tools. Though there is some general acceptance of the broad philosophy and principles underlying the HPS approach, it has been acknowledged that there is no universally acceptable definition or consensus on explicit criteria by which schools may be assessed. Efforts have been made to identify potential indicators of a health promoting school, but more work is required to gain definitional clarity.
Though a number of interesting case studies have been described in the literature, it is only very recently that intervention trials have begun to be more rigorously evaluated.\textsuperscript{93-97} Most of these are in the primary school setting (ie. ages 5 to 12) with only a few focused on secondary (or high) schools.\textsuperscript{92,96,97} Researchers have noted that due to their size, structure and emphasis on academic achievement, secondary schools appear to have a reduced capacity to embrace and co-ordinate a school-wide approach to health promotion.\textsuperscript{9,98} There is a need for more rigorous research on the HPS approach,\textsuperscript{9,89,98,99} particularly in the secondary school setting.

While the results of intervention trials to date will be described in more detail in Chapter Five, in brief, they have been mixed. Some report significant short- and long-term behavioural effects,\textsuperscript{54,55,57} while others have failed to find any significant intervention effect.\textsuperscript{95-98,100} Research has also focused on different impact and outcome measures ranging from student knowledge, skills, attitudes and health behaviour, to school policy and structural change. There needs to be further exploration and identification of which outcomes are achievable.\textsuperscript{90,102}

The question of efficacy of the HPS approach, particularly in changing health risk behaviour, remains unresolved. In addition, little is known about the factors which facilitate or inhibit the success of the HPS approach, its acceptability and cost-effectiveness.\textsuperscript{90} Further, if the HPS approach is found to be efficacious, then issues regarding dissemination and adoption of the approach must also be explored. These gaps in research and the questions raised above require quality research so that future efforts to promote the HPS approach are based on empirical evidence.
Evidence-based health promotion

The recent drive by influential bodies\textsuperscript{103-105} to promote evidence-based practice comes in response to the quest for improving the quality and cost-effectiveness of health promotion interventions.\textsuperscript{106} This pursuit stems from a larger context of discussions on evidence-based medicine which are taking place in much of the world.\textsuperscript{107} Evidence-based health promotion has been defined as \textit{"the appraisal or collection of research data being systematically integrated into and directed by the health promotion decision-making process."}\textsuperscript{108} One example to date of evidence-based health promotion is provided by the Centers for Disease Control and Prevention in the US which have compiled a \textit{Guide to Community Preventive Services: Systematic Reviews and Evidence-Based Recommendations}. The \textit{Guide} aims to summarise and rate the quality of available evidence on the effectiveness of a range of population-based strategies (eg. mass media campaigns, price increases) on health-related outcomes (eg. smoking rates, cancer incidence). Recommendations are made regarding health promotion interventions based on the strength of available evidence.\textsuperscript{105}

There has been considerable debate and discussion surrounding evidence-based health promotion,\textsuperscript{105,106,108-111} most notably on the issues of agreement on the kinds of evidence deemed acceptable and appropriate methodologies for developing such evidence. While some consider evidence-based health promotion to be a difficult and daunting challenge,\textsuperscript{109} others argue that new health promotion initiatives should not be implemented without supporting research evidence because of professional accountability and ethical reasons.\textsuperscript{108} Indeed, in 1998, the 51\textsuperscript{st} World Health Assembly urged all member states to \textit{‘adopt an evidence-based approach to health promotion policy and practice, using the full range of quantitative and qualitative methodologies’}.\textsuperscript{104}

Upon consideration of the status of evidence for HPS, a recent gathering of HPS experts from around the world identified the need for the application of
a framework to existing reviews of HPS and school-based health promotion, so that information can be organised, synthesized and extracted in manageable pieces.\textsuperscript{111} This thesis is an attempt at such an ambitious task. It addresses evidence-based practice issues regarding the HPS approach by undertaking a logical and systematic development and evaluation of a health promoting schools intervention program through the application of an appropriate framework or model of program development and evaluation.

\textbf{Models of health promotion program development}

A number of models have been proposed over the years to assist with decision-making at the stages of development, research and evaluation of health promotion interventions. These include Green and Kreuter's PRECEDE/PROCEED model;\textsuperscript{112} Galbally's Integrated Model of Health Promotion Planning;\textsuperscript{113} Ewles and Simnett's Nine-stage model;\textsuperscript{114} and several recent others\textsuperscript{108,114-117} all of which identify distinct stages in the development and evaluation of new interventions. These stages focus on: the identification of health-related needs or problems; the selection and design of appropriate interventions to address these problems; evaluation of intervention effectiveness; and methods of dissemination and wide-spread diffusion of efficacious health promotion activities. A general consensus exists that applying such a staged and systematic approach to health promotion intervention leads to more evidence-based practice which is more likely to produce a significant and sustained improvement in the health of the community.\textsuperscript{108} The models can also be used to indicate the current state of knowledge and where gaps in evidence may lie.\textsuperscript{109}

Despite being recognised for their conceptual usefulness,\textsuperscript{119} a number of these models have been criticised. For instance, although the Ewles and Simnett model provides a logical step-by-step framework for planning health promotion activities in a variety of settings, it suffers from a lack of detailed
methods for identifying health needs and does not consider evaluation procedures in the planning stages.\textsuperscript{30} Several publications in recent years have noted that many of the models do not clearly identify the links between the development and evaluation of a health promotion program and subsequent stages of program dissemination and adoption.\textsuperscript{108,119,120} Though Green and Kreuter's \textit{PRECEDE/PROCEED} model\textsuperscript{112} is internationally known, widely used in the health promotion field and would have been appropriate for this thesis, the candidate has opted to apply another model which was developed in Australia.\textsuperscript{118} \textit{The Staged Approach to Health Promotion Research and Practice} model\textsuperscript{118} outlines a logical sequence in planning health promotion interventions from the development stage through to dissemination and adoption, and critically evaluates available research evidence at each step in the process.

\textbf{The Staged Approach to Health Promotion Research and Practice}

The \textit{Staged Approach} was initially developed by Sanson-Fisher and Campbell in 1994 in response to a need for a structure to evaluate health promotion research and to assess progress towards Australia’s national health goals and targets.\textsuperscript{118} It is currently used as a guide for health promotion practitioners in incorporating research evidence into the routine planning and implementation of health promotion activities.\textsuperscript{108} The model involves five stages structured as a logical sequence of questions to which the practitioner must determine if sufficient evidence is available for the questions to be answered. The nature and quality of available evidence then acts as a guide for the choice and design of health promotion activity. Where sufficient evidence is not available or the evidence is of poor quality, the model directs the practitioner to collect research data to address the identified deficiency in evidence\textsuperscript{108} (see Figure 1.1).
The Staged Approach closely parallels the steps contained in *The Measurement Iterative Loop* framework developed by researchers at McMaster University, Canada in the early 1980s. The "loop" was designed as a practical guide for both the consumers of research, by assisting in health care decisions, and researchers themselves, by guiding the planning and implementation of health research. Its application provides a framework for critically appraising available evidence; emphasises the importance of on-going monitoring; and can be used to identify gaps in research evidence, in much the same way that the Staged Approach does. Though the Measurement Loop is internationally known and has been applied to a range of health care services, the Staged Approach is considered a more appropriate model for the purposes of this
investigation as it has been designed specifically for the field of health promotion research and practice.

More detailed descriptions of each of the stages of the Staged Approach will follow in subsequent chapters, but an overview of the five stages will now briefly be outlined. The five stages or sequenced questions are as follows:-

**Stage 1: Adequacy of measures**

The first stage of the model requires a critical appraisal of available research evidence to determine whether existing measures and tools are reliable, valid, acceptable and sensitive enough to detect small changes. The outcomes of following stages and subsequent decisions and action of the practitioner are dependent of the availability and selection of adequate measures.

**Stage 2: Descriptive research**

In this second stage, questions are directed at finding out descriptive information about the health problem that will guide what factors and/or groups in the community the intervention will target. These questions include: *what is the magnitude of the problem?* (eg. prevalence, incidence); *are there any groups which experience the greatest burden of illness?*; and *what is known about determinants of the health problem?*

**Stage 3: Efficacy of intervention**

In this stage the practitioner is required to assess whether efficacious and acceptable interventions are available. That is, consideration must be given to the quality of research evidence, particularly rigorously designed
randomised trials, so that the selected intervention approach has the proven capacity to achieve a positive health benefit in a cost-effective manner.

**Stage 4: Dissemination trials**

If or when the efficacy of a particular intervention has been demonstrated, the next stage asks the question: are there effective and acceptable ways to disseminate health promotion strategies? To be effective and achieve the desired health benefits, interventions need to be widely distributed, accepted and adopted by all relevant organisations or persons. This stage requires an understanding of the factors and/or conditions under which the intervention is most likely to be adopted.

**Stage 5: Adoption**

The final task requires the practitioner to determine whether the intervention is effective in reducing the health problem when adopted and implemented on a large scale. The absence of health gains would therefore indicate that modifications to the intervention or a new intervention are necessary. The model at this point directs the practitioner to Stage 2 to search for more descriptive information and incorporate this through the re-worked stages of the model.118

The *Staged Approach* has been used by a number of reviewers to highlight strengths and gaps and research evidence.123-126 It has also been used as a tool for allocating research funds in the drug and alcohol field,127 and for planning and evaluating health promotion interventions in large-scale community trials.128 It provides a logical sequence and structured
mechanism for appraising available research evidence and incorporating that evidence into the design and implementation of health promotion initiatives. This thesis describes an application of the *Staged Approach* to the development and evaluation of a health promoting schools intervention program which aims to reduce three priority health risk behaviours (smoking, unsafe alcohol use and inadequate sun protection) among a sample of Australian adolescents.

**The Staged Approach to a health promoting schools intervention**

The chapters in this thesis move through the logical sequence of questions posed by the *Staged Approach*, in an endeavour to carry out a systematic and evidence-based approach to the evaluation of a HPS intervention. No research using this approach has been undertaken in this field. This thesis will provide verification of the current state of knowledge concerning the HPS approach and identify where gaps in evidence may lie. It will also permit the question of efficacy to be answered, in addition to addressing the issues raised earlier that relate to achievable outcomes; facilitating and/or inhibiting factors; and the degree of activity adopted in schools to date. Though the *Staged Approach* includes stages of dissemination and adoption, and while recognising the importance of these stages in the health promotion planning and evaluation process, this thesis will focus on Stages I, II and III only because of funding limitations and time constraints. Sufficient evidence for these first three stages must be identified before advancing onto the final two stages.
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Chapter Two

Audit of Research Publications on School-Aged Children and Health Risk Behaviour

Parts of this chapter have been published in the following paper:

Introduction

All fields in the health sector strive to adopt and implement principles of evidence-based practice. The rationale for this shift in practice, presented in Chapter One, derives from limited resources and increasing demands for accountability in demonstrating health outcomes.\textsuperscript{1, 2} Initiatives such as the Cochrane Collaboration,\textsuperscript{3} together with principles adopted by the World Health Assembly\textsuperscript{4} and the Australian Health Ministers' Advisory Council,\textsuperscript{5} provide much of the impetus for evidence-based practice. While acknowledging the on-going debate and difficulties associated with evidence-based health promotion,\textsuperscript{6-8} there is collective agreement that new health promotion initiatives should not be implemented without supporting research evidence.\textsuperscript{1, 2}

Few attempts have been made to gain a picture of the adoption of the principles of evidence-based practice into health promotion activity. In a study involving interviews with health promotion specialists working in the National Health Service in England, there was found to be a general awareness of the importance of evidence-based practice. However, it was also acknowledged that most evaluation activity was \textit{ad hoc} and not methodically rigorous enough to contribute to the development of the evidence base.\textsuperscript{8} In another study, four journals (Annals of Behavioral Medicine, Health Psychology, Journal of Nutrition Education, Tobacco Control) were audited and empirical studies were classified into one of five phases of research leading to evidence-based interventions. Descriptive research, which most commonly identified influences on health behaviour, was the most common type of published study. Studies on the development of measures were the least common, along with intervention trials.\textsuperscript{9} In a similar study, Oldenburg and others\textsuperscript{10} conducted a systematic audit of all fields of health promotion research published during 1994 in 12 peer-reviewed journals. The vast
majority (89%) of articles were classified as *Research and Development*, of which 63% were descriptive research. Only 16% of publications were intervention-based and 11% were methods development. Results of this audit further demonstrated that the majority of both health promotion and non-health promotion research was targeted at individuals, rather than at settings or systems. This is in contrast to the new public health approach and recommendations made in the Jakarta Charter (July, 1997) for a focus on a 'settings' approach to health promotion.\(^\text{11}\)

One setting in the health promotion field where little has been done using evidence-based practice principles is in the HPS approach. Despite wide acceptance of the approach as offering the greatest potential for having a positive impact on children's health,\(^\text{12-15}\) a number of important questions around evidence-based practice issues remain unanswered. These gaps in knowledge and research were described in Chapter One.

The first step towards the application of evidence-based practice to the HPS approach is to provide an accurate picture of the overall quantity and quality of available research evidence that has focused on health promotion activity in schools. This chapter deals with the scope of published research while its quality is appraised in Chapter Five. Though it has been argued that the availability of research does not directly lead to the implementation of good health promotion practice,\(^\text{10}\) it does provide the opportunity for the transfer of current knowledge. Insufficient research can also be used to indicate where gaps in evidence may lie.\(^\text{1}\)

In 1995, the candidate performed an audit of all literature published between January 1983 and March 1995 relevant to school-based health promotion and which targeted one or more of the health risk behaviours of smoking, alcohol use and inadequate sun protection.\(^\text{16}\) A total of 538 relevant individual citations were identified, the majority (51%) of articles were classified as
Descriptive research, typically on the prevalence and predictors of the three health risk behaviours in school-aged children. Only 4.3% of articles were classified as development of measures, 18% were intervention trials, and few (1.2%) citations were dissemination / adoption studies. Of the intervention trials articles, a total of 86 individual school-based intervention programs were published between January 1983 and March 1995 which targeted smoking and/or alcohol, or skin protection. These findings indicate an over-emphasis on descriptive studies in school-based health promotion research and highlight the need for more research into developing adequate measures, evaluating interventions and disseminating effective strategies.

While this literature audit specifically explored the HPS concept, there have been a number of comprehensive reviews of health education and school-based health promotion in general carried out in Australia,14,17 Europe,18 and the United Kingdom.12 The main focus of these reports is on the quality of evidence for the effectiveness of school health promotion (see Chapter Five), although they are briefly examined here as they give some indication of the amount of available evidence. The first review was undertaken by the Regional Office for Europe of the International Union for Health Promotion and Education in 1994. It identified only 12 school health evaluation studies from a search of three databases between the years 1984 to 1994 which met certain criteria for retrieval.18

Second, as part of a report prepared by the Australian NHMRC Health Advancement Standing Committee in 1996, a similar review was undertaken of international literature on school-based health programs. No specific details were provided on the review process or selection criteria other than stating that only refereed journals and/or reports were included. This review identified 39 school-based programs carried out since the mid-1970s. Of these, only 12 (31%) utilised a comprehensive approach.14
In the first of two systematic reviews conducted by the National Coordinating Centre for Health Technology Assessment in the United Kingdom, 1,067 citations published between 1980 and 1997 were identified that were relevant to HPS. Of these, 111 (10%) articles appeared to describe evaluations of interventions, of which only 12 (1.2%) met the inclusion criteria for review. An additional 215 reviews of the effectiveness of school health promotion programs were identified in a second review, of which only 32 publications met the inclusion criteria.

A substantial quantity of school-based health promotion research activity is being published. However, few intervention programs were deemed worthy of inclusion in these reviews as they failed to meet selection criteria. (These selection criteria are explored in more detail in Chapter Five.) This suggests that many programs were not carried out with the scientific rigour expected in evidence-based practice. Oldenburg, in his audit of all health promotion research, noted that many health promotion programs do not appear to have been adequately tested. He suggested a need for staged research to ensure that efficacy and effectiveness of programs are proven prior to their wider adoption and dissemination.

One framework which fulfills this requirement by providing a logical framework for conceptualising the steps involved in the development and evaluation of health promotion activities is The Staged Approach to Health Promotion Research and Practice. As outlined in Chapter One, the five stages of the model provide a useful structure for the evaluation of quantity and quality of available research evidence and incorporation of that evidence into the design and implementation of health promotion initiatives. The Staged Approach was utilised by the candidate in the 1995 audit to classify types of research publications according to the sequential stages involved in the development, planning and evaluation of health promotion strategies. This
model was again used in an extended audit to examine research published since that time.

Therefore the aim of this chapter is to audit research publications between the years 1983 to 2000, to quantify and identify gaps in the available evidence on school-based health promotion within each of the stages of health promotion development and evaluation as described by the Staged Approach. Given the potential enormity of this task, this thesis focuses on school-based research that has targeted one or more of three health risk behaviours among school-aged children (ie. smoking, alcohol use and inadequate sun protection). Relevant literature published from April 1995 through to December 2000 will be examined and combined with data collected from the earlier audit (January 1983 to March 1995) to provide an overall picture of trends in research in the field over an 18-year period from 1983 to 2000.

Methods

Search procedure

A series of computer database searches were conducted to identify and extract published literature in the English language, on school-aged children and one or more of the three health risk behaviours of smoking, drinking and inadequate sun protection over an 18 year period, from January 1983 to December 2000, utilising MEDLINE and ERIC databases. Key search terms for publications on smoking and school-aged children included: 'smoking and school', 'tobacco and youth', 'smoking and child', 'smoking and prevention', 'smoking and program', 'smoking and education'. Key search terms for
publications on alcohol and school-aged children included: 'alcohol and school', 'alcohol and youth', 'drinking and child', 'drinking and prevention', 'alcohol and program', 'alcohol and education'. Key search terms for articles on sun protection and school-aged children included: 'sun and protection', 'solar and protection', 'sun and exposure', 'sun and school', skin and child**, 'skin cancer and education', 'sun and program'. Identified articles were firstly checked for relevance to the appropriate topic and then downloaded onto lists for retrieval. For the period from January 1995 to December 2000 three additional databases which had only recently become available - APAIS (AUSTHealth), PROQUEST Education Complete, and Expanded Academic ASAP International Edition - were also utilised to identify and retrieve as many relevant publications as possible, using the same key search terms.

**Classification of publications**

All relevant citations retrieved from the database searches were classified into one of six types of publication using the framework of the Staged Approach to health promotion research and practice. Categories of articles adopted from the model were as follows:

1. **Measures.** This category included articles which dealt with either the development of measurement tools and/or the investigation of reliability and validity issues, and other methodological research or measurement issues;

2. **Descriptive research.** This category included data-based descriptive and analytical research, such as studies which have investigated prevalence, associations with and predictors of the three health risk behaviours of interest among school-aged children;
3. Intervention trials. This category included evaluation studies of programs, intervention trials and randomised controlled trials which were conducted, with the aim of reducing one or more of the health risk behaviours in school-aged children, and primarily included a school-based component;

4. Dissemination / Adoption trials. This category included research which evaluated strategies of disseminating primarily school-based health promotion programs and/or studies of wider-scale implementation of programs to reduce the magnitude of a health problem.

In addition to the above, the following two categories were used to enable classification of all types of publications:

5. Opinions / Reviews. This category included editorials, comments, position papers, non-data-based articles, literature reviews and letters;

6. Non-classifiable. This category included citations which were unable to be classified into one of the above five categories due to either insufficient or conflicting information available in the database or citation.

This classification method is similar to that used by other computer-based literature reviews and audits in the areas of breast cancer, skin cancer, smoking,\textsuperscript{20} drug and alcohol.\textsuperscript{21} This method is identical to the one used by the candidate in the initial audit period of January 1983 to March 1995, the results of which were published in 1997.\textsuperscript{16}
Reliability of classifications

To assess the reliability of the classification process, an independent assessment of a random selection of 10% of all citations identified in the earlier audit (ie. January 1983 to March 1995), was made by the candidate and an independent reviewer. Classification of this set of publications was found to be highly reliable (kappa = 0.94). A second reliability check was conducted on a further random selection of 10% of all citations identified in the later audit (ie. January 1995 to December 2000), by the candidate and a different independent reviewer. Classification of this more recent set of publications was also found to be highly reliable (kappa = 0.83). Guidelines for the interpretation and evaluation of kappa indicate that values > 0.8 denote excellent reproducibility.22

Analysis

The numbers of citations categorised into the six classifications were then tallied and cross-checked so that a particular publication was only tallied once if it appeared in more than one database. Percentages of each type of publication focussing on each of the three health risk behaviours were then calculated. In addition, the number of articles in each of the years 1983 to 2000 were tallied separately in order to make an 18 year analysis of trends in published literature.
Results

A total of 1,187 publications were identified as relevant from the series of computer database searches. However, after cross-checking, 82 of these were common to both the smoking and alcohol topic areas. Therefore, a total of 1,105 individual published articles on school-aged children and one or more of the three health risk behaviours of smoking, drinking and/or inadequate sun protection were identified over an 18 year period, from January 1983 to December 2000. The majority of articles (n=655; 55%) pertained to smoking, followed by alcohol (n=435; 37%), with substantially fewer publications on solar protection in children and/or adolescents (n=97; 8.2%).

Trends in publications

The number of publications on all three health risk behaviours combined increased from 27 publications in 1983, to 116 in 2000, representing a 330% rise in published literature over the 18 year period. The changes over time in publication numbers for each of the three health risk behaviours will now be presented individually.
Smoking

Publications which focussed on smoking and school-aged children increased three-fold from 20 in 1983, to 60 in 2000, with a peak of 65 publications in 1999. The number of publications on smoking and school-aged children in each of the years between 1983 and 2000 are shown in Figure 2.1

Figure 2.1 Number of publications on smoking and school-aged children from January 1983 to December 2000
Alcohol

On the topic area of drinking and school-aged children, publications increased from seven in 1983, to 39 in 2000, representing a 457% increase. The greatest number of publications (49) occurred in 1999. The number of publications on alcohol and school-aged children in each of the years between 1983 and 2000 are shown in Figure 2.2.

Figure 2.2 Number of publications on alcohol and school-aged children from January 1983 to December 2000
Sun Protection

On the topic area of solar protection and school-aged children, the number of published articles increased from zero in 1983 to 17 in 2000, with the most publications (25) again occurring in 1999. The number of publications on solar protection and school-aged children in each of the years between 1983 and 2000 are shown in Figure 2.3.

Figure 2.3 Number of publications on sun protection and school-aged children from January 1983 to December 2000
Categories of research publications

The classifications of published articles are presented for the each of the health risk behaviours separately.

Smoking

Between January 1983 and December 2000 there were 655 published articles relevant to the topic of smoking and school-aged children. Most of these publications were categorised as descriptive research (361; 55%), and addressed the prevalence of smoking in different populations of school-aged children, and/or on the predictors or factors associated with the uptake of smoking in adolescents. There were 17% (113) of articles classified as intervention trials describing a range of strategies primarily aimed at reducing and/or preventing smoking behaviour in adolescents. An equal number of publications (113; 17%) were categorised as opinion/review articles. These generally described the current status of knowledge on smoking uptake and prevention among adolescents. There were 27 papers (4%) published over the time period which addressed issues of measurement and/or methodology in research, and only 14 publications (2%) which described community-wide dissemination and/or adoption studies. Twenty-seven (4%) publications were unable to be classified into any of the categories. The percentages of different types of published articles pertaining to smoking and school-aged children over the time period are presented in Figure 2.4.
Figure 2.4 Categories of publications on smoking and school-aged children between January 1983 and December 2000

Alcohol

There were 435 published articles relevant to the topic of alcohol and school-aged children between January 1983 and December 2000. The majority of publications reported descriptive research (259; 59%), typically on the prevalence of drinking in populations of school-aged children, and/or on the predictors or factors associated with alcohol consumption in adolescents. The next most frequent type of publications was opinion/review articles (78; 18%), followed by intervention trials (57; 13%) which described a range of strategies primarily aimed at reducing and/or preventing drinking in adolescents. There were 16 papers (4%) published over the time period which addressed issues
of measurement and/or methodology in research, and only five publications (1%) which described community-wide dissemination and/or adoption studies. Twenty (5%) publications were unable to be classified into any of the categories. The percentages of different types of published articles pertaining to alcohol and school-aged children over the time period are presented in Figure 2.5.

Figure 2.5 Categories of publications on alcohol and school-aged children between January 1983 and December 2000
Solar Protection

Ninety-seven papers relevant to the topic of solar protection and school-aged children were published during the 18-year time period. Most papers were categorised as *descriptive research* (34; 35%), usually describing the prevalence of inadequate sun protection behaviours of school-aged children and/or on the factors associated with those behaviours. There were 28 articles (29%) classified as *intervention trials* on the effectiveness of different strategies aimed at increasing adequate sun protection behaviour in children or adolescents. Twenty-one papers (22%) were categorised as *opinion/review* articles, six papers (6%) which addressed issues of *measurement* and/or methodology in research on the topic area, and only three publications (3%) which described community-wide *dissemination and/or adoption* studies. Five (5%) publications were unable to be classified into any of the categories. The percentages of different types of published articles pertaining to solar protection and school-aged children over the time period are presented in Figure 2.6.
Discussion

Results of this audit of research publications indicate that there have been significant increases in the overall quantity of published research literature focusing on school-aged children and each of the health risk behaviours of smoking, alcohol use and solar protection among over the past 18 years. For all three behaviours, most of these publications were predominantly classified as descriptive research, describing the prevalence of, and influences on, the health risk behaviour. There were far fewer research publications categorised as intervention trials, measurement studies and/or dissemination research.
The finding of an increase over the past 18 years in the quantity of published research which on smoking, alcohol use and solar protection among school-aged children is not unexpected given the increasing recognition given to these three health risk behaviours because of their associated high burden of illness and identification as priority areas of concern for Australia's young population. Though the number of publications has increased, the proportion of articles focussing on the three different health behaviours has remained relatively unchanged over the past six years. Comparisons with the results from the 1995 audit reveal that while 58% of publications from January 1983 to March 1995 targeted smoking in children, this proportion had decreased only slightly to 55% during the extended time period of January 1983 to December 2000. Similarly, 40% of publications in the first audit targeted alcohol use in comparison to 37% in this current lengthened audit. Articles focusing on solar protection and young people showed the only increase in proportion from 3% in the first audit to 8% in the current.

This consistency in publication efforts directed towards the different health risk behaviours could be interpreted in a number of ways. The differing quantities of published research may mirror both the real and perceived significance that these three behaviours have in the public health / health promotion arena. Tobacco smoking, of all the three behaviours, is most certainly associated with the highest mortality and morbidity in the developed world and increasingly in developing countries. Oldenburg and others, in their 1994 audit of health promotion research, found that most health promotion research has targeted behaviours associated with cardiovascular risk and cancer, with smoking having the single highest proportion of research (17%) when compared to 12 other health risk behaviours. Until fairly recently, the serious detrimental health effects associated with inadequate sun protection has been confined to countries like Australia, with its highest rates of skin cancer in the world. This may explain the low
proportion of publications focused on this health issue. Alternatively, the unchanged proportions of published literature may simply reflect the preferences of journal editors and peer reviewers for research articles on smoking over those on alcohol or sun protection.

Another interesting finding relates to the trends in publication numbers for each of the health risk behaviours over the 18-year period as displayed in Figures 2.1, 2.2 and 2.3. The increases in published research on smoking and alcohol appear to be fairly gradual and consistent over time, with the exception of one or two years in which there were slight declines. In contrast, it is only in the past four years, since 1997, that there has been greater efforts invested in research on sun protection and young people. This most likely indicates that countries and populations, other than Australia, are beginning to experience increased incidences of skin cancer and are starting to recognise the importance of targeting sun protection behaviour during younger years, which is now known as the crucial period of risk for developing skin cancer later in life.\textsuperscript{26, 27}

Classification of published articles over the 18 year time period shows that, for all of the three health risk behaviours, the greatest majority of research activity has been descriptive, focusing on the measurement of prevalence and predictors of behaviour among school-aged children. This was also the case in the 1995 audit.\textsuperscript{16} For all three health risk behaviours, descriptive studies have increased in relative proportion to other categories of research. There are a number of possible reasons for the large quantity of descriptive research being published. The first and most obvious explanation is that the proportion of publications simply reflects the type of research which is mainly being conducted in the field and submitted to journals for publication. Perhaps the research community, including practitioners and funding bodies, believe that descriptive research is easier to do and are less confident in developing...
and implementing interventions because of either lack of expertise, large costs involved or longer follow-up time in obtaining results. Alternatively, it may reflect the failure of intervention trials or more advanced staged research studies to report significant findings.

A further explanation for the large quantity of descriptive research may lie in the immense importance that descriptive research serves by providing information on changes in prevalence and predictors of health behaviour, fluctuations in community attitudes and a greater understanding of newly identified health issues, essential for the planning and implementation of more advanced research on health interventions.

A similar finding of an over-emphasis on descriptive research was also noted by Oldenburg and others in their audit of health promotion research. Given that tobacco smoking has been the subject of research investigation since the 1960s, one would expect a higher proportion of research to have focused on the more advanced stages of research. Yet only 17% of publications were categorised as intervention trials and a mere 2% as dissemination / adoption studies. These figures are much lower than the findings of Oldenburg's audit in which 33% of all health promotion smoking studies were coded as intervention research and 22% were categorised as innovation development, diffusion and institutionalization. The differences in proportions of categories of research between this audit and Oldenburg's may be explained by slight variations in category definitions. Oldenburg's audit also focused on only 12 public health and health promotion journals over a one-year period which may have given preferential publication to more advanced stage research studies.

Oldenburg's audit also found that health promotion research into sun protection was relatively undeveloped with no studies having moved beyond intervention research. In contrast, this audit found that a greater proportion
of publications in the topic area were categorised as intervention trials (29%), when compared with smoking research, and a similar proportion coded as dissemination / adoption studies (3%), suggesting that the quality of research on solar protection and young people appears to have advanced quite rapidly in recent years despite a lower overall quantity in research.

Limitations

Limitations of the audit include a bias towards research publications which only appear in the databases that were utilised in the audit process, namely MEDLINE, ERIC databases for the entire audit period and APAIS (AUSTHealth), PROQUEST Education Complete and Expanded Academic ASAP International Edition for the period between 1995 and 2000. These databases were chosen because of their accessibility and universality. While considered to be reliable, these databases may not necessarily contain all relevant published research. The key words used as search terms also could have also influenced the outcomes. There was no attempt to include unpublished literature, dissertations, conference proceedings or educational resource packages produced by departments of youth or education because of difficulties in searching and retrieving these sources in a systematic manner. Further, it is accepted that because of publication bias there would be a significant amount of research in the topic areas that has gone unpublished over the years.

Another significant limitation of the audit has been its focus on only three health risk behaviours. There are undoubtedly other health risk behaviours and health issues that are important in a school-aged population (such as diet and nutrition, physical activity, illicit drug use and mental health issues), and there is most likely a fair amount of research literature which focuses on
these. However, the potential sheer size of numbers of publications found if no limits had been imposed dictated that some constraints be placed on the parameters of the audit. These three health risk behaviours were chosen because of the current unacceptable levels of prevalence among adolescents,\textsuperscript{28, 29} and associated burden of illness.\textsuperscript{14} Smoking and alcohol use have also been the main behaviours traditionally targeted by school-based intervention programs.\textsuperscript{14} Further justification of the focus on these three health risk behaviours is given in Chapter Three.

**Strengths**

A notable strength of the audit is the longitudinal nature of the investigation. An 18-year period was used to examine the published research. No other audits have been conducted over such an extended period of time. Second, the categorisation process of published research was conducted with a high level of reliability, strengthening the methodological rigour of the audit. Third, the application of stages within the Staged Approach model to health promotion research and practice model permitted the distinction between categories, and therefore relative advancement, of research into each of the topic areas. These categories of research have provided a basis for comparison with previous audits and can be used to assess and track changes in research in future years.

**Conclusion**

The findings from this audit strongly suggest more research needs to be directed towards the more advanced stages of intervention trials and dissemination / adoption research, while still recognizing the tremendous
importance that descriptive research serves, especially when it contributes, or leads to, such higher level research. Given that the rates of smoking, alcohol use and inadequate sun protection among Australian school-aged children are still unacceptably high, research efforts should be directed away from descriptive research and priority given to evaluations of interventions which aim to reduce rates of these behaviours. This priority could be addressed by both practitioners and academics working in relevant fields and through the allocation of research grants and greater publications in journals.

In agreement with others,\textsuperscript{10} we conclude there is an inadequate research base for the dissemination and adoption of school-based health promotion programs targeting these health risk behaviours. Evidence-based practice requires that the effectiveness of intervention programs be demonstrated before advancing on to this final stage.\textsuperscript{1,2} Future research should look to a greater emphasis on methodology and more rigorously designed intervention trials, such as randomised controlled trials, in all three areas of smoking, alcohol and sun protection.
References for Chapter Two


Chapter Three

Application of a systematic framework to the development and evaluation of a school-based intervention: Stages I & II
Introduction

Adolescence represents an important period of physical, cognitive and psychosocial development in which individuals begin making health choices and engage in health risk or protective behaviours. It is these health risk or protective behaviours which develop into future habits and lifestyles. Epidemiologists and health care professionals agree that the main causes of death and disease in the Western world are largely due to lifestyle and health risk behaviours, and so are potentially preventable. The majority of cases of adolescent mortality and morbidity are due to the consequences of engaging in health risk behaviours such as motor vehicle use, substance use and abuse, and sexual activity. Recent reports have identified a number of health risk behaviours as priority areas of concern for the current and future health of Australia’s young population, three of which are: smoking, alcohol use and inadequate sun protection.

Tobacco smoking is widely acknowledged as the single largest preventable cause of morbidity and mortality in developed countries, with an estimated 18,000 Australians dying from tobacco-related illnesses in 1997. Cigarette smoking is a major risk factor for the development of lung cancer, cardiovascular disease and pulmonary diseases. Increased absenteeism and number of disability days; feelings of depression, hostility and hopelessness; suicidal attempts; more visits to a health professional for emotional complaints; and lower self-ratings of overall health all provide indication of the impact of smoking behaviour and its associated health problems on the quality of life for both adolescents and adults. The economic impact of cigarette smoking has long been documented with the total cost of tobacco related diseases in Australia during 1989-90 estimated to be $719 million. This includes both direct costs such as those associated with hospital and medical care, and indirect costs such as loss of earnings due to absenteeism.
Alcohol is the most popular drug in Australia and is second only to tobacco as the major cause of drug-related mortality and morbidity. In 1997, approximately 3,700 deaths and 100,000 hospitalisations were due to excessive use of alcohol. Among young Australians aged 15 to 19 years, alcohol is responsible for 82% of drug-related deaths. High levels of alcohol use have been linked to an increased risk of cerebrovascular disease, brain and liver damage, and some cancers. Alcohol is a contributory factor in 40% of fatal motor-vehicle accidents, in two out of every five divorces or family separations and violent crimes in Australia, and is associated with being overweight and obesity, high blood pressure, domestic violence and other injuries. Among young people aged 14 to 19 years who are recent users of alcohol, approximately 9% report missing school or work due to personal use of alcohol. The implication of alcohol in all of these problems, together with its estimated direct Australian health care costs of $145 million and $767 million in road accident costs in 1992, affords proof of its significant impact on the health of the Australian community.

A third health risk behaviour identified as an important concern for the health of Australia’s school-aged population is inadequate sun protection. Skin cancer is the most common form of cancer in Australia, with two out of three people expected to develop some form of skin cancer during their lives. Approximately 1,000 to 1,200 Australians die each year from skin cancers. With approximately 4,500 people developing melanoma and more than 150,000 developing non-melanocytic cancers each year in Australia, these rates are among the highest in the world. Recent Australian data show reductions in incidence rates of both malignant melanoma and basal cell carcinoma in younger cohorts, contrary to previous trends of increases. While these are encouraging trends, there is little doubt of the impact of skin cancer on health. At an individual level there is disfigurement and distress, and at a community level, the utilising of resources that could arguably be spent on other health priorities.
total direct health cost of skin cancer in Australia in 1993/94 was estimated to be about $170 million per year.\textsuperscript{22}

It is now widely accepted that exposure to ultraviolet radiation (UVR) is the main modifiable risk factor for all types of skin cancer.\textsuperscript{22, 26} Though the exact nature of the relationship remains unclear, evidence indicates that both intermittent and cumulative exposures lead to an increased risk of skin cancer.\textsuperscript{27-30} More importantly, research has shown that high levels of UVR exposure during childhood and adolescence is a major risk factor for the development of skin cancer later in life.\textsuperscript{29, 31-34} Since 50\% of lifetime sun exposure occurs during childhood and adolescence,\textsuperscript{32} this is a critical period which has significant implications on an individual’s risk of developing skin cancer.

Not diminishing the many other issues which significantly impact on the health of Australian adolescents, these three health risk behaviours have high priority because of their associated burden of illness;\textsuperscript{7, 18, 35} high prevalence among the adolescent population;\textsuperscript{8, 36} and amenability to health promotion intervention.\textsuperscript{7, 18, 37} Most importantly, it is widely accepted that these are appropriate behaviours to target within school communities.\textsuperscript{37, 36}

Results of the publication audit presented in Chapter Two indicate that the majority of published research, which has focussed on smoking, alcohol use and inadequate sun protection in school-aged children, has been descriptive in nature. Clearly, a smaller proportion of journal publications have focussed on the evaluation of the effectiveness of interventions (including school-based and non-school-based interventions) targeting these behaviours, and even fewer efforts have been directed toward dissemination research. The findings from the audit suggest that, at least in terms of research quantity, there are clear gaps in evidence supporting the effectiveness of school-based interventions targeting these three health risk behaviours, and even less evidence to support their dissemination. (It is possible that there are greater quantities of
intervention research which have targeted other health issues in school-aged populations, and this, together with the quality of available evidence is described in more detail in Chapter Six.)

Recent support for evidence-based practice indicates that the evaluation of school-based interventions should be undertaken in a logical and systematic manner, using an appropriate framework or model. The Staged Approach to Health Promotion Research and Practice (as outlined in Chapter One) is one such model which provides a logical sequence and structured mechanism for appraising available research evidence and incorporating that evidence into the design and implementation of health promotion interventions. Application of the Staged Approach also provides a picture of the current state of knowledge concerning the school-based programs and can identify where gaps in evidence may lie.

This chapter (and the chapters following) presents the application of the Staged Approach framework to the development and evaluation of a school-based health intervention targeted at smoking, unsafe alcohol use and inadequate sun protection among adolescents.

Specifically, this chapter aims to:

1. outline in detail Stage I of the Staged Approach model to health promotion and review the available research evidence on the adequacy of measures of smoking, alcohol use and inadequate sun protection among school-aged children; and

2. outline in detail Stage II of the Staged Approach model to health promotion and review the available research evidence on the prevalence, key target groups and determinants of smoking, alcohol use and inadequate sun protection among school-aged children.
The Staged Approach to Health Promotion

As briefly outlined in Chapter One, the Staged Approach model to health promotion consists of five sequential stages used to guide the development of health promotion interventions. Each stage of the model poses a series of questions that must be answered using the available research evidence to guide the development of interventions and proceed onto subsequent stages. If there is insufficient available research evidence to adequately address a particular issue, then further research must be conducted to address the gap in knowledge. The first stage of the model will now be described in greater detail.

Stage I: Adequacy of measures

The main question posed in this first stage of the model is - are adequate measures of relevant outcomes available? This relates to the assessment of both measures of health status and outcomes of intervention research. The 'adequacy' of existing measures should be determined by critical appraisal of available research evidence in relation to the following criteria:

- **reliability** - the extent to which it is consistent over time, place and between persons;
- **validity** - the extent to which it measures what it intends to measure;
- **acceptability** - acceptable to both research practitioners and subjects in terms of cost, time, ease and sensitivity; and
- **sensitivity** - the extent to which it is able to detect small differences or change.
If there are no existing measures that satisfy these criteria, then the model directs the practitioner to the development and testing of more adequate measures before proceeding through to the next stage. 41

Evidence on the adequacy of measures

Consideration of the availability of measures of health outcomes and the adequacy of these measures is the first important step in the planning process of any health intervention. As such, the topic deserves significant attention and discussion of empirical evidence. In fact, the topic merits entire theses devoted to addressing measurement issues associated with each of the behaviours of smoking, alcohol use and sun protection. However, due to the constraints of this thesis and a considerable existing body of literature that has addressed these issues, the discussion here aims to provide only a brief overview and summary of the literature to date and its main findings. The adequacy of available measures of the three health risk behaviours will be now examined each in turn.

Smoking

A large amount of research has been dedicated to the adequacy of measures of cigarette smoking behaviour, with much of this occurring in the 1970s and ‘80s. Results of the publications audit, as described in Chapter Two, indicated that there were 27 papers published between the years 1983 and 2000 which addressed measurement and/or methodology issues in relation to smoking and school-aged children. Many more studies have focussed on smoking validation and adult population groups. It is also likely that a number of other studies, focussing on adolescents, were conducted in the past 18 years but were not identified in the audit due to limitations on the search method utilised.
Though smoking is typically considered to be a dichotomous variable,\(^{43}\) (ie. either one is a smoker or not a smoker) several different measures of smoking behaviour have been utilised by researchers over the years which include: lifetime smoking; regular smoking; smoking frequency; quantity of cigarettes smoked daily; and smoking intentions. Two of the most commonly used measures of smoking behaviour among adolescents are: 'current smoking' defined as having smoked at least one cigarette in the week prior to survey; and 'ever smoked' defined as having ever smoked a cigarette, even one or two puffs, in one's lifetime. These measures have been used in state\(^{38, 44}\) and national surveys\(^{45-47}\) of school-aged students in Australia, with similar measures used in the United States.\(^{7, 48, 49}\)

The main method used for measuring cigarette smoking behaviour in school-aged children has been self-report, through interview or self-administered questionnaires. Self-report is simple, efficient, cost-effective and acceptable.\(^{50}\) In the late 1970s and early 1980s, several researchers\(^{51-53}\) suggested that adolescents, among other population groups, have a tendency to under-report or deny their smoking status. Perceived disapproval of smoking by parents and teachers and other social pressures may influence adolescent smokers to report their behaviour as conforming to the intensifying social norm of "not smoking".\(^{54}\) This belief sparked a chain of investigations seeking to find more objective measures and/or methods for validating smoking status. Methods used for increasing the accuracy and adequacy of self-report measures have generally fallen into one of three groups: biochemical validation measures; bogus-pipeline methods; and the use of anonymity.

**Biochemical validation measures**

In simple terms, these measures involve the detection of biochemical markers or by-products left in the body following the use of tobacco. The
three leading types are: carbon monoxide (CO) in the blood or expired alveolar air; cotinine in saliva, urine or blood; and thiocynate (SCN) in plasma or saliva.55, 56 Each of these markers differ in their sensitivity and specificity, that is, their ability to classify a smoker correctly as a smoker and to classify a non-smoker correctly as a non-smoker, with plasma cotinine samples found to be the most reliable.54 For a while, these biochemical measures were considered to be the "gold standard" in validation studies because of the belief that they were more objective and less susceptible to bias. This is no longer the case as evidence has since shown that all of the markers can be elevated in non-smokers,54 and are often ineffective in detecting smoking in adolescents due to the sporadic nature of their smoking habits.55, 57

On a practical level, biochemical measures also have a number of drawbacks. Measurement is obtrusive, requiring either blood, saliva or breath samples to be collected from subjects. In a school student population, this may have a damaging impact on firstly gaining ethical clearance from relevant bodies, and secondly, getting consent from students and their parents to participate.58 Because of the short half-life of smoking by-products, particularly CO (four hours) and cotinine (11 to 37 hours), their use as measures of smoking status is dependent on the time elapsed since the last cigarette was smoked.54, 56 In addition, the costs associated with collecting samples, handling, frozen storage, and analysis can be quite considerable, especially in large-scale field studies.54

**Bogus – pipeline methods**

Originally developed to increase the accuracy of self-reports of behaviour, beliefs and attitudes in the social psychology field,59 the bogus pipeline method was applauded by researchers as the ‘new’ methodological advancement which would overcome the drawbacks of biochemical
measures, yet still increase the accuracy of smoking self-report. The procedure entails convincing participants that their self-reports can be independently verified by an objective measure, either real or 'bogus'. The assumption is that students are more likely to report with greater accuracy their tobacco consumption if they believe that researchers can determine if they have been truthful or not.

While some studies did show that bogus pipeline procedures increased the validity of self-reported smoking behaviour by adolescents, several others failed to find any differences in smoking rates between students measured under pipeline and non-pipeline conditions. Further research supported the ineffectiveness of the bogus pipeline in enhancing the validity of self-reported smoking behaviour among adolescents. It was argued that any discrepancies in self-report rates were accounted for by differences in age, study setting, population under study and degree of confidentiality.

The use of anonymity

The discovery of the above factors, in particular the issue of confidentiality, led to the identification of anonymity as a potential strategy for increasing the accuracy of self-report. The strategy is based on the premise that students who believe that their identity is known to researchers or who expect to be contacted again about their smoking habits may feel greater pressure to under-report and therefore not provide valid responses. Removal of personal identifiers from questionnaires also removes the fear that any reported smoking behaviour will be conveyed back to teachers, parents or other figures of authority. In studies comparing the effectiveness of anonymity with the bogus pipeline procedure, findings indicated that an anonymity procedure, which is believed by the study
participants, is as good as or better than measures gained using a pipeline.  

**Alcohol Use**

As with smoking, a considerable body of literature has focused on working towards defining and measuring alcohol use and misuse. Between 1983 and 2000, 16 publications on issues of measurement of alcohol use in school-aged children were identified in the audit described in Chapter Two. However, unlike smoking, and because of the recognition that low to moderate levels of alcohol consumption may in fact be beneficial to health, the determination of widely accepted levels of 'safe' or 'unsafe' levels of alcohol use has been much more complex and remains somewhat unresolved. This is due to the many confounding factors, such as gender, age, circumstance, frequency and quantity, all of which impact on the potential effect of alcohol on an individual.

Research can be broadly divided into that which measures actual alcohol consumption and that which attempts to assess problem drinking, although the two are clearly linked. The focus of this thesis is on the measurement of actual alcohol consumption in school-aged children, with consideration given to definitions of ‘unsafe’ levels of use. The main rationale for this lies in the fact that it is alcohol consumption, with or without alcohol misuse or problem drinking, that is itself an important risk factor for a wide range of health and social problems. Assessment of the level of alcohol use is also the single most important component in identifying any future alcohol-related problems. In addition, despite the variety of instruments currently available to screen for adolescent problem drinking, there is still no consensus on the operationalisation of this multidimensional behaviour and/or appropriate cutpoints for use with adolescents. Furthermore, most
large prevalence studies and health promotion intervention trials target reduced alcohol consumption as a health outcome, and not alcohol dependence.

There is little argument among researchers that assessment of alcohol use includes consideration of both quantity and frequency of consumption to provide measures of average number of drinks consumed either daily, per week, per month etc. There is also wide acceptance of the concept of a ‘standard drink’, or unit, which contains approximately eight to 10 grams of pure alcohol or ethanol. Where difference of opinion does occur is in the varying terms used to define ‘unsafe’ levels of consumption and their associated cutpoints. The most ubiquitous of these in Australia are the guidelines promoted by the NHMRC. In 1992, the NHMRC recommended that four-six units per day or 28-42 units per week be considered as ‘hazardous’ for men, and that two-four units per day or 14-28 units per week be considered as ‘hazardous’ alcohol consumption for women. Consumption of alcohol below these levels was considered ‘safe’, although the guidelines recommended that all people should have at least two alcohol-free days per week. These are similar to the guidelines recommended by the Department of Health in England and in the US. The guidelines did not provide recommendations specific to adolescents or school-aged children.

In 2001, the NHMRC produced revised guidelines which differentiated between risk of harm in the short-term and risk of harm in the long-term. Recommended drinking levels are classified as ’low risk’, with consumption of alcohol above these levels considered to as either ’risky’ or ’high risk’. The recommended ’low risk’ drinking levels for men in the general population are an average of no more than four standard drinks a day, and no more than 28 drinks per week; with not more than six standard drinks in any one day; and one or two alcohol-free days per week. The ’low risk’ levels for women are: an average of no more than two
standard drinks a day, and no more than 14 standard drinks per week; not
more than four standard drinks in any one day; and one or two alcohol-free
days per week. The new guidelines also provide recommendations
specific to particular population groups. Young adults are advised not to
drink beyond these ‘low risk’ levels and to not drink at all for at least
several hours before engaging in risky activities (eg. driving, swimming,
cycling). Young people (up to 18 years) are advised to also follow these
guidelines, but in addition, if they choose to drink alcohol then they should
be supervised by adults at all times; should keep any drinking to a
minimum; and they should not drink to become intoxicated.74

While these definitions and cut-points have been widely adopted by
researchers working with school-aged populations,75,76 others have utilised
assorted terms and definitions. For instance, students who participated in
the Australian School Students’ Alcohol and Drugs Survey in 1996 were
classified as ‘heavy drinkers’ if they reported drinking five or more drinks
on a single occasion during the past week.77 In the New South Wales
Secondary School Age Survey, students who reported consuming five or
more drinks in a row at least once during the previous fortnight were
classified as ‘unsafe’ drinkers.38 In the US, other studies have used the
term ‘high intensity drinker’ to describe students who report drinking
alcohol at least once a week or more, consuming five or more drinks per
occasion, and becoming intoxicated at least once a month.78,79

The definitions and measures above appear to reflect a shift away from
just measures of quantity and frequency to focus more on patterns of
drinking behaviour. This is due to the reported increase in ‘binge drinking’,
particularly in young populations, and its associated health costs, and a
growing general concern with patterns of alcohol consumption.80,81 The
terms “binge” and “heavy” drinking are often used interchangeably with
varying consumption levels.82 Some have used the upper limits (or harmful
levels) of the NHMRC guidelines – which deem six or more standard
drinks for a male and four drinks for a female on the one occasion – as the definition for a “binge”. Others have used quantities above the ‘hazardous’ levels – more than four standard drinks for a male and two drinks for a female – to imply binge drinking. Others still have utilised the classification of the WHO’s AUDIT screening instrument which defines harmful drinking as more than six drinks, for either men or women, in a single session as a proxy measure. To accommodate differences in lean body mass and tolerance levels between adults and adolescents, a number of researchers have used a modified WHO definition of five or more drinks on the one occasion, for both boys and girls, to indicate ‘binge drinking’ in adolescent populations.

Despite general support for these measures, it has been argued that they are too simplistic and ambiguous. In a survey of the views of Australian drug and alcohol specialists about “binge drinking”, results indicated that respondents employed ‘the number of drinks consumed’ as only one factor in the definitional characteristics of a ‘binge drinker’. Other factors identified included age, gender, physique, food intake and length of drinking episode. Age was especially highlighted in relation to school-aged students who often drink to achieve a level of ‘drunkenness’, have limited experience in coping with alcohol and its effects, and therefore, are at particular risk of harm.

It is this “harm” or the negative consequences associated with drinking that some researchers have recently incorporated into studies in an attempt to more broadly define ‘unsafe alcohol use’ among adolescents. For example, as part of the School Health Alcohol Harm Reduction Project (SHARP) being conducted in Western Australia, students were asked a series of questions about harms associated with their own use of alcohol and harms associated with other people’s use of alcohol, as part of a baseline survey. Harms associated with students’ own use of alcohol included: feeling sick after drinking; unable to remember what happened.
after drinking; getting into a physical fight because of being affected by alcohol; and getting into trouble with friends/parents/teacher/police because of drinking. Harms associated with other people's use of alcohol included: being verbally abused or physically hit by someone affected by alcohol; being a passenger in a car when the driver was affected by alcohol; and being sexually harassed by someone affected by alcohol. Results of the survey indicated that boys (aged 11 to 12 years) had experienced more than five and girls more than three alcohol-related harms associated with their own alcohol consumption in the past 12 months, with the most common harms being — drinking more than planned, being sick and having a hangover. Students also experienced a similar number of harms associated with other people's use of alcohol, with one-quarter of all students reporting having been a passenger in a car with a driver they perceived was affected by alcohol.86

In a comparative study using the varied definitions of 'unsafe adolescent alcohol use', results showed substantial differences in the estimates of prevalence of unsafe drinking. Using the modified WHO definition of "consuming five or more standard drinks on the one occasion in the last two weeks" yielded a prevalence estimate of 11% of all students who had drunk unsafely. When the definition "felt very drunk or sick at least once in the last 12 months" was applied, the proportion of students who had used alcohol unsafely rose to 21%. When the definition considered other alcohol-related harms — "one or more activities from the following list in association with drinking in the past 12 months (swimming, walking on main road, walking across main road, riding a push bike, driving a motor vehicle, boating)" — the estimated prevalence increased to 65% of students who had consumed alcohol unsafely.87 These comparisons provide further support for the argument that confinement to the "five or more standard drinks" definition, limits the amount of potential information gathered about 'unsafe alcohol use' among school-aged populations. Because 'unsafe drinking' is a complex, multidimensional behaviour, the definition needs to
reflect those dimensions. This has important implications for the development and design of health promotion interventions targeting these behaviours, the messages conveyed, and opportunities for measurement of success of interventions.

Though it is acknowledged that the definition of ‘unsafe alcohol use’ is problematic and still unresolved for school-aged children, few would dispute that self-report is the dominant method of measurement or means of collecting information about alcohol use. Typically, this has taken the form of either “usual frequency” and “usual quantity” questions or retrospective diary recall methods, with both proving to be relatively robust. Despite evidence that self-report data obtained from people with alcohol-use disorders may be invalid, no such evidence exists for self-report data on alcohol consumption levels for the general population, and or adolescents. Efforts have been made to validate alcohol use using biochemical measures, such as ethanol in breath, blood and urine, but these have significant shortcomings. The most important of these is the complete absence of an objective measure that can detect alcohol use which has occurred more than a few hours prior to testing. Current biochemical measures do not allow for identification of the maximum amount of alcohol that may have been consumed, and are not sufficiently sensitive to detect low-level drinking or infrequent use of alcohol, both common patterns of drinking among adolescents. Research has also shown that a bogus pipeline procedure has no impact on self-reports of alcohol use among adolescents, leading to the conclusion that the pipeline procedure is unnecessary with this population group when confidentiality can be assured.
Sun Protection

Unlike smoking and alcohol use, relatively fewer studies have examined the ‘adequacy’ of measures of sun protection. Findings from the publications audit, as described in Chapter Two, indicated that there were only six papers published between the years 1983 and 2000 which addressed measurement and/or methodology issues in relation to sun protection and school-aged children. The main outcome measures targeted by health promotion programs can be broadly grouped into two types:- (i) measures of exposure to the sun (because of the strong association of UVR with skin cancer) and its effects (eg. tanning, sunburn); and (ii) measures of sun protection behaviours, such as hat wearing and sunscreen use. Other less common indicators used with school-aged children include:- assessment of shade provision in school playgrounds using aerial photographs; identification of school policies, rules and regulations governing sun protection activities; and reported skin self-examinations.

Despite a wide range of measures having been utilised, there is no universal acceptance of the ‘best’ solar protection measure. Nor is there total agreement on how measures are to be interpreted, given that UVR exposure is influenced by a range of environmental factors (eg. weather conditions, latitude, time of day) and its effects mediated by both the nature of UVR exposure (eg. intermittent, cumulative) and biological factors (eg. skin type). This may in part be due to the absence of a true gold standard against which all sun protection measurements can be compared, and it is because of this that most research has focused on assessing concurrent validity.
Measures of sun exposure

The two main methods for measuring personal UVR exposure are: polysulphone film badges\textsuperscript{96} and electronic monitors which are linked to data loggers.\textsuperscript{99} The use of polysulphone badges in studies measuring sun exposure in school-aged children has been found to correlate well with both self-reported behaviour\textsuperscript{100} and video-taped observations,\textsuperscript{92, 93} and to have an acceptable level of reproducability.\textsuperscript{92} However, studies have shown that the potential UVR dose varies considerably at different sites of the body, which in turn is influenced by different body positions.\textsuperscript{35, 101} Using only a single polysulphone badge can therefore give variable results\textsuperscript{101} and lead to imprecise measurements.\textsuperscript{92} Researchers have also noted technical difficulties that can affect the validity of polysulphone film badges as a measure of UVR sun exposure, the main one being that some UVR can also be emitted from certain types of fluorescent lighting and this may contribute to the overall dose registered by the badges.\textsuperscript{93} Also, the badges are not able to measure long-term exposure or provide information on a person’s history of sun exposure or sunburn.\textsuperscript{35}

Several studies have employed colorimeters as an objective measure for quantifying skin colour changes, as an indicator of UVR exposure, in school-aged populations.\textsuperscript{102-105} In simple terms, the colorimeter is a portable electronic device that measures colour in three dimensions,\textsuperscript{106} specifically the skin colour changes associated with tanning. The device has been shown to have acceptable levels of intra-rater and inter-rater reliabilities,\textsuperscript{102} and concurrent validity with both child self-reports of sun protection behaviours\textsuperscript{105} and parents’ reports of indoor-outdoor behaviour of children.\textsuperscript{104} Two significant disadvantages of the colorimeter are its ineffectiveness for use with darker-skinned or densely freckled individuals,\textsuperscript{102, 106} and its inability to detect sunburn or tanning several weeks after their occurrence.\textsuperscript{106} In addition, the natural variations in skin
colour related to seasonal change and clothing styles may interfere with precise measurements.\textsuperscript{102}

\textit{Measures of sun protection behaviour}

The main methods for measuring sun protection behaviour in school-aged populations can be broadly categorised into either observation of individual behaviour or self report or report by others (eg. parents or teachers) of usual behaviour. Direct observation of actual sun protection behaviours of school-aged children has been utilised by a number of studies using both trained observers\textsuperscript{107-109} and video-recording equipment.\textsuperscript{92, 93} While observation methods may in some instances be more accurate than self-report\textsuperscript{106}, there are several limitations to this methodology. These entail: difficulties in monitoring some types of sun protective behaviours such as the application of sunscreen and the sun protection factor (SPF) level of sunscreen used;\textsuperscript{97, 106} inability to monitor behaviour in multiple settings and over any length of time;\textsuperscript{97, 106} high costs involved in training observers;\textsuperscript{97} and potential for observer bias\textsuperscript{97} though acceptable levels of inter-rater reliability have been demonstrated.\textsuperscript{109, 110}

Self-report measures which inquire about usual or typical sun protection behaviours have been frequently utilised.\textsuperscript{26,111-114} Concerns have been expressed about potential social desirability and recall biases,\textsuperscript{97, 106} and evidence shows that these measures can overestimate actual behaviour.\textsuperscript{108} Self-report measures of behaviour over relatively short periods of time (eg. one or two days previous) have been shown to be reasonably accurate when compared to observation data.\textsuperscript{35}

To minimise potential recall bias, a number of studies have used a diary methodology in which students record their sun exposure and sun protection behaviours over a specified time period, either the preceding weekend or school day.\textsuperscript{97,109,115-118} A sun protection score is then
calculated by considering the proportion of the body adequately protected from the sun by the use of either clothing, hats, sunscreen or shade.\textsuperscript{109, 119}

The diary tool has been demonstrated to have high levels of validity with both primary\textsuperscript{109} and secondary school-age children\textsuperscript{97} using parental/guardian reports of behaviour as the criterion measure. The method also allows for the measurement of behaviour over an extended period of time, is cost-effective, and permits the relatively easy collection of data on large number of participants, suggesting that the self-report diary is a relatively valid and feasible tool for measuring student sun protection behaviour.\textsuperscript{97}

There is, however, a lack of research that has addressed the reliability of the diary method.\textsuperscript{106}

\textbf{Are adequate measures of relevant outcomes available? (Stage I)}

In summary, three main strategies have been used to increase the accuracy of self-report measures of smoking behaviour: biochemical validation measures; bogus-pipeline methods; and the use of anonymity. Extensive research has shown that biochemical and pipeline methods are no more effective in eliciting valid responses of adolescent smoking behaviour than self-report alone. School-aged students will accurately report their smoking status if sufficient assurance of confidentiality is provided.\textsuperscript{120} Measurement of adolescent smoking behaviour by self-report questionnaire is non-invasive, inexpensive\textsuperscript{54} and equally valid across different ethnic groups.\textsuperscript{121} Research has also indicated a high degree of reliability in self-reporting of tobacco use among adolescents.\textsuperscript{122, 123} Self-report, without biochemical or pipeline validation, is now recognised as an adequate measure of smoking behaviour in school-aged populations because of its accuracy, reliability and acceptability, and is the preferred method of measurement in state and national surveys both in Australia\textsuperscript{44-47} and other large international studies.\textsuperscript{48, 49, 124, 125}
'Unsafe alcohol use' among adolescents has generally been defined in terms of quantity and frequency of alcohol consumed, with the NHMRC guidelines of 'more than five standard drinks on the one occasion' being the most well recognised cut-point. However, because unsafe alcohol use is a multi-dimensional behaviour, it is now considered important to also include measures of alcohol-related harm in its assessment. Self-report is credited as a low cost and acceptable method of measurement of alcohol use by adolescents, which is both reliable and valid, particularly where data collection procedures provide assurances of confidentiality. Self-report is the dominant method of measurement employed in state and national surveys in Australia and overseas.

In relation to sun protection, a number of different measures and methods have been used to assess sun protection in school-aged populations, each with its strengths and limitations. The absence of an acceptable gold standard has hindered efforts to evaluate the adequacy of measures, with most researchers using a criterion measure to validate tools. There remains a need for further research to develop a suite of standard measures of established validity and reliability for use with school-aged children. Given the advantages and disadvantages of each of the measures described, and despite the gaps in existing evidence, it appears that the self-report sun protection diary can be used with children and adolescents with a high degree of confidence in its validity and feasibility.

In an attempt to answer the question posed by the first stage of the Staged Approach, that is "are adequate measures of relevant outcomes available?", it appears from the literature and evidence presented above that for each of the three health risk behaviours there are commonly used, acceptable definitions with self-report being the main method of measurement. Despite the absence of true gold standards against which each behaviour can be compared, sufficient evidence supports self-report measures having concurrent validity with a range of other measures. They
are sensitive to change, and are acceptable to both researchers and school-aged students. Fewer studies confirm their reliability, but as a whole, self-report measures of smoking, alcohol use and sun protection behaviours can be considered to be "adequate" in meeting the criteria of the Staged Approach as described on page 62.

Stage II. Descriptive research

In the second stage of the model, there are three main questions directed at finding descriptive information that will guide the development and design of health promotion interventions. These questions are:

1. **What is known about the scale of the health risk behaviour?** Evidence concerning the current prevalence and/or incidence of health risk behaviours is required to ensure that practitioners focus on issues which both impose a significant burden of suffering and have the capacity to achieve the greatest health gain;

2. **Are there any groups which experience greater rates of prevalence?** Identification of population groups with the greatest burden of suffering is important in the tailoring of interventions so that those with the greatest prevalence, at most risk or with the greatest need can be targeted;

3. **What is known about the determinants of the health risk behaviour?** Reviewing available research evidence is required to identify individual, social and environmental factors that are significantly associated with and/or predict health issues, and also those factors that may act as barriers to health improvements. Consideration of such factors is necessary for interventions to target the most important determinants, or barriers to change, and therefore increase their likelihood of success.41
Evidence on the prevalence and predictors

What is known about the scale of the problem?

Smoking

Recent estimates of smoking rates among Australian adolescents show that the percentage of 12 to 15 year-olds who are current smokers (defined as smoking at least one cigarette in the last seven days) has remained stable at 16% since 1993. Among 16 and 17 year olds, the proportion of current smokers has increased slightly from 29% in 1993 to 30% in 1996. These figures indicate a halt to the decline in adolescent smoking in Australia as found in previous surveys. Extrapolations from a 1999 survey estimated that approximately 85,000 secondary school students (aged 12 to 17 years) in New South Wales had smoked in the last week (18% of males and 19% of females), of whom 30,100 were aged between 12 and 14 years. Given that the average age at which people start smoking is 12 to 13 years, plus evidence that smoking in adolescence is a strong predictor of smoking in adulthood and combined with its significant impact on health and quality of life, tobacco smoking is an important health risk behaviour which needs addressing during the period of adolescence.

Alcohol Use

It is estimated that in 1998 over one million Australian teenagers consumed alcohol, with 30% of all young people aged 14 to 19 years reporting that they were regular drinkers (defined as consuming alcohol on at least one day per week). Young people are more likely to drink at harmful or hazardous levels than any other age group in the Australian population, with more than 66% of 14 to 19 year olds drinking at these levels. Binge drinking is also a problem with one in ten young people
reporting drinking more than 12 standard drinks on a day that they drank alcohol in 1998.\(^{15}\) Data from Western Australia indicates that between the years 1993 and 1996 there were significant increases in the numbers of school-aged students who had ever used alcohol and who had drunk alcohol at harmful levels.\(^{129}\) Given that the rates of alcohol use by Australian adolescents are unacceptably high and appear to be increasing,\(^{129}\) together with a lower tolerance by young people to the effects of alcohol and tendencies towards high-risk patterns of consumption,\(^{130}\) plus the wide range of health and social problems associated with alcohol use,\(^{131}\) there is clear justification and support for addressing this health risk behaviour.

*Inadequate Sun Protection*

The earliest research which assessed the self-reported rates of sun protection provided estimates ranging from 46\(^{\%}\)\(^{118}\) to 70\(^{\%}\)\(^{115}\) of adolescents not using adequate sun protection during the previous weekend. A number of state-based surveys\(^{36,132,133}\) help to provide a more recent picture of the sun protection behaviours of adolescents. For example, a survey of over 3,600 New South Wales school students between the ages of 11 and 16 years indicated that 51\(^{\%}\) were classified as not using adequate levels of sun protection during the preceding weekend.\(^{36}\) The first Australian national survey conducted in 1993 found differences in the type of sun protection behaviour preferred by males and females, with males more likely to wear a hat, while females were more likely to use sunscreen.\(^{26}\) Studies have consistently shown that Australian adolescents, particularly adolescent girls, are less likely to use sun protection than any other group in the population.\(^{36,115,118,119}\) While most students usually take some precautions,\(^{26}\) these findings clearly indicate that there is still considerable room for improvement in the sun protection
behaviour by adolescents and justifies the identification of sun protection as an important health risk behaviour to be targeted during adolescence.

In answer to the question “what is known about the scale of the health risk behaviours”, much is known. There is compelling evidence that these three health risk behaviours: smoking, unsafe alcohol use and inadequate sun protection, both singularly and combined, are unequivocally associated with significant health problems, social and economic costs, and negative impact on quality of life.

Are there any groups which experience greater rates of prevalence?

As previously mentioned, evidence indicates that the average age at which people start smoking is 12 to 13 years, and smoking in adolescence is a strong predictor of smoking in adulthood. Among adolescents, the prevalence of smoking is higher for females than males at all ages after 13 years, the difference being between one and four percent. However, males tend to be heavier smokers, smoking more cigarettes per week on average than females. For example, among 12 year old current smokers, boys reported smoking 10 cigarettes a week in comparison to five cigarettes per week by girls. Other research indicates Aboriginal and Torres Strait Islander (ATSI) school students are 1.9 times more likely to have smoked compared to non-ATSI students, even after adjusting for age, sex and other socio-demographic variables. This is in contrast to the US, where smoking rates among African-American and Hispanic adolescents are lower than for caucasian adolescents.

The majority of young people in Australia are introduced to alcohol within the family, usually between the ages of 10 to 12 years. Even from this age, there are differences by gender, with adolescent males drinking more frequently and in larger quantities than adolescent females. Young males are also more likely to experience a greater number of alcohol-
related harms associated with both their own and other people's use of alcohol. Though the prevalence of regular drinking appears to be similar among ATSI and non-ATSI students, rates of hazardous drinking are significantly higher among ATSI students. For instance, twice as many ATSI students reported drinking at hazardous levels in Year 7 when compared with non-ATSI students (40% versus 18%).

Though the estimated self-reported rates of adequate sun protection among adolescents varies quite considerably, research has consistently shown a decreasing trend in use of sun protection measures as students get older. This is most striking between the Years 7 and 8, which represents the transition from primary to secondary school education in Australia. Gender differences among adolescents are also apparent in regard to preferred sun protection methods. Females are more likely to use sunscreen, while males are more likely to wear a hat, although this usually takes the form of a 'non-sun-safe' cap. Only one study could be found which has explored associations between sun protection among adolescents and socio-economic status or ethnicity. Results of this study indicated that a significantly higher proportion of students who spoke English at home used adequate sun protection in comparison to adolescents from non-English speaking families. No significant association was found for socioeconomic status. Finally, recent research has identified an association between skin type and sun protection behaviours, in that, students with more sensitive skin (i.e. tends to burn and not tan) are more likely to protect themselves in the sun. This suggests that students with less sensitive skin may be still be placing themselves at risk.

In answer to the question "are there any groups which experience greater rates of prevalence?", it appears that among adolescents, the ages of 12 to 13 years, or the years at which students first commerce their secondary schooling (i.e. Years 7 and 8) are important milestones for each of the
three health risk behaviours. Gender differences are also evident, with higher rates of smoking among females, but males smoking greater quantities and being the higher risk group for unsafe alcohol use. There were also varying preferences for different sun protection methods between the genders, namely that girls preferred sunscreen while boys opted for hats or staying in the shade. Evidence also suggests that ATSI students have higher rates of smoking and unsafe alcohol use, and students from non-English speaking families engage in less adequate sun protection behaviours. Finally, students who do not have fair skin also appear to utilise adequate sun protection methods less frequently.

What is known about the determinants of the health risk behaviour?

Despite decades of speculation and investigation, and the development of several complex theoretical models, there remains gaps in knowing why adolescents engage in seemingly 'risky' health behaviour. Clearly, smoking, unsafe drinking and sun protection are complex behaviours, influenced by a multitude of factors interacting directly or indirectly upon each other. This chapter reviews both theory and evidence-based literature for factors associated with, or which significantly predict, participation by adolescents in each of the three health risk behaviours. Though an abundance of potential factors have been explored in the literature, the discussion here seeks to identify those variables and conditions for which there has been the strongest and most consistent evidence of their link to adolescent health risk behaviour, particularly factors linked to smoking, unsafe alcohol use and inadequate sun protection. While the literature is extensive, much of it is limited in reliability and validity. Comparisons between studies are difficult due to the many definitions of each of the behaviours (eg. definition of a current smoker) and a lack of standardised tools for measurement. The majority of
research is cross-sectional, relying on self-report, and very few studies consider the effects of confounding variables.

This chapter will now focus discussion on factors associated with, and potential predictors of, the three health risk behaviours as prescribed by the Staged Approach under the broad sub-headings of - individual, social and environmental factors. These sub-headings closely mirror the three main categories of factors - ‘predisposing’, ‘reinforcing’ and ‘enabling’, identified by Green and Kreuter in their PRECEDE/PROCEED model. This model and its categories could have been appropriately applied to the following discussion, however, for reasons of simplicity and consistency in keeping with the Staged Approach model, the candidate has chosen to apply the original framework and terminology as proposed in the Staged Approach.

**Individual factors**

**Knowledge**

A considerable amount of research has investigated the associations between adolescent health risk behaviours and knowledge of the health hazards or consequences involved, and attitudes toward, or beliefs about, participation in risk behaviours. A number of models, such as the Health Belief Model and Theory of Reasoned Action, propose that having accurate knowledge and positive attitudes towards engaging in a particular protective behaviour (eg. not smoking or using sun protection) are important determinants of the adoption of that health protective behaviour. This has been supported by some of the literature in adolescence and smoking, alcohol use, and failure to use sun protection. For example, in the sun protection literature, one study found that students who had accurate knowledge about the maximum time for safe exposure to the sun were more likely to use sun protection, while
another found that negative attitudes toward sun protection methods were associated with poorer sun protective behaviour. In a recent study, expressed positive attitudes toward cigarettes and alcohol were shown to predict both future use and susceptibility to smoking and drinking among adolescents. Other studies however have failed to find any association between knowledge and sun protection behaviours of adolescents. In addition, studies have found no difference between smoking and non-smoking teenagers in their knowledge of the health hazards associated with smoking. This has led a number of researchers to conclude that the link between knowledge level and smoking behaviour is weak and inconsistent.

**Attitudes and beliefs**

Much of the literature on beliefs has focused on adolescents' perceptions of the personal costs and benefits of engaging in a particular behaviour, and their expectations or perceived risk for adverse consequences. The associations between these perceptions and risk behaviours of teenagers will now be explored further. Firstly, several investigators have suggested that adolescents engage in certain health risk behaviours because they are viewed as a way of projecting an image of maturity and independence in the case of smoking, or an image of being tough, deviant and more rebellious in the case of drinking. Similarly, the desire to be sun-tanned and therefore enhance one's physical appearance is a significant predictor of failure to use sun protection. This process, by which people present certain images or attempt to control how they are viewed by others, has become known as self-presentation or 'impression management'. Specifically, self-presentation can be explained as the motive to convey particular social images which are perceived to be essential for successful social interactions and the achievement of social goals in relation to friendships, romantic
Involvements, job success, interactions with strangers, and self-evaluation.\textsuperscript{164} It is this desire to control the inferences that others draw about them that unfortunately leads people to participate in image-creating behaviours which may be detrimental to one's health.\textsuperscript{165}

In a review article on impression management and several health risk behaviours (including smoking, alcohol and sun protection), it was concluded that there is sufficient evidence to indicate that interpersonal motives play an important, if not the most important, role in influencing people's decisions to engage in health risk behaviours.\textsuperscript{165} The authors argued that engaging in health risk behaviours by adolescents, particularly drug use, not only presents a desired image to their peers, but serves to convey their independence or autonomy from parents.\textsuperscript{165} It has also been suggested that self-presentation motives may explain the 'false consensus effect' of the overestimation by teenagers of risk behaviour prevalence among peers. That is, by stating that many others are engaging in a particular behaviour, the behaviour is viewed as less deviant and presents a more favourable image.\textsuperscript{166,167}

Despite the seemingly sufficient evidence and conclusions drawn by the authors as above, other research has failed to concur with the perceived images that smoking and drinking are believed to convey among teenagers.\textsuperscript{168} In one study, 510 adolescents aged 12 to 15 years were shown photographic slides of teenage models (both male and female) engaging in several health risk and health protective behaviours. Subjects were asked to rate each model on 16 personality traits using a semantic differential scale. Results indicated that adolescents do not view smoking and drinking as mature behaviour. Other traits of friendliness, intelligence, obedience and health were also negatively evaluated when models were depicted holding a cigarette or a beer can.\textsuperscript{168} While the external validity of these findings may be a questionable, it does suggest that perhaps the traits or images that adolescents want to convey to their friends by
engaging in risk behaviours are not the same as those perceived by their peers, or that perhaps self-presentation is not a significant determinant of adolescent health risk behaviour.

Cognitive-Affective models, such as the Health Belief Model, also contend that an individual's decision to engage in health risk behaviour is influenced by their perceptions of susceptibility to and severity of health hazards associated with the behaviour. This has received some support in the smoking, and alcohol, and sun protection literature. Not all research is in complete agreement, particularly within the sun protection literature. For example, one study found that male adolescents who perceived themselves to be at greater risk for skin cancer were in fact less likely to use sun protection than those who believed they were at less risk. The study also found no association between such beliefs and sun protection use among females. Another study showed that boys believed themselves to be less susceptible to skin cancer than girls and were more likely to perceive that occasional sunburn did no harm. These later findings have been interpreted as evidence for perceptions of invulnerability.

Adolescent risk taking behaviour is often attributed to exaggerated feelings of invincibility, that is, perceiving that the harmful consequences associated with risk behaviour "will not happen to me". Elkind proposed that feelings of invulnerability are a by-product of the emergence of two 'normal' cognitive processes during adolescent development. Firstly, adolescence is a time when young people begin to think about 'thinking'. This, together with their egocentrism, leads them to perceive that everyone else must be thinking what they are thinking, that is, about themselves. This has been labeled the 'Imaginary Audience'. The second cognitive process to emerge is the 'Personal Fable'. Believing that they are the object of everyone's attention, adolescents arrive at the "logical"
conclusion that they are unique and important, and therefore, invulnerable.\textsuperscript{170}

There is, however, little empirical evidence to support the 'Personal Fable', or that adolescents feel more invulnerable to harm than do adults. In a direct comparison between the risk perceptions of adolescents and their parents, there was no difference in the perceived personal harm associated with four health threats (alcohol dependency, mugging, motor vehicle accident, and unplanned pregnancy).\textsuperscript{171} In a recent study, teenagers and their parents were compared on their perceived risks associated with experimental, occasional and regular participation in 14 health-related behaviours (including smoking and drinking), as well as their perceived likelihood of encountering health problems or negative events (eg, getting hooked on cigarettes, developing cancer in later life).\textsuperscript{172} Interestingly, results showed firstly, that adolescents were less optimistic about their chances of not encountering health problems or injuries than were their parents. Moreover, the biggest risk takers were the least likely to exaggerate their own invulnerability to harm. For example, teenagers who were current smokers were significantly less optimistic about avoiding cancer or cigarette addiction than were non-smokers and experimental smokers.\textsuperscript{172} Secondly, the study found that adolescents rated participation in health risk behaviour as less harmful than did their parents, particularly in relation to experimental and occasional involvement. Large differences were detected especially in regard to adolescent alcohol use. Thirty-one percent of teenagers perceived that getting drunk at a party once or twice posed only a slight or no risk of harm to themselves, compared to only 9\% of parents who perceived the activity in the same way. Likewise, 54\% of teenagers believed that drinking alcohol once or twice involved a slight or no risk of harm to themselves, in contrast to 31\% of parents who perceived that drinking alcohol was a relatively safe activity for their children.\textsuperscript{172}
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The findings from Cohn et al\textsuperscript{172} and others in sun protection\textsuperscript{115, 133} do not support the contention that adolescents feel more invincible than do adults, but do suggest that teenagers may underestimate the risks associated with experimental or occasional participation in health risk behaviours. It has been suggested that this could be due to adolescents simply regarding periodic risk behaviour as less harmful than do adults, or that parents are biased in their perceptions by rating the health risk behaviours as more dangerous for their teenagers than for themselves.\textsuperscript{172} Perhaps the findings can be explained by two personality factors that have recently received attention in the literature - 'rebelliousness' and 'risk-taking'.\textsuperscript{173} Findings from several studies indicate that a propensity toward rebelliousness and risk-taking in childhood predicts smoking in adolescence.\textsuperscript{173-175} Whichever the explanation, it appears that adolescents' attitudes towards, and their perceptions about, the level of harm associated with periodic participation in health risk behaviours may be an important factor in their decision to engage in such behaviours.

\textit{Intentions}

It is generally well accepted that an adolescent's intentions or expectancies about engaging in health risk behaviours are reliable predictors of future behaviour. This has received support from both the smoking\textsuperscript{144, 176} and alcohol\textsuperscript{148, 177, 178} literature. For instance, expectancies about future alcohol consumption among students in years 7 and 8 were found to significantly predict actual drinking behaviour 12 months later.\textsuperscript{148} Results such as this have been interpreted as evidence for 'Expectancy Theory'\textsuperscript{179} in which it is proposed that early learning experiences influence later behavioural choices. An individual's expectancies or intentions need not derive from personal participation or experience in a behaviour, but may evolve from modeling or vicarious learning.\textsuperscript{180} In the case of alcohol, it is proposed that pre-drinking expectancies for positive outcomes from
drinking lead to more positive initial drinking experiences, which in turn produce stronger expectations about future drinking. Expectancy theory also contends that 'expectancies' mediate the influence of social factors, such as parental and peer influence, on adolescent risk behaviour. However, research has failed to support this last contention, indicating that social influences are directly associated with alcohol use independent of expectancies. While this suggests that intentions and expectancies about participation in future health risk behaviours influence future behaviour choices, this influence may be over-ridden by stronger parental or peer influences.

*Other individual factors*

Other *individual factors* which have been examined in association with adolescent health risk behaviour are self-esteem, self-efficacy, locus of control, behavioural self-control and depression or psychological distress. Self-esteem is most simply defined as a "favourable opinion of oneself". A number of studies have supported an inverse relationship between self-esteem and smoking among adolescents, in that, those with lower levels of self-esteem are more likely to smoke cigarettes. A similar association has been found with alcohol use. It is believed that teenagers with lower self-esteem are more susceptible to social influences and are therefore more likely to drink and smoke. However, other investigations have failed to support these claims with evidence that having higher self-esteem does not act as a buffer to the effects of peer smoking among adolescents, suggesting that there is no interaction between self-esteem and the effects of friends’ smoking on the smoking behaviour of adolescents. No studies could be identified which have examined the relationship between levels of self-esteem and sun protection behaviours.
A second variable, self-efficacy, refers to beliefs about one's ability to resist social influences or confidence in one's ability to carry out a behaviour. The results of studies have supported an association between refusal skills self-efficacy and smoking and drinking in that those with poorer self-efficacy are more likely to be smokers. Other studies have also found a link between actual social skills and smoking and drinking behaviours. For example, one study found that adolescent non-drinkers received the highest scores on social skills measures, followed by drinkers and then problem drinkers. Bandura proposed, in his Self-Efficacy Theory, that self-efficacious beliefs affect the degree to which social influences predict risk behaviour. That is, individuals with a strong sense of self-efficacy would be less affected by parental and peer influences. This contention has been supported in the literature with one study demonstrating that self-efficacy was a significant moderator of friends' social influence on adolescent smoking.

A third individual variable which has received less attention in the literature is 'locus of control'. This is broadly defined as the degree to which an individual attributes the control of life events to either external factors (eg. fate, chance, other people) or internal factors (eg. personal skill, personal choice). Some studies have shown support for an association between teenagers with an external view of control and a greater likelihood of substance use, while others have found no significant correlation between health locus of control and use of alcohol, cigarettes and other substances, or sun protection use. With such conflicting evidence the relationship between locus of control and adolescent health risk behaviour remains unclear.

Related to both self-efficacy and locus of control, and newly incorporated into the Theory of Reasoned Action, is 'perceived behavioural control' which has been defined as "skills in managing one's own impulsive or disruptive behaviour." This has resulted in a new theory called the...
Theory of Planned Behaviour. Though a few studies in the smoking and alcohol literature have supported the contention that poor perceived behavioural control is associated with an increased likelihood to engage in health risk behaviour, another has failed to find significant links between the two. It appears that this factor has not yet been extensively researched to determine the exact nature and or strength of its influence on adolescent health risk behaviour.

Finally, two other variables which have received some support in the literature for their association with adolescent health risk behaviour are ‘depressive symptoms’ and ‘stressful life events’. In a recent cross-sectional, school based survey of a US nationally representative sample of over 5,500 students in grades 7 through 12, findings indicated that female students who experienced depressive symptoms and one or more stressful life events were significantly more likely to report regular smoking and drinking. For boys, depressive symptoms were not significant but experiencing three or more negative events was a significant risk factor for both behaviours, suggesting that boys may be more resilient to stressors or employ different coping mechanisms, such as anger or physical violence. Consistent with earlier research, other studies have supported an association between depressive symptoms and smoking in secondary school-age boys. These two factors -‘depressive symptoms’ and ‘stressful life events’ - have not yet been researched extensively enough to determine their exact relationship with adolescent health risk behaviour.

Summary

In summary, the individual factors which appear to receive the strongest support in the evidence-to-date for having the potential to significantly predict adolescent health risk behaviour are:-
• positive attitudes toward the behaviour;

• favourable outcome expectancies associated with the behaviour (although the latter may be over-ridden by social influences);

• underestimating the risk of harm associated with experimental or occasional participation in the behaviour;

• expectancies or intentions for engaging in future behaviour;

• self-presentation motives; and

• lower levels of self-efficacy.

Less consistent support or conflicting evidence surrounds associations of adolescent health risk behaviour with:-

• knowledge level;

• feelings of invulnerability or invincibility;

• rebelliousness and risk-taking personality factors;

• low self-esteem;

• locus of control;

• poor perceived behavioural control; and

• depressive symptoms and stressful life events.
Social Factors

A number of theories and conceptual models argue that children model their behaviour on, or are influenced by the attitudes of, significant others, in particular - parents, siblings and peers. A large amount of research has focused on investigating and testing the complex associations and interactions between adolescent smoking and drinking and the characteristics of their family and friends, much of it providing conflicting findings. Significantly fewer studies have examined these associations in relation to sun protection behaviour.

Parent behaviour and attitudes

Parental influence has been demonstrated in numerous studies to be an important determinant of smoking behaviour in children and adolescents. This influence appears to be greater in girls, and particularly when the mother is a smoker. Parental attitude toward smoking has also been shown to have a significant effect on adolescent smoking behaviour, in that children of parents who have a permissive attitude to tobacco smoking are more likely to smoke. In contrast to the above findings, other studies have found that after controlling for other factors, parental smoking behaviour and attitudes do not predict the uptake of smoking by adolescents.

Similarly, parental drinking behaviour and parental attitude toward alcohol use have both been found to significantly correlate with adolescents' own drinking. For example, drinking frequency of parents of children aged 12 to 13 years was a significant predictor of alcohol use by the same children at age 15. In another study, the greater the quantity of alcohol parents reported drinking on a typical occasion, the more alcohol consumed by their children. While one study showed that only younger teenagers (less than 15 years) and girls are influenced by
parental alcohol use, another has demonstrated that regardless of gender, children who had been introduced to alcohol at home before the age of six years were 1.9 to 2.4 times more likely to report regular or heavy alcohol consumption at age 15 years compared to children who were not introduced to alcohol at such an early age.

Parental influence has also been found to be an important determinant of sun protection behaviour by children and adolescents. Even perceived parent behaviour has found to be important with results from a survey of over 3,600 high school students in Queensland showing that low perceived parental sun protection behaviour was strongly associated with poorer sun protection behaviours in students. Results of other studies suggest that adolescents whose parents insist that they take precautions in the sun or have a negative attitude toward sun-tanning are also more likely to use sun protection themselves.

Sibling behaviour

Many of the studies which support an association between parental smoking behaviour and adolescent smoking also support a link with sibling smoking behaviour. For example, in a two-year prospective study of 5,616 Australian children aged 10 to 12 years, 23% of children with smoking siblings became smokers during the study period compared to 12% of children with non-smoking siblings. The cessation rate among smoking children was almost twice as great in those with non-smoking siblings. In another study, having a smoking sibling increased the risk of taking up the habit in adolescence, with relative risks of 2.06 in boys and 1.75 in girls. The association between adolescent alcohol use and drinking behaviour of siblings has also received some support in the
No studies could be found which have explored whether sun protection behaviour of siblings is an important determinant of adolescent sun protection.

**Family relationships**

While the literature appears to provide some support for the influence of parental and sibling behaviour on adolescents' health risk behaviour, it has been suggested that this influence is mediated by the quality of the relationships that adolescents have with their parents or families. As adolescence is a period in which young people strive for autonomy from parents while maintaining some appropriate attachment to the family, theorists have proposed that individuals who achieve high levels of both autonomy and attachment are less likely to engage in health risk behaviours. This specific hypothesis was supported by a study which found that students (aged 11 to 14 years) who reported their parents to be supportive of their autonomy by encouraging the expression of opinions and not being over-protective were less likely to engage in sexual behaviour. Greater levels of parental acceptance, family cohesion and emotional attachment were associated with less fighting behaviour and substance use. Findings such as these have contributed to the development of Family Interaction Theory (FIT), which describes the parent-child dynamics during pre- and early-teen years and its important influence on drug-related behaviour of teenagers during later adolescence. Specifically, FIT proposes that adolescents of parents who lack conventional values and/or provide little affection and/or exert insufficient control are more likely to engage in experimental substance use.

Family Interaction Theory and the influence of family relationships on smoking and alcohol use by adolescents has received support from research over the years. For example, one study...
showed that smoking rates among 15 to 17 year olds were significantly higher when parents were seen not to have enough time to talk to teenagers or if adolescents felt some difficulty in talking with parents, suggesting that the quality and quantity of communication between parents and teenagers may have an important bearing on adolescent smoking. Another study found that adolescents who reported poor family relationships and greater family conflict also reported higher levels of alcohol use. Finally, teenagers who began to smoke and drink at a young age (12-13 years) were not as close to their families, were home less frequently in the evenings, and had fewer interests in common with their parents compared to teenagers who did not smoke or drink. Researchers have therefore concluded that strong parental support and frequent child-parent communication act as ‘protective factors’ by significantly reducing the risk of smoking and drinking among adolescents. Other experts argue that the influence of ‘parent closeness’ may be mediated by the gender of the parent, although there is disagreement over whether closeness to mothers is more important than closeness to fathers. The association between family relationships and adolescents’ sun protection behaviour has not been explored to date.

While the above findings suggests that the relationships teenagers have with their parents may be important determinants of subsequent risk behaviours, the findings from these studies should be considered with caution. First, measurement of the quality of relationships is done through the reported perceptions and experiences of teenagers and not the actual social environment. Second, it is not clear whether adolescents’ perceptions are linked to current, transitional family situations or early experiences. Third, because data is cross-sectional, causal inferences can not be made about the direction of influence. It is possible that engaging in health risk behaviours may cause teenagers to become detached from parents, communicate less and perceive parents as less supportive.
Peer behaviour and attitudes

One predictor of adolescent behaviour which has received strong and consistent support from the literature is the perceived or actual behaviour of friends. Many studies have demonstrated a significant association between adolescent smoking and smoking (or approval of smoking), by their peers.\textsuperscript{140,142-145,199,219,222,228,235,239} For example, one study found that 84% of girls and 93% of boys who were smokers had a best friend who had tried smoking compared to 40% of girls and 31% of boys who were non-smokers.\textsuperscript{239} Another study concluded that the best predictor of smoking at one-year follow-up was the number of friends who currently smoked.\textsuperscript{140} Similar associations have been found between the drinking behaviour/attitudes of peers and adolescent alcohol use,\textsuperscript{79,146,160,227,235,240-242} and between the use of sunscreen by friends and sun protection behaviours of adolescents.\textsuperscript{151} For instance, one of the strongest predictors of heavy drinking in Grade 12 was having had a majority of friends who drink while students were in the seventh grade.\textsuperscript{79}

More recent research indicates that the association with peer behaviour may be mediated by socio-demographic and personality variables. Girls, older students, teenagers of low social status, and adolescents with low self-esteem were more influenced by their friend's smoking and drinking than boys, younger teenagers, high social status students, and those with high self-esteem.\textsuperscript{79,222} In addition, research has suggested that the perceptions that adolescents have of their friends' behaviour and attitudes may be more important than their friends' actual behaviour.\textsuperscript{166,243,244}

It is well known that teenagers over-estimate the prevalence of health risk behaviours among their peers, especially those who are currently engaging in the behaviour.\textsuperscript{167,245} For example, adolescents who smoke or drink alcohol overestimate the proportions of their peers who do the same to a greater extent than those adolescents who neither smoke or drink.\textsuperscript{245} This "false consensus effect"\textsuperscript{246} has been demonstrated with several risk
behaviours, most notably smoking and alcohol use, and importantly, has also been associated with increases in actual rates of these behaviours.\textsuperscript{148,177,247,248} Put simply, the more common a teenager thinks a particular behaviour is among their peers, the more likely they are to engage in that behaviour at present and in the future. This suggests that a teenager's estimates of the numbers of peers who are engaging in a particular behaviour may play an important role in their decision to engage in that behaviour.\textsuperscript{166}

Much of the research which supports the association between adolescent and peer behaviour is correlational, and therefore provides no basis for inferring causality.\textsuperscript{249} It is not possible to determine whether adolescents select friends who have similar behaviours and attitudes, or whether teenagers change their behaviours to accommodate their friends. So, is the association with peers due to selection processes or socialisation?\textsuperscript{239} Many early researchers interpreted the association with peer behaviour as evidence for the effects of socialisation and as a result the term 'peer pressure' was coined. The term, perhaps incorrectly, implies that peers have a direct influence through some form of coercion or persuasion to engage in certain behaviours. With the knowledge that, at least in the case of drug use, few adolescents have reported ever feeling pressured by their friends to use drugs or even being offered some,\textsuperscript{250, 251} the term 'peer pressure' was replaced with more appropriate labels such as 'peer influence' or 'peer support'. Both of these terms recognise that the influence of peers may be more indirect, such as through the approval or even toleration of their friend's behaviour or attitudes.\textsuperscript{249}

Other investigators have, however, questioned the peer influence/support explanation, and argue that the association with peers is more appropriately interpreted as evidence for selection processes or 'peer preference'.\textsuperscript{249,252-254} Further progression of this argument led to the development of Peer Cluster Theory.\textsuperscript{217} Peer Cluster Theory describes
'peer clustering' as the coming together of teenagers who share common values, attitudes and behaviours. Specifically, it suggests that the attitudes which adolescents have towards drugs do not cause drug use, but rather cause them to become involved with drug-using peers. This involvement with substance-using peers is influenced by four broad factors: socio-demographics; psychological and personality traits; personal attitudes and beliefs; and socialisation opportunities.

While the Peer Cluster theory has been criticised for being reductionist in its view and failing to consider the long-term interaction between individuals and their social environment, it has long been acknowledged that teenagers do tend to cluster in groups with similar characteristics. Research has provided support for some of the contentions of Peer Cluster theory. In a cohort study of 1,265 New Zealand children and their smoking habits, results indicated that children who had engaged in early tobacco experimentation tended to associate with peer groups whose members smoked, who in turn, reinforced their smoking behaviour and contributed to its continuation in later adolescence. Family social background, parental and family smoking practices, gender, intelligence, and self-esteem were also related to early smoking behaviour (less than 13 years) and peer affiliations, however the total contribution of these factors to the continuities in smoking behaviour was relatively small. The two strongest predictors of cigarette smoking at age 16 were experimentation with smoking before 13 years of age, and affiliation with smoking peers at age 15.

Peer preference has been conceptualised as a three stage process: (i) adolescents selecting friends who are similar in attitudes and behaviour; (ii) peers influencing each other during the friendship; and (iii) the deselecting or ending of friendships with peers who are no longer similar. In a comparison between group members' and group outsiders' susceptibility to the influence of their friends' smoking behaviour, results
showed that group outsiders were more influenced by the smoking behaviour of their best friend than group members, particularly for teenagers who were very concerned about their friends' reactions to their smoking.\textsuperscript{253} Consistency in smoking behaviour was found to relate to the formation, but not the breakdown, of friendships. The authors concluded that adolescents may view engaging in health risk behaviour as a way of entering a desired peer group,\textsuperscript{253} providing further support for Peer Cluster theory and the peer preference argument. However, a recent study challenges these views. Findings from a school- and community-based alcohol use prevention trial in students in Grades 7 to 9, indicate that similarities in drinking behaviour among adolescent friends were due to processes of peer influence rather than peer selection.\textsuperscript{259}

\textit{School attachment}

A number of theories, like Social Control Theory,\textsuperscript{215} Social Bonding Theory,\textsuperscript{260} and the Social Development Model,\textsuperscript{261} also contend that attachment or "bonding" to the school is an important method by which conventional norms can act to control or discourage risk behaviour in students. These theories propose that teenagers who feel uncommitted to, or uninvolved with, activities within their school will not internalise school norms or values. Consequently, they will be more likely to become attached to risk-taking peers and therefore, engage in health risk behaviours themselves.\textsuperscript{262} Research has provided support for these contentions with studies showing an increased risk of smoking and/or drinking among teenagers who:- like school less;\textsuperscript{185, 263} participate less in sports and extra-curricular activities;\textsuperscript{185, 209, 263} report lower levels of school self-esteem;\textsuperscript{145, 188} have negative attitudes towards their school;\textsuperscript{147} or report lower levels of bonding with their school.\textsuperscript{264} Data from an international study show a strong correlation between indicators of 'alienation' from school, and the greater likelihood of a student engaging in health risk
behaviours. In particular, this relationship is strongest for the behaviours of smoking and drinking. Other studies have shown that, at least in the case of smoking, rates are higher among students who are frequently absent from school, and highest among high-school drop-outs. School teachers have also been found to have a strong influence on students' behaviour with studies showing higher smoking rates among students of schools in which more teachers smoke, and in schools where the teachers fail to express a negative attitude towards taking up smoking.

Summary

In summary, parents, siblings, peers, and the school appear to have a large potential influence on the health risk behaviour of adolescents in a number of ways. The Social Factors which appear to receive the strongest support in the evidence-to-date for having the potential to significantly predict adolescent health risk behaviour are:

- parental and sibling health risk behaviour and attitudes;
- quality of family relationships, parent closeness and frequency of child-parent communication;
- peer behaviour and attitudes (though there are conflicting views as to whether this association is due to 'peer pressure or influence' or to 'peer selection');
- perceived peer behaviour or subjective norms (though this is probably more appropriately labelled as an Individual Factor);
- attachment or 'bonding' to school and participation in extra-curricular school activities;
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- health risk behaviour and attitudes of school teachers.

Clearly, the relationships between adolescents and their social groups, such as family and peers, are complex and while the literature to-date provides some insight into the association between reciprocal relationships and health risk behaviours, further research is required to give greater understanding of the process by which it is mediated, particularly in relation to sun protection behaviour as few studies have examined this area. Evidence also supports the potential influence of school teachers, in particular their behaviour and attitudes, and other opportunities for bonding with the school community on the lifestyle and health risk behaviours of adolescents.

**Environmental factors**

In Social Learning Theory,\(^{214}\) the physical and social environment in which one lives is acknowledged as playing an important role in influencing behaviour. The notion of reciprocal determinism, which describes the three-way interaction between - person, environment, and behaviour - highlights the need to consider the potential influence of environmental factors.\(^{269}\) In the Health Belief Model,\(^{137}\) the environment is viewed as providing potential cues to act or engage in certain behaviours. The increasing importance being placed on environmental factors has been recognised by health promotion organisations such as the WHO as documented in the Ottawa Charter\(^ {270}\) and Jakarta Declaration.\(^ {271}\) Indeed, many experts advocate the use of policies and environmental interventions as a means to influence health behaviour.\(^ {272-274} \)
Availability and/or accessibility of products

Several environmental factors have been identified as potentially influencing adolescent health risk behaviour. The first of these, greater availability and/or accessibility of products both harmful (eg. tobacco, alcohol) and protective of health (eg. sunscreen, hats) has been shown to be associated with greater consumption or use of products.\textsuperscript{272} For instance, the cost of cigarettes, accessibility of cigarettes and availability of smoking cessation and prevention programs have all been shown to influence teenage smoking.\textsuperscript{45,207,275,276} Despite the sale of tobacco to minors being illegal in most developed countries, a number of studies in the US\textsuperscript{277-279} and Australia\textsuperscript{275,280} have shown that adolescents are successful in purchasing cigarettes in the majority of attempts, indicating that the law is being ignored by a large proportion of retailers. Similarly, research has shown that young people are also very successful in purchasing alcohol from retailers, despite being beneath the legal age.\textsuperscript{281,282} The regulation of alcohol sales through retail outlets, provision of alcohol-free events, and adult supervision of social functions, have all been found to discourage unsafe alcohol use by adolescents.\textsuperscript{283} In addition to actual availability, perceived accessibility has been shown to be significantly associated with behaviour.\textsuperscript{284} A study of Year 7 and 8 high school students in Sydney, New South Wales found that the odds of being a current smoker was almost 50% greater for students who perceived that access to cigarettes was easy or very easy, even after adjusting for other social factors.\textsuperscript{284}

Policy

The potential influence of school teachers through their behaviour and attitudes, and participation in school activities, have been discussed under the heading of Social Factors, but other aspects of the school environment
have been found to impact on the health behaviour of school students. School policies or rules, and their enforcement, are examples of social structures which can limit harmful behaviour and encourage healthy behaviour.\textsuperscript{272} Research has shown that smoking rates among students are lower in schools that strongly enforce strict non-smoking policies,\textsuperscript{285-289} adding support to the Ottawa Charter's advocacy of the importance of healthy public policy.\textsuperscript{270} Strong evidence also exists to support the importance that school policy has in influencing sun protection behaviours of students at school,\textsuperscript{36,111,116,229} and even out-of-school sun protection behaviour in primary-school aged children.\textsuperscript{229} These findings may reflect the success of widespread adoption of solar protection policies, including a "No Hat – No Play" policy, by primary schools throughout Australia over the past two decades.\textsuperscript{94}

Restrictions and rules in the home environment can also influence adolescent health risk behaviour. Several recent studies have confirmed that smoking restrictions in the home are associated with less smoking experimentation and lower rates of current smoking among high school students.\textsuperscript{285,290,291} For example, using data from two large population-based surveys of adolescents aged 15 to 17 years in the United States, researchers found that adolescents who lived in smoke-free homes were 74\% as likely to be smokers as adolescents who lived in households with no smoking restrictions, even after adjusting for the presence of smokers in the home.\textsuperscript{290} Research has also shown that students are more likely to move from experimentation to habitual smokers if they live in homes with low perceived levels of parent monitoring and low expectations of punishment for smoking.\textsuperscript{207}
Marketing

A third environmental factor demonstrated to have a strong impact on behaviour, particularly smoking, is marketing or advertising. Frequency and intensity of media messages can influence subjective norms, attitudes and beliefs associated with products. Adolescents are especially vulnerable to media messages and marketing strategies. Exposure to messages comes through a variety of media including television, films, radio, music videos, sport, advertising and other promotional marketing. Examining briefly the influence of film, a recent study showed that students who were completely restricted from viewing R-rated films (which tend to contain more substance use than other rating categories) were significantly less likely to smoke or drink compared with students who had no restrictions on viewing such films. Messages in films are often more pervasive though, as illustrated by a recent analysis of 50 G-rated children’s animated films. Results indicated that over two-thirds of children’s G-rated films featured tobacco or alcohol use in the story plots without any clear messages of the negative health effects associated with use of either substance.

Several studies indicate support for a positive association between tobacco advertising and other marketing promotions with adolescent smoking. Clear evidence exists that most teenagers prefer the most heavily advertised brands. Similarly, positive media messages about alcohol have been shown to accelerate the initiation of alcohol use and help forge positive attitudes toward alcohol among adolescents. However, other research suggests that the influence of media exposure may be moderated by adolescent expectancies and parental discussion. Finally, while advertising has been shown to have a strong influence on adolescent behaviour in the past, with bans on tobacco advertising on radio, television and print media in Australia over the past two decades, and recent bans on sports and cultural events sponsorship by tobacco companies under the Tobacco Advertising Prohibition Act 1992, one might
conjecture that the influence of advertising in relation to smoking should diminish, though as yet there is no empirical evidence which supports this.

Summary

In summary, *Environmental Factors* which receive the strongest support in the literature for influencing adolescent health risk behaviour are:-

- availability and accessibility of health-related products, both real and perceived;
- policies or restrictions regarding adolescent health risk behaviour in both school and home;
- exposure to positive portrayal of health risk behaviours in the popular media, advertising and marketing strategies.

Examination of both theory and empirical evidence presented here has endeavoured to answer the question “What is known about the determinants of the health risk behaviour?” In summary, a review of the literature reveals that a large amount of research has been conducted. This was supported by the results of the publication audit described in Chapter Two. Our audit found that the majority of research publications focused on school-aged children over the past 18 years was descriptive research, which addressed the prevalence and predictors of each of the three health risk behaviours. A range of potential factors that directly or indirectly influence adolescent health behaviour have been identified and examined, with particular attention given to those factors for which evidence has been strongest and most consistent. A summary of all these factors are presented in Table 3.1 under the headings of individual, social and environmental factors.
Table 3.1. What is known about the determinants of smoking, alcohol use and inadequate sun protection among adolescents? A summary of individual, social and environmental factors

<table>
<thead>
<tr>
<th>Individual Factors</th>
<th>Social Factors</th>
<th>Environmental Factors</th>
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<tbody>
<tr>
<td>Positive attitudes</td>
<td>Parent &amp; sibling health risk behaviour and attitudes</td>
<td>Availability and accessibility of products (real and perceived)</td>
</tr>
<tr>
<td>Favourable outcome expectancies</td>
<td>Parent closeness &amp; child-parent communication</td>
<td>Policies or restrictions at school and home</td>
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<tr>
<td>Underestimation of risk of harm (or beliefs about susceptibility &amp;/or severity)</td>
<td>Peer health risk behaviour and attitudes</td>
<td>Exposure to positive media messages, advertising and marketing strategies</td>
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<tr>
<td>Expectancies or intentions</td>
<td>Attachment or 'bonding' to school &amp; participation in extra-curricular school activities</td>
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<td>Self-presentation motives</td>
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<td>Lower levels of self-efficacy</td>
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<td>Subjective norms</td>
<td>Health risk behaviour and attitudes of school teachers</td>
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</table>
Conclusion

This chapter has described the application of the first two stages of the Staged Approach to the development and evaluation of a school-based health promotion intervention targeted at smoking, unsafe alcohol use and inadequate sun protection. An assessment of available evidence on the adequacy of existing measures indicates that there are commonly used and widely accepted definitions of each of the three health risk behaviours. Self-report is the main method of measurement, and as a whole, considered to be “adequate” by meeting criteria of validity, reliability, sensitivity and acceptability. A review of the plethora of research conducted on the prevalence and predictors of the three health risk behaviours revealed a vast number of potential factors that directly or indirectly influence adolescent health behaviour under the broad headings of individual, social and environmental factors. For several of these, evidence appears to be strong and consistent, while for others, the evidence is weak or inconsistent or has not been tested for association with the target health risk behaviours in question. Gaps in knowledge remain in relation to what is known about the specific determinants of smoking, unsafe alcohol use and inadequate sun protection among adolescents in Australia.
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Chapter Four

Study I: Prevalence of, and factors associated with, smoking, unsafe alcohol use and inadequate sun protection in Hunter Region adolescents

Part One: Study design and development of an adequate measurement tool
Introduction

Results of the literature audit described in Chapter Two indicated a vast amount of descriptive research has been conducted on the prevalence and determinants of smoking, unsafe drinking and sun exposure behaviours in school-aged populations. However, most of this research is international and there remains a gap pertaining to which factors are most strongly associated with Australian adolescents. Descriptive research also plays an important role in providing up-to-date information in changing trends, and is particularly useful when it directly leads to the design and implementation of more advanced intervention research. This chapter and the following (Chapter Five) endeavour to address this deficit in knowledge by describing a descriptive study on the prevalence of, and factors associated with, each of the three health risk behaviours among adolescents residing in the Hunter region of NSW.

This study is important for several reasons. First, it is important to obtain measures of prevalence of the health risk behaviours in the target population to gauge a more accurate picture of the magnitude of each health issue and to identify any high risk groups within the population under investigation, namely adolescents in the Hunter region of NSW. Second, this descriptive study leads to the design and implementation of a more advanced research trial of a school-based intervention. Obtaining precise baseline estimates will enable pre- and post-intervention comparisons as a means of evaluating effectiveness. Third, though a list of potential determinants has been identified, it is essential to know which individual, social and environmental factors most strongly influence the target population. This is vital for the design and development of the intervention program, so that health promotion strategies are tailored specifically for the study group by targeting these factors, therefore increasing the likelihood of success.¹
In Chapter Three, a review of literature identified several factors that directly or indirectly influence adolescent health risk behaviour, with particular attention given to those for which evidence has been strongest and most consistent. A summary of these factors was presented in Table 3.1. While this study attempted to measure most of the factors outlined in Table 3.1, a number were not included because either valid and reliable measures of the variable were not available; the factor was viewed as unmodifiable through intervention in the school setting; or it simply was not practical to do so. For example, adolescents’ perceptions about the quality of their family relationships were not included in the study because of the lack of reliable and valid measurement tools and a perceived inability to modify this variable through intervention in the school setting. Similarly, sibling behaviour and media exposure were also omitted because of the minimal potential to modify these factors in a school-based intervention program.

A number of factors relating to the school environment, namely – student perceived opportunities for bonding; teacher behaviour and attitudes; and enforcement of school policies - were not included because of lack of valid measurement tools, but were still presumed to have a potential influence on the behaviour of the target population. These factors were retained as important determinants in the design and development of the intervention program. Finally, despite discrepancies in the literature related to the influence of knowledge, there is a general consensus that as it is a key ingredient in many behavioural theories and models, it would be an error to overlook its importance in behavioural interventions. Therefore, it is included in the study so that efforts can focus on identifying specific areas of knowledge deficits and maintaining diligence. A list of all factors included as potential determinants of smoking, unsafe alcohol use and inadequate sun protection in the target population are presented in Table 4.1.
Table 4.1 Individual, social and environmental factors measured for association with smoking, alcohol use and inadequate sun protection in the target population

<table>
<thead>
<tr>
<th>Individual Factors</th>
<th>Social Factors</th>
<th>Environmental Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge</td>
<td>Parent health risk behaviour and attitudes</td>
<td>Perceived availability / accessibility of products</td>
</tr>
<tr>
<td>Attitudes</td>
<td>Peer health risk behaviour and attitudes</td>
<td>Rules at home</td>
</tr>
<tr>
<td>Outcome expectancies</td>
<td></td>
<td></td>
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<tr>
<td>Perceived risk of harm (or beliefs about susceptibility &amp;/or severity)</td>
<td></td>
<td></td>
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<tr>
<td>Behavioural intentions</td>
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<td>Self-presentation motives</td>
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<tr>
<td>Self-efficacy</td>
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<td>Subjective norms</td>
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</table>

The aims of this chapter are to:

1. describe the study design and methodology used in a cross-sectional study on the prevalence of, and factors significantly associated with, smoking, unsafe alcohol use and inadequate sun protection among young adolescents in Hunter region secondary schools; and

2. describe the development and validation of an adequate measurement tool used in the above study.
chapter four

METHOD

Design

A cross-sectional survey of all consenting secondary school students in years 7 and 8 (the first two years of secondary schooling in Australia, in which most students are aged between 12 and 14 years), drawn from six (6) randomly selected government schools in the Hunter region, NSW, Australia was conducted in July and August, 1994.

Study Region

The Hunter region is located 130 kilometers north of Sydney in NSW. It covers approximately 31,000 square km and includes 13 local government areas. The estimated population in 1994 was just over 500,000, equating to 9% of the total population of NSW. The majority (84%) of this population resided in five local government areas nearest the coast. The Hunter region is noted for its mining and energy production, thoroughbred horse studs, world famous vineyards and surfing beaches.\(^3\) (See Appendix 4.1 for maps of the region.)

Sample

Eight (8) schools were initially randomly selected from the total 38 state-funded Department of School Education secondary schools in the Hunter region using a simple random sampling method. Schools were numbered “1” to “38” and a computer program randomly generated eight numbers. One (1) school refused to participate and a replacement school was randomly selected from the original list. Two (2) further schools declined to participate but were not replaced due to external restraints of time and the risk of contamination with another school-based program which was
planned for the region at a later date. This left a total of six (6) consenting schools with a potential sample of 1,953 students enrolled in Years 7 and 8.

As measurement was based on individuals, sample size calculations indicated that a sample of 206 students was required to estimate the prevalence of smoking, 345 students for the measurement of prevalence of unsafe alcohol use, and 384 students for the measurement of prevalence of inadequate sun protection, with 5% precision and 95% confidence. These calculations were performed using the most recent estimates of the prevalence of each of the health risk behaviours among Australian adolescents.\textsuperscript{2,4,5} Even though estimates were individual-based, schools were selected because first, involving the total number of students in these schools was sufficient to meet sample size requirements. Second, the planned intervention trial was a school setting-based program rather than individual-based and would target all students in the schools. Third, the limited number of schools was chosen due to budget and personnel constraints by which the candidate was restricted.

**Training of assistants.**

A research assistant was trained by the candidate in liaison and other health promotion skills to facilitate the process of gaining consent from school principals. Four other research assistants were trained in how to conduct surveys, and were provided with written training materials which containing step-by-step guidelines on what to do on the days that students were surveyed.
Procedure

After gaining ethical clearance from the Hunter Region Department of School Education Head Office and the University of Newcastle, principals of selected schools were mailed an invitation to participate in the study and then contacted by telephone to further explain the purpose of the study. Each of the schools was then visited by either the candidate or the research assistant. The purpose of this visit was to provide further information to school principals, make contact with relevant staff, answer questions and obtain final consent for the study. Following this, and two weeks prior to the survey being conducted, participating schools were supplied with Parental Information Letters and Consent Forms (see Appendix 4.2) which were distributed by teachers to all students in Years 7 and 8. To maximise the return of signed Consent Forms, schools were asked to provide prompts to students on a daily basis, posters were displayed on bulletin boards and reminder notices were included in school weekly newsletters to parents. As an added incentive, several donated prizes (e.g., movie passes, tickets to local sporting events, and signed sports posters and T-shirts) were provided and all students who returned signed Consent forms were eligible to enter a draw for these. Only those students who returned a Consent Form signed by a parent/guardian were permitted to participate in the study. Consent Forms were collected by teaching staff and forwarded to the candidate.

The survey was carried out on two consecutive Mondays during July and August 1994, with three schools surveyed the first week, and the remaining three schools on the second week. This procedure was used because most of the schools had a similar timetable on a Monday and the measurement tool contained some questions related to behaviour over the previous weekend. Personnel constraints meant that not all schools could be surveyed on the same day, so the consecutive Mondays were chosen to increase reliability.
Prior to the survey days, schools and assisting teachers were sent information letters detailing instructions. (See Appendix 4.3) A team of two trained research assistants arrived at each school approximately one hour before the survey was due to commence. All students completed the questionnaire in the afternoon class period directly after the lunch break, and were supervised by their classroom teacher and the candidate or a research assistant. Students were grouped either in their normal classrooms or assembled together by Year in the school auditorium/gymnasium. Most students completed the survey in 30 to 40 minutes.

Development and Validation of Questionnaire

A 16-page 118-item self-administered questionnaire (see Appendix 4.4) was developed by the candidate in consultation with groups of experts including behavioural scientists, medical practitioners and teachers. Previously published research\textsuperscript{3-9} was reviewed and validated items were duplicated for greater face and content validity, and to enable comparison of results. A readability analysis using the RightWriter computer program calculated a Flesch-Kincaid Grade Readability Index of 4.41, indicating that readers needed a minimum of 4th grade level of education to understand the questionnaire. The questionnaire was piloted on a small convenience sample of 12-year-old students, slightly modified and re-piloted on a second small convenience sample.
Measures

The questionnaire was divided into five sub-sections which addressed the areas of:

1. Smoking behaviour;
2. Unsafe drinking behaviour;
3. Sun exposure and sun protection behaviour;
4. Socio-demographic variables; and
5. Factors associated with smoking, unsafe drinking and sun exposure health risk behaviour:
   - knowledge;
   - intentions or expectancies;
   - perceived parent health risk behaviour and attitudes;
   - rules at home;
   - perceived peer health risk behaviour and attitudes; and
   - attitudes and beliefs (including perceived risk of harm, perceived benefits, subjective norms, self-efficacy, and perceived availability).

These sections and their specific items will now be described in more detail.
1. Smoking behaviour

Smoking behaviour was assessed over three different time periods:

1. lifetime smoking (*Have you ever smoked even part of a cigarette?*);

2. smoking in the past month (*Have you smoked cigarettes at all in the last 4 weeks?* and *About how many cigarettes would you have smoked in the last month?*); and

3. smoking in the last week *How many cigarettes have you smoked in the last 7 days?*;

Students responded to this last question by completing a retrospective diary in which they indicated how many cigarettes, if any, they had smoked each day over the past seven days.

For the purposes of describing prevalence, current smoking was defined as having smoked at least one cigarette in the past week. This definition was based upon measures commonly used in previous research as described in Chapter Three.4,6

2. Unsafe drinking behaviour

Lifetime and recent drinking behaviour was first assessed over four different time periods:

1. lifetime drinking behaviour (*Have you ever had even part of an alcoholic drink?*);

2. drinking in the past year (*Have you had an alcoholic drink in the last 12 months?*);

3. drinking in the past month (*Have you had an alcoholic drink in the last 4 weeks?*); and
4. drinking in the past fortnight (*How much alcohol have you had in the last 2 weeks?*)

Students responded to the last question by completing a retrospective diary in which they indicated the number of standard alcoholic drinks consumed on each of the preceding 14 days, beginning with 'yesterday'. (Students were supplied with a diagram and explanation of what a standard drink was – see Appendix 4.4.) The retrospective diary-recall method of measurement has been shown to be both valid and reliable. Current drinking was defined as having consumed at least one standard drink of alcohol in the previous two weeks, a measure commonly used in prevalence studies.

Unsafe alcohol use was also assessed using questions on the frequency with which students reported having experienced a number of effects from alcohol use (eg. *feeling very drunk or sick; passing out*) and engaged in potentially harmful behaviours associated with their own or other people's use of alcohol (eg. *gone swimming within 4 hours of drinking; walked along the edge of a road within 4 hours of drinking; drunk alcohol without your parents knowing*). These behaviours were measured with two questions, *In the last 12 months when you have drunk alcohol, how often have you felt the following effects as a result?* and *In the last 12 months when you have drunk alcohol, how many times have you done the following?*, respectively. Responses were measured on a 3-point scale (*Often, Occasionally, Not at all*) for reported alcohol effects and a 4-point scale (*10 or more times, 3 to 9 times, 1 or 2 times, Never*) for potentially harmful behaviours associated with own and other people's use of alcohol. The inclusion of these items in the questionnaire reflects the move towards a broadening of the definition and measurement on 'unsafe alcohol use', as incorporated by recent studies in Australia, and the latest Australian NHMRC drinking guidelines for young people.
‘Unsafe alcohol use’ was defined and measured in three ways:

1. in terms of a quantity-frequency measure by having engaged in binge-drinking, defined as having drunk five or more standard drinks on at least one occasion in the previous fortnight for males and having drunk three or more standard drinks on at least one occasion in the previous fortnight for females. This measure was assessed using the retrospective diary which asked - *How much alcohol have you had in the last 2 weeks?*. This definition utilised the recent Australian NHMRC recommended drinking levels for adolescents, which classified consumption of alcohol at these levels or above to be ‘risky’ or ‘high risk’; 

2. in terms of reported experienced effects from alcohol use, that is, responses of either “Often” or “Occasionally” to the questions - *In the last 12 months when you have drunk alcohol, how often have you…felt very drunk or sick?… or passed out as a result of drinking?*; and

3. in terms of having engaged in harmful behaviours associated with own and other people’s use of alcohol in the last 12 months, that is, responses of either 10 or more times, 3 to 9 times and 1 or 2 times (meaning at least once) to the question which asked – *In the last 12 months when you have drunk alcohol, how many times have you done the following?….eg. gone swimming within 4 hours of drinking; walked along the edge of a road within 4 hours of drinking; drunk alcohol without you parents knowing.*

Inclusion of the second and third definitions reflects the shift towards a broader definition of ‘unsafe alcohol use’ that incorporates measures of alcohol-related harms and effects. These extended definitions have been recently adopted in some Australian studies and also reflect drinking guidelines produced by the NHMRC for young people as described in Chapter Three.
3. Sun exposure and sun protection behaviour

Students’ usual use of hats and sunscreen at school were assessed with the questions: During summer, how often would you wear a hat at school during lunch-time? and During summer, how often would you wear sunscreen at school during lunch-time?. Responses to these questions were measured using a 5-point scale (Every day; 3 – 4 days a week; 1 – 2 days a week; Less than once a week; and Not at all.) To measure current behaviour, a diary format was utilised to obtain information on the prevalence of sun protection behaviour during school recess periods on the day on which the survey was conducted. Students were asked to indicate whether they were outdoors for each of three periods - Recess, 1st half of lunch, and 2nd half of lunch using the question – Where were you mostly during this activity? Responses were measured on a 3-point scale (Indoors; Outdoors, mostly in the sun and Outdoors, mostly in the shade.) For each of the three periods, students were asked to indicate whether they were wearing a hat, (What were you wearing on your head?); wearing protective clothing, (What were you wearing on your upper body/ lower body/ feet?) or wearing sunscreen, (Were you wearing any sunscreen on your face/neck/shoulders/arms/chest/back/legs?) The diary method has been demonstrated to have a high level of validity in secondary school-aged students.13

Based upon responses in the diary, a solar protection score was then calculated for each student. The formula used to quantify the level of sun protection was a modified version of those used in previous studies,2·13·14 in which weighted points are allocated to each body region (face, neck, upper arm, lower arm, and legs), to reflect the relative risk of that region developing melanoma or skin cancer.16 Students were allocated points for the use of either protective clothing or sunscreen on each body region. For example, one point was awarded for protection of the lower arms if students reported wearing either a long-sleeved shirt or having applied sunscreen to the lower arm. However, if students reported wearing a
short-sleeved shirt and no sunscreen was applied to the lower arms, no points would be awarded. The maximum possible score for each school recess period was 10 points. An overall indicator of sun protection behaviour for each student was obtained by adding scores across all three periods and dividing by the individual’s number of sun exposure opportunities, (ie. school recess periods when the student was neither inside nor under shade). Students who scored 8 points or more (indicating that greater than 80% of the body was protected) were defined as being ‘adequately sun protected’. Similar cut-points have been used in school-based studies in Australia.\textsuperscript{12,14}

Students were also assessed on their history of sunburn with the question: \textit{During last summer, did you get a sunburn which was sore or tender the next day?}. Responses were measured on a 3-point scale – Yes, once; Yes, a few times and No.

4. Socio-demographic variables

Students were asked to indicate their gender and age. Ethnic origin was determined by responses to questions that asked students to name the country in which their mother and father were born. Countries were combined into one of six ethnic categories reflecting common geographical and cultural considerations: Australia/New Zealand; United Kingdom/Ireland; Mediterranean/Middle East; other European; Asian; and "other". Where at least one parent had been born overseas, that parent’s country of birth was used to assign the student’s ethnicity. In cases where both parents were born overseas, the father’s country of birth was used to assign ethnic origin. This method has previously been used in Australian research.\textsuperscript{17}

Socio-economic status was determined by students' responses to questions about the occupation of their mother and father. Occupations
were coded using Daniel's\textsuperscript{18} scale of occupational prestige. This measure ranks occupations on a scale ranging from one to seven with the lower scores denoting high status occupations (eg. professionals, managers) and the higher scores indicating lower status occupations (eg. sales staff, labourers, drivers). Other categories utilised were: unemployed; retired; full-time student; unable to work/pensioner; and don't know/can't remember. The parent with the highest status occupation (ie. lowest score) was used to determine socio-economic status of the child. That is, respondents with one or both parents falling into the ranks of one to three were classified as 'high' status, while respondents whose parents both fell into the ranks of four to seven and/or 'other' categories were classified as 'low' status.

5. Factors associated with smoking, unsafe drinking and sun exposure health risk behaviour

Following the review of available evidence on the predictors of health risk behaviour in Chapter Three, several potentially modifiable determinants were assessed in the questionnaire. These were derived from the list of factors presented in Table 4.1. The specific items which pertained to each factor are described below.

Knowledge

As ‘Health and Physical Education’ is one of eight key learning areas of the national secondary school curriculum in Australia, making it a compulsory curriculum with minimum time allocations for class contact time,\textsuperscript{19} knowledge related to smoking, alcohol, and sun protection (such as short- and long-term effects) is comprehensively addressed and assessed as part of routine classroom activity. In addition, inconsistencies in the literature related to the influence of knowledge on behaviour, suggest that
efforts should focus on identifying specific areas of knowledge deficits. As a result, assessment of students’ knowledge related to the three health risk behaviours was limited to areas that were suspected of not being adequately addressed in the mandatory classroom curriculum.

Thirteen separate items, using multiple choice, true/false and open-ended response options, were included to assess:

- knowledge of ‘safe’ levels of cigarettes and alcohol consumption;
- identification of the correct legal age at which cigarettes can be sold and alcohol purchased; and
- knowledge of skin cancer and effective solar protection behaviour.

For example, participants were asked What do you think is a ‘safe’ level of smoking? How many cigarettes per day? and provided with a blank space to write in their answer. As an example of a multiple choice question, participants were asked How long can the average Australian stay unprotected in the midday sun without burning? and provided with four possible response options from which to choose the correct answer.

**Attitudes and Beliefs**

Students’ beliefs and attitudes towards each of the health risk behaviours were determined by their responses to a number of attitudinal items which were derived from three sources: past scales and constructs used in previous research with established reliability and validity; items which measured aspects of the Health Belief model; and items developed by the candidate. Items were presented in the form of a statement to which students were asked How much do you agree or disagree with the statements below? and responded using a 4-point Likert scale in which “1” equated to strongly agree and “4” equated to strongly disagree. The
particular attitudes and beliefs and the number of items by which they were assessed were as follows:

- Perceived risk of harm, including beliefs about susceptibility to and severity of health problems associated with the behaviour (six items – smoking; five items – alcohol; four items – sun protection);

- Perceived benefits, including self-presentation motives (four items – smoking; three items – sun protection);

- Perceived norms (three items – alcohol);

- Self-efficacy beliefs (five items – smoking; four items – alcohol);

- Perceived barriers to and accessibility of products (four items – alcohol);

- Perceived influence of advertising (two items – alcohol);

- Perceived parental behaviour and attitudes towards sun protection (three items); and

- Perceived effectiveness of sun protection behaviours (four items).

**Behavioural intentions**

Students' intentions for engaging in health risk behaviour in the future were measured by the use of three separate questions. Intentions regarding smoking behaviour were measured with the question: *One (1) year from now, do you think you will...be smoking cigarettes regularly/be smoking cigarettes occasionally/not be smoking at all?*. Intentions regarding alcohol use were determined by students' responses to the question: *One (1) year from now, do you think that, when you go out with friends, you will...be drinking a lot of alcohol (3 glasses or more)/be*
drinking a moderate amount of alcohol (1-2 glasses)/be drinking a small amount of alcohol (2 glass or less)/ not be drinking alcohol at all?

Intentions regarding the use of sun protection measures were measured with the question: Next summer, do you think you will...try to get as deep a tan as possible/try to get a medium suntan/try to get a light suntan/not even think about tanning/try to protect yourself against the sun as much as possible?.

Perceived parent smoking and drinking behaviour and attitudes

Parental smoking and drinking behaviours were measured with the questions: Does your father/mother smoke cigarettes? and How often does your father/mother drink alcohol?. Responses were measured on a 3-point scale (Yes, No, Don’t know) for parental smoking and a 6-point scale (Never, Only on special occasions, Sometimes – once or twice a week, Often – most days, but not every day, Every day, Don’t know) for parental drinking behaviour.

Rules at home

Rules at home regarding substance use were determined by students' responses to the questions: What are the rules about smoking in your home?; In your home, what are the rules about how much alcohol you are allowed to drink? and In your home, what are the rules about how often you are allowed to drink alcohol?. Rules regarding sun protection at home were not measured directly, but were indirectly inferred from level of agreement or disagreement with two of the perceived parental behaviour and attitudes items, namely - My parents tell me all the time to protect my skin from the sun and My parents try to make me wear a hat to the beach/pool.
Peer behaviour and attitudes regarding smoking and drinking

Questions related to smoking and alcohol use by peers included: How many of your close friends smoke cigarettes?; and How many of your close friends do you think have drunk alcohol in the last 12 months?. Responses were measured on a 11-point scale by which participants were required to circle a number from 0 to 10 or more. Peer attitude towards smoking and drinking were measured by two questions which asked students to indicate what their friends thought about smoking and drinking alcohol (was it a ... cool / uncool thing to do / neither cool nor uncool or don't know).

Validation of attitude and belief items

A series of principal-components analyses with varimax rotation were performed to establish construct validity of the questionnaire attitude and belief items as the first stage of analysis on the cross-sectional data collected in the study. Separate analyses were performed for each set of items related to smoking, alcohol use and sun protection using BMDP statistical software. Emerging factors were identified using eigenvalues greater than 1.0, and only items which loaded significantly (that is, > 0.5) on any of the factors were retained for further analyses.
Results

Smoking

There were 1,114 students who completed the 23 smoking attitude items. Initial findings from a principal components analysis indicated three items (F4 – The anti-smoking advertisements on TV do not put young people off smoking; F6 – There is too much anti-smoking advertising these days; and F11 – Smoking only a few cigarettes a day would not hurt my health) which did not load on any of the emerging factors. These three items were removed and the analysis was conducted again. Three factors emerged from the data set accounting for 47% of the variance. The three factors identified reflected the findings from previous research on attitudes toward and beliefs related to smoking (see Chapter Three). These three factors measured students' beliefs about the perceived benefits of smoking, including self-presentation motives (four items, eg. Smoking is a good way to keep you weight down); self-efficacy beliefs (five items, eg. I could smoke cigarettes without getting hooked); and the perceived risks associated with smoking (six items, eg. Smoking makes you short of breath). The factor loadings for these 15 items are displayed in Table 4.2.

Of the 20 items, five items did not load significantly (that is, > 0.5) on any of the three factors. These five included: F5 – Smoking makes you look more attractive; F1 – People who smoke are usually more popular than non-smokers; F12 – The health risks of smoking have been exaggerated; F16 – I'd smoke if it helped you stay thin; F17 – Kids who smoke seem more grown up than kids who don't smoke. These five items were discarded and not included on any subsequent analyses.
Table 4.2. Sorted rotated factor loadings of items measuring attitudes and beliefs associated with smoking

<table>
<thead>
<tr>
<th>Item</th>
<th>Factor 1</th>
<th>Factor 2</th>
<th>Factor 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>F22 - People who smoke are better at sport than non-smokers.</td>
<td>0.75</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>F18 - Most of my sports idols smoke.</td>
<td>0.75</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>F20 - Coaches of sporting teams approve of smoking.</td>
<td>0.69</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>F23 - Smoking is a good way to keep your weight down.</td>
<td>0.55</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>F21 - People who smoke do so because they want to, not because their friends do.</td>
<td>0.00</td>
<td>0.67</td>
<td>0.00</td>
</tr>
<tr>
<td>F10 - People who smoke are more relaxed and confident.</td>
<td>0.00</td>
<td>0.61</td>
<td>0.00</td>
</tr>
<tr>
<td>F14 - I could smoke cigarettes without getting hooked.</td>
<td>0.00</td>
<td>0.60</td>
<td>0.00</td>
</tr>
<tr>
<td>F2 - Students should be allowed to smoke at school.</td>
<td>0.00</td>
<td>0.56</td>
<td>0.00</td>
</tr>
<tr>
<td>F13 - People enjoy life more when they smoke.</td>
<td>0.29</td>
<td>0.54</td>
<td>0.00</td>
</tr>
<tr>
<td>F8 - Smoking can harm your health.</td>
<td>0.00</td>
<td>0.00</td>
<td>0.79</td>
</tr>
<tr>
<td>F9 - Smoking makes you short of breath.</td>
<td>0.00</td>
<td>0.00</td>
<td>0.77</td>
</tr>
<tr>
<td>F7 - When you smoke you look awful.</td>
<td>0.00</td>
<td>-0.32</td>
<td>0.69</td>
</tr>
<tr>
<td>F3 - It's not very smart to smoke.</td>
<td>0.00</td>
<td>-0.30</td>
<td>0.61</td>
</tr>
<tr>
<td>F19 - Breathing other people's cigarette smoke is harmful to your health.</td>
<td>0.00</td>
<td>0.00</td>
<td>0.59</td>
</tr>
<tr>
<td>F15 - People who smoke usually don't care about their health.</td>
<td>0.00</td>
<td>0.00</td>
<td>0.50</td>
</tr>
</tbody>
</table>

NB. Factor loadings < 0.25 have been replaced by zero.
Unsafe alcohol use

There were 1,165 students who completed the 25 alcohol-related attitude and belief items. Initial findings from the analysis indicated three items which (E19 – Drinking low alcohol drinks is likely to keep me safer; E7 – Most people are okay about kids drinking; and E16 – Drinking alcohol looks cool) did not load on any of the emerging factors. These three items were removed and the analysis was conducted again. Five factors emerged from the data set accounting for 53% of the variance. The five factors identified measured students' beliefs about self-efficacy or drinking behaviour under which drinking is considered safe (four items, eg. it's alright to swim after drinking if you are a strong swimmer); perceived barriers to use and accessibility of alcohol (four items, eg. People selling alcohol often check kids ages); perceived risks associated with alcohol use (five items, eg. Drinking causes health problems); perceived norms about peer drinking behaviour, including false-consensus beliefs (three items, eg. Most people my age drink alcohol); and perceived influence of advertising (two items, eg. Advertising by alcohol companies influences people my age).

Of the 22 items contained in the second analysis, four items did not significantly load on any of the five factors, and included: E13 – Lessons should be taught in school about alcohol and how not to drink or how to drink sensibly; E14 - Parents should know whether or not their children drink alcohol; E23 – People who drink are more fun at a party and E21 – Getting drink every now and then is okay. These four items were subsequently excluded from any further analyses.
### Table 4.3. Sorted rotated factor loadings of items measuring attitudes and beliefs associated with alcohol

<table>
<thead>
<tr>
<th>Item</th>
<th>Factor 1</th>
<th>Factor 2</th>
<th>Factor 3</th>
<th>Factor 4</th>
<th>Factor 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>E2 - Driving after drinking is safe if you drive very slowly.</td>
<td>0.84</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>E1 – It’s alright to swim after drinking if you are a strong swimmer.</td>
<td>0.82</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>E4 – As long as you walk facing the oncoming traffic, it’s quite safe to walk along the road when you’ve been drinking.</td>
<td>0.78</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>E3 – As long as you’re with a group of friends, you’re pretty safe even if you’re drunk.</td>
<td>0.73</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>E8 – Police often check on drinking by young people.</td>
<td>0.00</td>
<td>0.78</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>E9 – A lot of people are concerned about kids getting drunk.</td>
<td>0.00</td>
<td>0.74</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>E11 – There is a lot of information around on the effects of drinking alcohol.</td>
<td>0.00</td>
<td>0.70</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>E12 – People selling alcohol often check kids’ ages.</td>
<td>0.00</td>
<td>0.56</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>E24 – People my age can easily afford to drink regularly.</td>
<td>0.00</td>
<td>0.00</td>
<td>0.70</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>E15 – Drinking alcohol causes health problems.</td>
<td>0.00</td>
<td>0.00</td>
<td>0.61</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>E17 – Drinkers can become addicted to alcohol.</td>
<td>0.00</td>
<td>0.00</td>
<td>0.60</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>E20 – Drink drivers should be punished.</td>
<td>0.00</td>
<td>-0.32</td>
<td>0.58</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>E5 – Kids are likely to drink more when their parents aren’t around or don’t know about it.</td>
<td>0.00</td>
<td>-0.30</td>
<td>0.53</td>
<td>0.32</td>
<td>-0.28</td>
</tr>
<tr>
<td>E6 – Most people my age drink alcohol.</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.74</td>
<td>0.00</td>
</tr>
<tr>
<td>E10 – When they do drink, most young people drink a lot.</td>
<td>0.00</td>
<td>0.28</td>
<td>0.00</td>
<td>0.56</td>
<td>0.00</td>
</tr>
<tr>
<td>E25 – People my age can easily afford to drink regularly.</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.55</td>
<td>0.00</td>
</tr>
<tr>
<td>E18 – Advertising by alcohol companies influences people my age.</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.49</td>
<td>0.65</td>
</tr>
<tr>
<td>E22 – Alcohol companies should continue to sponsor sports events.</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>-0.58</td>
</tr>
</tbody>
</table>

NB. Factor loadings < 0.25 have been replaced by zero.
Sun protection

There were 1,289 who completed the 15 solar protection attitude and belief items. Four factors emerged from the data set accounting for 54% of the variance. The four factors identified measured students' beliefs about: perceived parental behaviour and attitudes (three items, eg. *My parents tell me all the time to protect my skin from the sun*); perceived benefits of sun exposure, including self-presentation motives (three items, eg. *Getting a tan is a good way to look attractive*); perceived risks of sun exposure and susceptibility to skin cancer (four items, eg. *I don't think I have much chance of getting skin cancer*); and beliefs about the effectiveness of sun protection behaviours (four items, eg. *I'd wear a shirt at the beach if it would protect me against skin cancer*) as shown in Table 4.4. All of the 15 items, with the exception of one – D14 – *My parents would be really angry if I came home sunburnt*, loaded onto one of the four factors.
### Table 4.4. Sorted rotated factor loadings of items measuring attitudes and beliefs associated with sun protection

<table>
<thead>
<tr>
<th>Item</th>
<th>Factor 1</th>
<th>Factor 2</th>
<th>Factor 3</th>
<th>Factor 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>D5 – My parents tell me all the time to protect my skin from the sun.</td>
<td>0.86</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>D4 – My parents always take sunscreen along on family outings and use it.</td>
<td>0.80</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>D12 – My parents try to make me wear a hat to the beach/pool.</td>
<td>0.70</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>D1 – Looking tanned is heaps better than looking white in summer.</td>
<td>0.00</td>
<td>0.87</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>D6 – Getting a tan is a good way to look attractive.</td>
<td>0.00</td>
<td>0.85</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>D3 – Having a tan makes you look like an outdoors person and that’s important.</td>
<td>0.00</td>
<td>0.77</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>D8 – I don’t think I have much chance of getting skin cancer.</td>
<td>0.00</td>
<td>0.00</td>
<td>0.72</td>
<td>0.00</td>
</tr>
<tr>
<td>D11 – My parents have never had skin cancer, so I won’t.</td>
<td>0.00</td>
<td>0.00</td>
<td>0.71</td>
<td>0.00</td>
</tr>
<tr>
<td>D15 – By the time I’m old enough to get skin cancer, medical science will have a cure.</td>
<td>0.00</td>
<td>0.00</td>
<td>0.64</td>
<td>0.00</td>
</tr>
<tr>
<td>D2 – Skin cancer is not a very scary disease.</td>
<td>0.00</td>
<td>0.00</td>
<td>0.51</td>
<td>0.00</td>
</tr>
<tr>
<td>D9 – I’d wear a shirt at the beach if it would prevent skin cancer.</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.73</td>
</tr>
<tr>
<td>D13 – Shirts with sleeves look trendy in summer.</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.63</td>
</tr>
<tr>
<td>D10 – I choose to wear clothes that protect me from the sun.</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.62</td>
</tr>
<tr>
<td>D7 – I’d use a sunscreen if I thought it would protect me against skin cancer.</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.55</td>
</tr>
</tbody>
</table>

NB. Factor loadings < 0.25 have been replaced by zero.
Discussion

This chapter has described the methodology and procedure for a cross-sectional, descriptive study on the prevalence and factors associated with smoking, unsafe alcohol use and inadequate sun protection behaviours among young Australian adolescents. A measurement tool was developed and designed to satisfy the criteria of ‘adequacy’ as defined by the Staged Approach model\textsuperscript{22}, described in detail in Chapter Three. The tool incorporated previously validated self-report measures of each of the behaviours and efforts made to establish face, content and construct validity of items measuring potential factors associated with health risk behaviours.

There were, however, some limitations evident in its design. First, not all potential associated factors were measured in relation to each health risk behaviour. For example, perceived barriers to and accessibility of products were measured only in relation to alcohol, but not smoking or sun protection. For reasons of consistency, it would have been beneficial to ensure that all potential factors were measured in relation to each of the behaviours. Second, though the principal component analyses helped to establish construct validity of the attitude and belief items, results indicated that the identified factors accounted for less than an optimal amount of variance. Third, no tests of reliability were carried out on the attitude and belief items.

Despite these weaknesses, the measurement tool appears to be rigorous enough to meet the aims of this descriptive and subsequent intervention studies. Few HPS studies have even considered measurement tools and their adequacy as this chapter and thesis has done. Another strength of this chapter is its detailed description of the measurement tool and the linking of relevant items with the potential factors associated with health risk behaviour as identified from the research literature (as described in Chapter Three).
References for Chapter Four


Chapter Five

Study 1: Prevalence of, and factors associated with, smoking, unsafe alcohol use and inadequate sun protection in Hunter Region adolescents

Part Two: Results and discussion
Introduction

This chapter presents Part Two of a cross-sectional study on the prevalence of, and factors significantly associated with, smoking, unsafe alcohol use and inadequate sun protection among young adolescents in Hunter region secondary schools. The rationale, study design, procedure, development and validation of the measurement tool were described in the previous chapter, Chapter Four. The separation of the study into two chapters was done because it was necessary to first, justify the need for a descriptive study; second, provide a detailed description of the proposed measurement tool; third, establish its adequacy in terms of reliability, validity and acceptability; and fourth, demonstrate its ability to meet the study aims.

The aims of this chapter are to:

1. describe the procedure for analysis of data; and
2. present the results and discussion.

Statistical Analyses

Each questionnaire was coded for computer entry and carefully assessed by an experienced data entry person for incorrect or invalid responses. Where invalid responses were detected (eg. no questions answered, multiple responses to a question), data was coded as ‘missing’ and excluded from further analyses relating to those variables. As a result, the denominator size in statistical analyses varied. The frequency distributions of responses to each question and prevalence estimates for each of the health risk behaviours were calculated by gender and age. Chi-square analyses were conducted to assess whether any significant differences existed in the prevalence rates between gender, age and school year groups. Continuity-adjusted chi-squares were conducted for all 2x2 tables.
and standard chi-squares were conducted for larger frequency table. Each of the main outcome variables (as defined in Chapter Four) were tested for intra-cluster correlation by school using a proc glm procedure in SAS\textsuperscript{1} with output entered into a Microsoft Excel\textsuperscript{2} spreadsheet for calculation of intra-cluster correlations, upper and lower 95% limits, and inflation factors. Any significant clustering effects detected were incorporated by the calculation of adjusted 95% confidence intervals for the prevalence estimates. Differences between means were tested using standard t-tests.

Several items on the questionnaire were combined to produce factor scores. Calculation of a ‘sun protection score’ was previously described in Chapter Four. Items measuring knowledge were combined to present a ‘knowledge score’ in relation to each of the health risk behaviours. This score was then treated as a dichotomous variable by dividing scores into ‘high’ and ‘low’. For instance, a ‘high sun protection knowledge score’ was determined as providing four or more correct responses to the eight knowledge items, and a ‘low sun protection knowledge score’ equated to three or fewer correct responses. All the attitude and belief items were analysed by combining items according to the factors identified in the principal component analyses as described in the previous chapters. Items that did not load on to any of the factors were not included in any further analyses.

A series of Chi-square analyses were conducted to test for association between each of the individual, social and environmental factors and each of the main outcome measures of the health risk behaviours. Those variables reaching a \( p \) value of 0.2 or less were subsequently entered into a backward stepwise logistic regression analysis to test for multivariate prediction of each of the health risk behaviours. Logistic regression analyses were first undertaken in SAS,\textsuperscript{1} eliminating non-significant variables one-by-one, leaving only significant associated variables which were then analysed in SUDAAN to account for the potential influence of intra-clustering by schools resulting from the sample selection procedure.
Adjusted odds ratios and 95% confidence intervals, with correction for finite populations, were calculated to identify the significant factors associated with smoking, unsafe alcohol use and inadequate solar protection while controlling for the effects of other factors. Only those variables that were significant (ie. the confidence interval did not include 1.0) remained in the final model. The analyses did not explore any effect modifications because of the inconsistent and weak evidence base for such effects in relation to each of the three health risk behaviours. Also, the planned HPS intervention program (described in Chapter Seven) utilised a ‘whole-school’ approach and did not target sub-groups, for example, males and females, differently. All analyses were conducted using the SAS\(^1\) statistical package, Microsoft Excel\(^2\) spreadsheet package, and SUDAAN.
RESULTS

Participation rates

A total of 1,953 students were enrolled in Years 7 and 8 at the six schools that participated in the study. Of these, 1,589 students' parents consented for their child to participate, an overall consent rate of 81%. A breakdown of consent rates for each of the six schools labeled ‘A' to ‘F', as shown in Table 5.1, reveals that consent rates ranged from 54% to 91%. Only school ‘A' had a less than 80% consent rate which was due to the survey date unknowingly and unavoidably coinciding with a school excursion. As a result a large number of students from Years 7 and 8 were not at school on the day of the survey.

Table 5.1 Participation rates of student sample by school

<table>
<thead>
<tr>
<th>School</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of students surveyed (n)</td>
<td>136</td>
<td>274</td>
<td>275</td>
<td>280</td>
<td>384</td>
<td>240</td>
<td>1,589</td>
</tr>
<tr>
<td>No. of students enrolled (n)</td>
<td>254</td>
<td>342</td>
<td>301</td>
<td>341</td>
<td>441</td>
<td>274</td>
<td>1,953</td>
</tr>
<tr>
<td>Consent rate (%)</td>
<td>54%</td>
<td>80%</td>
<td>91%</td>
<td>82%</td>
<td>87%</td>
<td>88%</td>
<td>81%</td>
</tr>
</tbody>
</table>

Sample characteristics

As shown in Table 5.2, the sample comprised a slightly higher proportion of boys (54%) than girls (46%) which was not significantly different from proportions in 1991 Census Data for the age group 10-14 years (the nearest age grouping in Census Data to the study sample) in the Hunter Region. A greater number of students were from Year 7 (52%) than in Year 8 (48%), and the majority of students were aged 13 (50%) or 12
years (35%). Only four students in the sample were aged 11 years, not an unexpected number as most students this age would still be in Year 6 of schooling. Because of the low numbers, participants in this age group were excluded from any analyses which tested for differences in age.

A greater proportion of students (82%) were from Australian/New Zealand-born parents, with the United Kingdom/Ireland (8.8%), and Other European (4.6%) nominated next. Only small percentages of students derived from Asian (2.4%), USA/Other (1.5%) and Mediterranean/Middle East (1.0%) backgrounds. The study sample appears to contain a lower proportion of adolescents from Australian/New Zealand families than the census data indicates for the region (82% versus 89%) and slightly higher proportions of students from families of the other ethnic regions. Although the study data are compared to ABS data, it should be noted that this is not a true comparison as the census data only provides information on the birthplace of all residents in the region, not just school-aged children. While the majority (60%) of students in the study were from low socio-economic status families, comparisons between the study sample and census data on socio-economic status were similarly not possible as the census data only provides information on occupational/employment status of all persons, not just adolescents and their families.

Based on these limited comparisons, there appear to be no appreciable differences between the socio-demographic characteristics of the study sample and the 1991 census data for the region, indicating that the sample of students surveyed is approximately representative of adolescents in the Hunter region.
### Table 5.2 Socio-demographic characteristics of study sample

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Students (n = 1,589)</th>
<th>1991 Census Data for Hunter Region</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>868</td>
<td>55</td>
</tr>
<tr>
<td>Female</td>
<td>721</td>
<td>45</td>
</tr>
<tr>
<td><strong>Grade</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year 7</td>
<td>821</td>
<td>52</td>
</tr>
<tr>
<td>Year 8</td>
<td>768</td>
<td>48</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11 years</td>
<td>4</td>
<td>0.3</td>
</tr>
<tr>
<td>12 years</td>
<td>554</td>
<td>35</td>
</tr>
<tr>
<td>13 years</td>
<td>783</td>
<td>50</td>
</tr>
<tr>
<td>14 years</td>
<td>242</td>
<td>15</td>
</tr>
<tr>
<td><strong>Ethnic origin</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Australia/New Zealand</td>
<td>1,125</td>
<td>82</td>
</tr>
<tr>
<td>UK/Ireland</td>
<td>122</td>
<td>8.8</td>
</tr>
<tr>
<td>Mediterranean/Middle East</td>
<td>14</td>
<td>1.0</td>
</tr>
<tr>
<td>Other European</td>
<td>64</td>
<td>4.6</td>
</tr>
<tr>
<td>Asian</td>
<td>33</td>
<td>2.4</td>
</tr>
<tr>
<td>USA/Other</td>
<td>21</td>
<td>1.5</td>
</tr>
<tr>
<td><strong>Socioeconomic status</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>529</td>
<td>40</td>
</tr>
<tr>
<td>Low</td>
<td>808</td>
<td>60</td>
</tr>
</tbody>
</table>

* Only includes those respondents who completed the questions n=1,379. Comparisons made with the ABS 1991 Census of Housing & Population data on birthplace by regions of all persons in the Hunter.

# Only include those respondents who completed the questions n=1,337

*na = information not available.*
Prevalence of health risk behaviours

Smoking

The estimated prevalence of various levels of smoking experience are shown in Table 5.3. Data show the prevalence of smoking increased with age. Overall, a greater proportion of girls than boys reported smoking in the last four weeks and smoking in the last seven days. However, this difference was only significant among Year 8 students, with more girls (26.9%) than boys (20.5%) reporting smoking in the last month ($\chi^2=5.29$, df=1, $p<0.05$). The average number of cigarettes smoked per week by current smokers was higher in boys than girls aged 13 and 14 years, but lower in 12-year-olds. However, none of these differences were significant.

In relation to the main smoking behaviour outcome, approximately 13% (n=202) of all students were classified as 'current smokers' (ie. had smoked at least one cigarette in the seven days preceding the survey). A significant clustering effect by school on rates of current smoking was detected (see Appendix 5.1), and therefore the adjusted 95% confidence intervals (9.0%, 16.2%) are relatively wide.
Table 5.3 Past and current cigarette smoking behaviour of Hunter region adolescents,* across all ages and gender

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>12</th>
<th>13</th>
<th>14</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$n$</td>
<td>$n$</td>
<td>$n$</td>
<td>$n$</td>
</tr>
<tr>
<td>M</td>
<td>303</td>
<td>402</td>
<td>150</td>
<td>855</td>
</tr>
<tr>
<td>F</td>
<td>249</td>
<td>380</td>
<td>92</td>
<td>721</td>
</tr>
<tr>
<td><strong>Never smoked</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>68%</td>
<td>52%</td>
<td>40%</td>
<td>55%</td>
</tr>
<tr>
<td>F</td>
<td>65%</td>
<td>50%</td>
<td>43%</td>
<td>54%</td>
</tr>
<tr>
<td><strong>A few puffs only</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>19%</td>
<td>19%</td>
<td>23%</td>
<td>20%</td>
</tr>
<tr>
<td>F</td>
<td>19%</td>
<td>20%</td>
<td>22%</td>
<td>20%</td>
</tr>
<tr>
<td><strong>Less than 10 cigarettes</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>6%</td>
<td>10%</td>
<td>12%</td>
<td>9%</td>
</tr>
<tr>
<td>F</td>
<td>7%</td>
<td>12%</td>
<td>9%</td>
<td>10%</td>
</tr>
<tr>
<td><strong>More than 10 cigarettes</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>8%</td>
<td>19%</td>
<td>24%</td>
<td>16%</td>
</tr>
<tr>
<td>F</td>
<td>9%</td>
<td>18%</td>
<td>26%</td>
<td>16%</td>
</tr>
<tr>
<td><strong>Smoked in last 4 weeks</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>28%</td>
<td>39%</td>
<td>34%</td>
<td>35%</td>
</tr>
<tr>
<td>F</td>
<td>42%</td>
<td>47%</td>
<td>44%</td>
<td>45%</td>
</tr>
<tr>
<td><strong>Smoked in last week</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(current smoker)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>6%</td>
<td>13%</td>
<td>15%</td>
<td>11%</td>
</tr>
<tr>
<td>F</td>
<td>8%</td>
<td>17%</td>
<td>21%</td>
<td>14%</td>
</tr>
<tr>
<td><strong>Mean number of cigarettes per week</strong>a</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>13.4</td>
<td>20.8</td>
<td>19.8</td>
<td>15.2</td>
</tr>
<tr>
<td>F</td>
<td>14.2</td>
<td>16.1</td>
<td>15.3</td>
<td>14.8</td>
</tr>
</tbody>
</table>

* Percentage of total in each age and gender category.

a Based on current smokers only
Unsafe Alcohol Use

Lifetime drinking behaviour

The prevalence of varying levels of lifetime drinking experience among the study sample are shown in Table 5.4. Results show increasing use of alcohol with age from 12 to 14 years. There were no significant differences between boys and girls in lifetime drinking experience, except among 12 year olds in whom a significantly greater proportion of boys (14%) than girls (8%) reported having consumed more than 10 standard drinks in their lifetime ($\chi^2=8.02$, df=2, $p<0.05$).

Table 5.4 Lifetime drinking behaviour of Hunter region adolescents,* according to age and gender

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>12</th>
<th>13</th>
<th>14</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$n$</td>
<td>$n$</td>
<td>$n$</td>
<td>$n$</td>
</tr>
<tr>
<td>M</td>
<td>302</td>
<td>401</td>
<td>149</td>
<td>852</td>
</tr>
<tr>
<td>F</td>
<td>243</td>
<td>380</td>
<td>91</td>
<td>714</td>
</tr>
<tr>
<td>Never drunk alcohol</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>23%</td>
<td>15%</td>
<td>13%</td>
<td>17%</td>
</tr>
<tr>
<td>F</td>
<td>30%</td>
<td>16%</td>
<td>22%</td>
<td>22%</td>
</tr>
<tr>
<td>A few sips only</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>48%</td>
<td>43%</td>
<td>34%</td>
<td>43%</td>
</tr>
<tr>
<td>F</td>
<td>49%</td>
<td>43%</td>
<td>41%</td>
<td>45%</td>
</tr>
<tr>
<td>Less than 10 drinks in lifetime</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>15%</td>
<td>22%</td>
<td>24%</td>
<td>20%</td>
</tr>
<tr>
<td>F</td>
<td>13%</td>
<td>23%</td>
<td>18%</td>
<td>19%</td>
</tr>
<tr>
<td>More than 10 drinks in lifetime</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>14%</td>
<td>20%</td>
<td>30%</td>
<td>20%</td>
</tr>
<tr>
<td>F</td>
<td>8%</td>
<td>17%</td>
<td>20%</td>
<td>14%</td>
</tr>
</tbody>
</table>

* Percentage of total in each age and gender category.
Recent drinking behaviour

The proportions of students drinking in the past 12 months, past four weeks and past two weeks are shown in Table 5.5. As age increased from 12 to 14 years, there was an increase in the proportion of both boys and girls who reported having drunk alcohol in each of the time periods. There were no significant differences between boys and girls for any of the measures of recent drinking behaviour. Tests for intra-cluster correlation showed no significant clustering effect by school on rates of alcohol-related behaviour. (see Appendix 5.1) Across all ages, 19% of boys (95%CI: 16.7; 22.0) and 18% of girls (95%CI: 15.4; 21.0) were classified as current drinkers (ie. had consumed at least one alcoholic drink in the two weeks preceding the survey).

Across all ages, girls were found to be heavier consumers than boys, with girls averaging 8.6 standard drinks in the past two weeks compared to an average of 6.4 drinks for boys, however the differences were not statistically significant.
Table 5.5 Recent drinking behaviour of Hunter region adolescents,* according to age and gender

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>12</th>
<th>13</th>
<th>14</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drank in last 12 months</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>68%</td>
<td>74%</td>
<td>84%</td>
<td>74%</td>
</tr>
<tr>
<td>F</td>
<td>71%</td>
<td>78%</td>
<td>76%</td>
<td>76%</td>
</tr>
<tr>
<td>Drank in last 4 weeks</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>44%</td>
<td>52%</td>
<td>46%</td>
<td>48%</td>
</tr>
<tr>
<td>F</td>
<td>40%</td>
<td>47%</td>
<td>55%</td>
<td>46%</td>
</tr>
<tr>
<td>Drank in last 2 weeks</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>14%</td>
<td>23%</td>
<td>23%</td>
<td>19%</td>
</tr>
<tr>
<td>F</td>
<td>12%</td>
<td>22%</td>
<td>22%</td>
<td>18%</td>
</tr>
<tr>
<td>Drank 5 or more drinks (M) or 3 or more drinks (F) on at least one occasion in last fortnight</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>1.0%</td>
<td>4.0%</td>
<td>5.3%</td>
<td>3.1%</td>
</tr>
<tr>
<td>F</td>
<td>3.6%</td>
<td>6.3%</td>
<td>6.5%</td>
<td>5.4%</td>
</tr>
<tr>
<td>Mean number of standard drinks consumed per fortnight.*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>5.8</td>
<td>6.4</td>
<td>7.4</td>
<td>6.4</td>
</tr>
<tr>
<td>F</td>
<td>10.9</td>
<td>7.8</td>
<td>8.2</td>
<td>8.6</td>
</tr>
</tbody>
</table>

* Percentage of total in each age and gender category. * Based on current drinkers only

Effects of Alcohol Use

The most commonly reported effects of alcohol use within the past 12 months (as shown in Table 5.6) were felt merry/happy (53% responded either occasionally or often) and felt a bit drunk/funny (36% responded either occasionally or often). Approximately 18% of students reported that they either occasionally or often felt very drunk or sick as a result of drinking. The proportions of students who reported that they had passed out after drinking either often or occasionally were 1.9% and 3.2%, respectively.
Table 5.6 Frequency of experienced effects of alcohol use as reported by students who had used alcohol in the last 12 months

<table>
<thead>
<tr>
<th>Effect of alcohol use</th>
<th>Often</th>
<th>Occasionally</th>
</tr>
</thead>
<tbody>
<tr>
<td>Felt merry/happy</td>
<td>20% (182)</td>
<td>33% (296)</td>
</tr>
<tr>
<td>Felt a bit drunk/funny</td>
<td>8.8% (77)</td>
<td>27% (239)</td>
</tr>
<tr>
<td>Felt very drunk/sick</td>
<td>4.4% (38)</td>
<td>13% (115)</td>
</tr>
<tr>
<td>Passed out</td>
<td>1.9% (16)</td>
<td>3.2% (27)</td>
</tr>
<tr>
<td>Had an accident due to drinking</td>
<td>1.1% (9)</td>
<td>1.9% (16)</td>
</tr>
</tbody>
</table>

NB. Data include only those respondents who reported drinking within the last 12 months.

Harms associated with own and other people’s use of alcohol

The most frequently reported alcohol-related ‘harm’ that students reported engaging in over the last 12 months at least 10 or more times (as shown in Table 5.7) included - drinking alcohol without parents knowing (14%); drinking alcohol without parents or adults present (13%); and being a passenger in a vehicle with someone else who had been drinking (12%). Students reported participating less frequently (1 or 2 times) in other alcohol-related harms such as - swimming (15%); walking along edge of road (21%); walking across a road (21%); and riding a push bike (16%) - all within four hours of drinking alcohol.
Table 5.7. Frequency of harms associated with own and other people’s use of alcohol as reported by students in the past 12 months

<table>
<thead>
<tr>
<th>Alcohol-related harm</th>
<th>10 or more times</th>
<th>3 to 9 times</th>
<th>1 or 2 times</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
<td>(n)</td>
<td>%</td>
<td>(n)</td>
</tr>
<tr>
<td>Gone swimming*</td>
<td>2.5</td>
<td>(23)</td>
<td>2.6</td>
<td>(24)</td>
</tr>
<tr>
<td>Walked along edge of road*</td>
<td>4.6</td>
<td>(43)</td>
<td>6.6</td>
<td>(61)</td>
</tr>
<tr>
<td>Walked across a road*</td>
<td>5.5</td>
<td>(51)</td>
<td>6.9</td>
<td>(64)</td>
</tr>
<tr>
<td>Ridden a push bike*</td>
<td>6.0</td>
<td>(55)</td>
<td>6.3</td>
<td>(58)</td>
</tr>
<tr>
<td>Driven a motor vehicle*</td>
<td>2.6</td>
<td>(24)</td>
<td>1.2</td>
<td>(11)</td>
</tr>
<tr>
<td>Gone boating*</td>
<td>1.0</td>
<td>(9)</td>
<td>2.1</td>
<td>(19)</td>
</tr>
<tr>
<td>Been passenger in vehicle with someone who had been drinking</td>
<td>12</td>
<td>(114)</td>
<td>10</td>
<td>(96)</td>
</tr>
<tr>
<td>Drunk alcohol without parents knowing</td>
<td>14</td>
<td>(130)</td>
<td>15</td>
<td>(136)</td>
</tr>
<tr>
<td>Drunk alcohol without parents/ adults present</td>
<td>13</td>
<td>(118)</td>
<td>13</td>
<td>(121)</td>
</tr>
</tbody>
</table>

* All behaviours participated in within 4 hours of drinking alcohol.

In relation to the main drinking behaviour outcome of **unsafe alcohol use**, different prevalence rates were identified using each of the three definitions (as shown in Table 5.8). First, an overall prevalence of 4.1% of students engaged in ‘binge-drinking’. Second, 19% of students reported having felt very drunk or sick, or passing out as a result of drinking either **often** or **occasionally** in the past 12 months. Third, broadening the definition further to ‘having engaged in one or more harms associated with own or other people’s use of alcohol’ at least once in the last 12 months’ resulted in a further increased prevalence of 82%. Significant clustering effects by school were detected for the latter two outcomes measures, but not for ‘binge-drinking’ (see Appendix 5.1).
**Table 5.8 Comparison of prevalence rates of ‘unsafe alcohol use’ using different definitions**

<table>
<thead>
<tr>
<th>Definition</th>
<th>Prevalence of Unsafe Alcohol Use</th>
<th>95% Confidence Intervals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Binge-drinking (ie. having drunk 5 or more standard drinks for males &amp; 3 or more for females on at least one occasion in the previous fortnight)</td>
<td>4.1%</td>
<td>3.1%; 5.1%</td>
</tr>
<tr>
<td>Having felt very drunk or sick, or passing out as a result of drinking in the last 12 months</td>
<td>19%</td>
<td>14.0%; 23.2%*</td>
</tr>
<tr>
<td>Having engaged in one or more of alcohol-related harms at least once in the last 12 months</td>
<td>82%</td>
<td>77.7%; 85.7%*</td>
</tr>
</tbody>
</table>

*95% CI adjusted for clustering effect by school.
Sun Protection

Usual sun protection behaviour at school

The frequencies with which students reported engaging in usual sun protection behaviours during school lunch breaks are shown in Table 5.9. Close to half the students said they never wore a hat (43%) or sunscreen (50%) during the school lunch breaks. More students reported wearing a hat every day (28%) than wearing sunscreen every day (13%). The types of hats most commonly owned by students included - a cap without a neck-flap (76%), a wide-brimmed hat (24%), a narrow-brimmed hat (21%) and a sun-visor (16%).

Table 5.9. Frequency of reported usual sun protection behaviour by students during school lunch breaks

<table>
<thead>
<tr>
<th>Sun Protection Behaviour</th>
<th>Every day</th>
<th>3-4 days/wk</th>
<th>1-2 days/wk</th>
<th>&lt;Once a wk</th>
<th>Not at all</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wear a hat</td>
<td>28 (437)</td>
<td>11 (176)</td>
<td>8.5 (134)</td>
<td>9.7 (153)</td>
<td>43 (681)</td>
</tr>
<tr>
<td>Wear sunscreen</td>
<td>13 (204)</td>
<td>13 (202)</td>
<td>12 (187)</td>
<td>13 (203)</td>
<td>50 (792)</td>
</tr>
</tbody>
</table>

History of sunburn

Two-thirds (66%) of students reported being sunburnt on at least one occasion during the previous summer, with 14% having skin that reacts to sun exposure by always burning/never tanning and 45% having skin that burns a little, then tans gradually.
Sun protection behaviour during school recess periods

Information obtained from the sun protection diary which students completed on the day of the survey showed differences between the proportion of boys and girls who engaged in the various types of sun protection behaviour. Approximately half of all boys (53%) and girls (47%) reported being outdoors in the sun for at least one of the three school break periods. In relation to the main solar protection behaviour outcome, approximately 24% (95% CI: 21.4%; 25.8%) of all students were classified as 'adequately sun protected' (ie. had a score of eight or more out of a possible 10) during the school recess periods on the day of the survey. No significant clustering effect by school on rates of adequate sun protection was detected (see Appendix 5.1). Across all ages, a significantly higher proportion of boys (34%) than girls (12%) were classified as 'adequately protected' ($\chi^2=101.23$, df=1, $p<0.001$). Rates of adequate sun protection behaviour decreased slightly with age, with 12 year olds reporting the highest rates of protection, though the differences were not significant (see Table 5.10).

<table>
<thead>
<tr>
<th>12 years</th>
<th>13 years</th>
<th>14 years</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>%</td>
<td>(n)</td>
<td>%</td>
<td>(n)</td>
</tr>
<tr>
<td>M</td>
<td>38%</td>
<td>32%</td>
<td>32%</td>
</tr>
<tr>
<td>F</td>
<td>12%</td>
<td>12%</td>
<td>10%</td>
</tr>
</tbody>
</table>
The proportion of students who utilised each of the three main methods of sun protection during the school recess periods is presented in Table 5.11. There were significant differences between males and females in usage of two of the methods during all recess periods. A greater proportion of males than females reported wearing a hat during ($\chi^2=193.76$, df=1, $p<0.001$) and more females than males reported wearing sunscreen on their face ($\chi^2=28.87$, df=1, $p<0.001$). There were no significant differences between the genders in the use of shade or staying indoors.

Table 5.11 Proportion of students who used each of the main sun protection methods during school recess periods

<table>
<thead>
<tr>
<th>Method of Sun Protection</th>
<th>males</th>
<th></th>
<th>females</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
<td>(n)</td>
<td>%</td>
<td>(n)</td>
</tr>
<tr>
<td>Were indoors or in the shade for all recess</td>
<td>31%</td>
<td>270</td>
<td>27%</td>
<td>195</td>
</tr>
<tr>
<td>periods.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wore a hat during all recess periods.</td>
<td>25%</td>
<td>218</td>
<td>0.7%</td>
<td>5</td>
</tr>
<tr>
<td>Wore sunscreen on face during all recess</td>
<td>1.5%</td>
<td>13</td>
<td>6.9%</td>
<td>50</td>
</tr>
<tr>
<td>periods.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Factors associated with adolescent health risk behaviour

Smoking

A total of 15 chi-square analyses were conducted to test for association between the main outcome measure of current smoking and each of the individual, social and environmental factors (see Appendix 5.2). Results of these are presented below.

Socio-demographic factors

Current smoking was significantly associated with age ($\chi^2 = 24.05$, df=2, $p<0.0001$), school year or grade ($\chi^2 = 25.38$, df=1, $p<0.0001$) and socioeconomic status ($\chi^2 = 7.42$, df=1, $p=0.0065$). These associations indicated that older students, students in Year 8 and students from low socioeconomic backgrounds were more likely to report having smoked in the past seven days. Though more females than males were smokers, gender was not significantly associated with current smoking ($\chi^2 =3.59$, df=1, $p=0.0582$), nor was ethnic background ($\chi^2 =0.58$, df=5, $p=0.9890$).

Knowledge

The two items measuring knowledge of NSW laws on the sale of cigarettes to minors and safe levels of smoking were combined to produce a ‘smoking knowledge’ score. Students who responded correctly to both questions were categorised as having a ‘high’ level of knowledge, while incorrect responses to one or both questions were categorised as having a ‘low’ knowledge level. Knowledge of these two smoking-related facts was significantly associated with current smoking ($\chi^2 =45.04$, df=1, $p<0.0001$), with students who knew that there was no ‘safe’ level of smoking and the
current legal minimum age for persons to be sold cigarettes in NSW less likely to report current smoking in comparison to students who responded incorrectly to one or both items.

**Intentions**

Students' expectancies about smoking in the future was significantly associated with current smoking behaviour ($\chi^2 = 452.71, df=1, p<0.0001$), with 81% of current smokers intending to be smoking in one year's time in comparison to 14% of non-smokers who intend to be smoking in a year's time.

**Parent behaviour**

Both mothers' and fathers' smoking behaviour was significantly associated with students' current smoking ($\chi^2 =25.57, df=1, p<0.0001; \chi^2 =21.42, df=1, p<0.0001$ respectively), with smokers more likely to report that their mother and father were smokers.

**Rules at home**

There was a significant association between rules at home regarding smoking and current smoking behaviour ($\chi^2 =6.78, df=1, p<0.0092$), with smokers more likely to report that smoking was permitted at home.
Peer behaviour and attitudes

Peer attitude towards smoking and peer smoking behaviour were both significantly associated with current smoking behaviour ($\chi^2 = 50.21$, df=2, $p<0.0001$; $\chi^2 = 298.91$, df=5, $p<0.0001$ respectively). Students who were current smokers were more likely to report that their friends thought smoking was 'cool' or did not have an opinion either way about smoking, and report that a greater number of close friends smoked compared with non-smokers. Only 2% of smoking students reported that they had no close friends who smoked in comparison to 38% of all students.

Attitudes and Beliefs

Current smoking was significantly associated with all three attitude and belief factors. Students who reported current smoking perceived fewer risks associated with smoking ($\chi^2 = 124.50$, df=3, $p<0.0001$); agreed with more benefits associated with smoking ($\chi^2 = 47.10$, df=2, $p<0.0001$); and believed that smokers had higher levels of self-efficacy ($\chi^2 = 218.63$, df=2, $p<0.0001$).

Multivariate Logistic Regression Analysis

Results of chi-square analyses for current smoking and each of the 15 variables representing individual, social and environmental factors indicated that all except one variable (ethnicity) had a $p$ value of $<0.2$, and were therefore eligible for entry into a multiple regression analysis. As age and school year were highly correlated, only school year was entered in the analysis. A backward stepwise logistic regression analysis was subsequently conducted on the 13 variables in SAS, resulting in seven variables which were significantly associated with current smoking. The
seven variables were: school year, number of close friends who smoke, father’s smoking behaviour, intention to smoke in one year’s time, perceived risks associated with smoking, beliefs about the benefits of smoking, and beliefs about smokers’ self-efficacy. These seven variables were then entered into logistic regression analyses in SUDAAN, both non-adjusted and adjusted for clustering. Two of the seven variables, school year and perceived benefits of smoking, became non-significant after adjusting for clustering, leaving five variables significantly associated with current smoking in the final model, as shown in Table 5.12.

The odds of students being a current smoker were greater for all students who had one or more friends who smoked in comparison to students who had no smoking close friends. Odds ratios for this association increased with the increase in number of close friends who smoked. Intention to smoke in one year’s time was significantly associated with current smoking compared to intention not to be smoking (OR = 9.70; 95% CI: 5.3 – 17.8). The odds of being a current smoker were greater in students whose fathers smoked (OR = 1.9; 95% CI: 1.3 – 2.8) than in students whose fathers did not smoke. Students who believed in more smoking self-efficacious beliefs and perceived fewer risks associated with smoking had a greater likelihood of being a current smoker compared to students who disagreed that smokers had high self-efficacy and perceived more risks with smoking.
Table 5.12 Backward stepwise logistic regression for variables associated with CURRENT SMOKING, adjusted for clustering by school

<table>
<thead>
<tr>
<th>Variable</th>
<th>Adjusted Beta Coefficient</th>
<th>Standard Error</th>
<th>Odds Ratio</th>
<th>95% Confidence interval</th>
<th>Wald F</th>
<th>P-value Wald F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>-6.25</td>
<td>0.38</td>
<td>0.0019</td>
<td>0.0009 - 0.0040</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>No. of friends smoking</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>No friends smoke</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 or 2 friends smoke</td>
<td>1.67</td>
<td>0.50</td>
<td>5.3</td>
<td>2.0 - 14.2*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 or 4 friends smoke</td>
<td>1.96</td>
<td>0.53</td>
<td>7.1</td>
<td>2.5 - 20.2*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 or 6 friends smoke</td>
<td>2.53</td>
<td>0.37</td>
<td>12.6</td>
<td>6.1 - 26.0*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 or 8 friends smoke</td>
<td>2.37</td>
<td>0.04</td>
<td>10.8</td>
<td>9.9 - 11.7*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9 or more friends smoke</td>
<td>3.02</td>
<td>0.44</td>
<td>20.6</td>
<td>8.7 - 48.7*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Father' smoking</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Father a non-smoker</td>
<td>0.64</td>
<td>0.20</td>
<td>1.9</td>
<td>1.3 - 2.8*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Father a smoker</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Intention to smoke</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Intend not to smoke</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intend to smoke</td>
<td>2.28</td>
<td>0.31</td>
<td>9.7</td>
<td>5.3 - 17.8*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Perceived risks</th>
<th></th>
<th></th>
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<tbody>
<tr>
<td>Agree with 5-6 risks</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Agree with 3-4 risks</td>
<td>0.82</td>
<td>0.23</td>
<td>2.3</td>
<td>1.4 - 3.6*</td>
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<tr>
<td>Agree with 1-2 risks</td>
<td>1.07</td>
<td>0.52</td>
<td>2.9</td>
<td>1.1 - 8.1*</td>
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<tr>
<td>Agree no risks</td>
<td>0.98</td>
<td>0.13</td>
<td>2.7</td>
<td>2.1 - 3.4*</td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Self-efficacy beliefs</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Disagree 3-5 beliefs</td>
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</tr>
<tr>
<td>Disagree 1-2 beliefs</td>
<td>0.61</td>
<td>0.19</td>
<td>1.8</td>
<td>1.3 - 2.7*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disagree no beliefs</td>
<td>1.31</td>
<td>0.35</td>
<td>3.7</td>
<td>1.9 - 7.3*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Significant odds ratio difference compared to reference group.

Note n=1275 (330 observations were excluded due to missing data).
Unsafe alcohol use

Seventeen chi-square analyses were used for each measure of 'unsafe alcohol use' (ie. binge drinking and having felt very drunk or passed out in the last 12 months) and their association with each of the individual, social and environmental factors. (See Appendices 5.3 and 5.4) The third measure of 'unsafe alcohol use' (having engaged in one or more harms associated with alcohol use at least once in the last 12 months) was not tested because of the high prevalence rates associated with this measure. Current drinking behaviour was not tested for associated factors as by definition (ie. having consumed at least one standard drink in the past two weeks), it does not constitute 'unsafe alcohol use'. Results of the chi-square tests are presented below.

Socio-demographic factors

Significantly more female than male students reported binge drinking ($\chi^2 = 4.55$, df=1, p=0.0329) but there were no differences between boys and girls in having experienced the effects of alcohol ($\chi^2 = 0.15$, df=1, p=0.7020). Both measures of 'unsafe alcohol use' were significantly associated with age, with older students more likely to report binge drinking ($\chi^2 = 9.05$, df=3, p=0.0287) and having felt very drunk or passed out in the last 12 months ($\chi^2 = 6.17$, df=2, p=0.0461). Similarly, students in Year 8 were more likely to report both measures of 'unsafe alcohol use' ($\chi^2 = 5.67$, df=1, p=0.0173; $\chi^2 = 5.18$, df=1, p=0.0230) in comparison to Year 7 students. Neither ethnic origin or socioeconomic status were associated with either measures.
Knowledge

The three items measuring knowledge of NSW laws on the purchase of alcohol by minors and of safe levels of drinking for males and females were combined to produce an ‘alcohol knowledge’ score. Students who responded correctly to all three questions were categorised as having a high level of knowledge, while incorrect responses to one or more questions were categorised as having a low knowledge level. Knowledge of these three alcohol-related facts was significantly associated with both binge drinking ($\chi^2 = 24.06$, df=1, $p<0.0001$) and having felt drunk or passed out in the last 12 months ($\chi^2 = 9.71$, df=1, $p=0.0018$). Students who knew the safe levels of drinking for both males and females and the current legal minimum age for purchasing alcohol in NSW, were less likely to report binge drinking and having experienced the effects of alcohol in the last 12 months in comparison to students who responded incorrectly to one or more items.

Attitudes and Beliefs

Binge drinking was significantly associated with four of the five attitude and belief factors. Students who reported having drunk five or more standard drinks for males and three or more for females on at least one occasion in the previous two weeks perceived fewer risks associated with drinking ($\chi^2 = 31.56$, df=2, $p<0.0001$); agreed with the subjective norms that many young people drink ($\chi^2 = 50.19$, df=1, $p<0.0001$); believed that drinkers were safe and self-efficacious ($\chi^2 = 60.03$, df=2, $p<0.0001$); and agreed that alcohol advertising influenced young people’s drinking behaviour ($\chi^2 = 5.90$, df=1, $p<0.0101$). There was no significant association between binge drinking and perceived barriers to alcohol use.

Having experienced effects of alcohol use in the last 12 months was significantly associated with all five attitude and belief factors. Students
who reported they had felt drunk, sick or passed out in the last 12 months perceived fewer risks associated with drinking \( (\chi^2 = 20.89, \text{df}=2, \ p<0.0001) \); agreed with the subjective norms that many young people drink \( (\chi^2 = 41.09, \text{df}=1, \ p<0.0001) \); believed that drinkers were safe and self-efficacious \( (\chi^2 = 42.66, \text{df}=2, \ p<0.0001) \); agreed that alcohol advertising influenced young people’s drinking behaviour \( (\chi^2 = 5.60, \text{df}=1, \ p=0.0179) \); and perceived fewer barriers to drinking and accessing alcohol \( (\chi^2 = 8.65, \text{df}=2, \ p=0.0132) \).

**Intentions**

Students’ expectancies about drinking in the future were significantly associated with both binge drinking \( (\chi^2 = 232.35, \text{df}=2, \ p<0.0001) \) and having the experienced effects of alcohol \( (\chi^2 = 89.98, \text{df}=2, \ p<0.0001) \), with 63% of binge drinkers intending to be drinking unsafely in one year’s time in comparison to 9.7% of the total sample.

**Parent behaviour**

No associations were found between parents’ drinking behaviour and unsafe alcohol use by students, with the exception of mothers’ drinking behaviour being significantly associated with students’ binge drinking \( (\chi^2 = 5.73, \text{df}=1, \ p=0.0167) \) with binge drinkers more likely to report that their mothers drink at least once a week or more.
chapter five

Rules at home

Rules at home regarding alcohol was associated with binge drinking ($\chi^2 = 13.14$, df=2, $p=0.0014$) but not with experienced effects of alcohol ($\chi^2 = 0.06$, df=2, $p=0.9708$). Binge drinkers were more likely to report that either safe or unsafe drinking was permitted, in comparison to non-binge drinkers who reported that alcohol consumption was not permitted at home.

Peer behaviour and attitudes

Peer attitude towards drinking and peer drinking behaviour were both significantly associated with binge drinking ($\chi^2 = 13.57$, df=2, $p=0.0011$; $\chi^2 = 110.59$, df=5, $p<0.0001$ respectively). Students who were binge drinkers were more likely to report that their friends thought drinking was 'cool' or did not have an opinion about drinking and reported that a greater number of close friends drank, compared with non-binge-drinkers. Only 1.5% of binge drinking students reported that they had one to two close friends who drank alcohol in comparison to 21% of non-binge drinkers. Conversely, 71% of binge-drinkers reported having nine or more close friends who drank alcohol, in comparison to 20% of non-binge drinkers. Similarly, both factors were also significantly associated with having felt very drunk or passed out in the last 12 months ($\chi^2 = 10.46$, df=2, $p=0.0054$; $\chi^2 = 52.48$, df=5, $p<0.0001$ respectively).
Multivariate Logistic Regression Analysis

Binge drinking

Results of chi-square analyses for each of the 17 variables representing individual, social and environmental factors indicated that all except one variable, ethnicity, were statistically associated with binge drinking at \( p<0.2 \) level. As age was highly correlated with school year it was not retained, leaving 15 variables which were subsequently entered into backward, stepwise, logistic regression analyses in SAS. In the final model, only seven remained which were significantly associated with binge drinking. The seven variables were: gender, number of close friends who drank, intention to drink in one year’s time, alcohol-related knowledge, beliefs in drinking and self-efficacy, perceived risks associated with drinking and perceived peer drinking norms. These seven variables were entered into logistic regression analyses in SUDAAN, both non-adjusted and adjusted for clustering. All variables, except perceived risks of drinking, remained significant after adjusting for clustering, as shown in Table 5.13.

The odds of being a binge drinker were less in girls compared to boys (OR = 0.33; 95% CI: 0.20 – 0.54). Because of a low number of observations in several of the response options to the question pertaining to the number of close friends who drank, responses were collapsed to two categories. Students who had three or more close friends who drank had greater odds of being binge drinkers than students who had none, one or two close friends who drank (OR = 14.4; 95% CI: 2.6 – 81.3).

The odds of being a binge drinker were greater in students who intended to drink safely (OR = 12.9; 95% CI: 2.2 – 74.2) or intended to drink unsafely (OR = 68.9; 95% CI: 11.9 – 400.6) in one year’s time compared with students who intended to be not drinking at all.
### Table 5.13 Backward stepwise logistic regression for variables associated with BINGE DRINKING, adjusted for clustering by school

<table>
<thead>
<tr>
<th>Variable</th>
<th>Adjusted Beta Coefficient</th>
<th>Standard Error</th>
<th>Odds Ratio</th>
<th>95% Confidence interval</th>
<th>Wald F</th>
<th>P-value</th>
<th>Wald F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>-9.1040</td>
<td>0.7730</td>
<td>0.0001</td>
<td>0.0000 - 0.0005</td>
<td>18.7</td>
<td>0.0075</td>
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<td><strong>Gender</strong></td>
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<tr>
<td>Males</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Females</td>
<td>-1.1150</td>
<td>0.2580</td>
<td>0.33</td>
<td>0.20 - 0.54*</td>
<td>9.1</td>
<td>0.0293</td>
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</tr>
<tr>
<td><strong>No. of friends drinking</strong></td>
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<td></td>
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<td></td>
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<tr>
<td>0 – 2 friends drink</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 or more friends drink</td>
<td>2.6680</td>
<td>0.8830</td>
<td>14.4</td>
<td>2.5 - 81.3*</td>
<td>66.8</td>
<td>0.0002</td>
<td></td>
</tr>
<tr>
<td><strong>Intention to drink</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Intend not to drink</td>
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</tr>
<tr>
<td>Intend to drink safely</td>
<td>2.5580</td>
<td>0.8920</td>
<td>12.9</td>
<td>2.2 - 74.2*</td>
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</tr>
<tr>
<td>Intend to drink unsafely</td>
<td>4.2330</td>
<td>0.8980</td>
<td>68.9</td>
<td>11.9 - 400.6*</td>
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<tr>
<td><strong>Alcohol knowledge</strong></td>
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<tr>
<td>High knowledge level</td>
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<tr>
<td>Low knowledge level</td>
<td>0.6160</td>
<td>0.2440</td>
<td>1.9</td>
<td>1.1 - 3.0*</td>
<td>6.4</td>
<td>0.0529</td>
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<tr>
<td><strong>Perceived risks</strong></td>
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<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Agreed with 3-4 risks</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agreed with 1-2 risks</td>
<td>0.5460</td>
<td>0.3070</td>
<td>1.7</td>
<td>0.9 - 3.2</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Agreed with no risks</td>
<td>2.4550</td>
<td>1.3200</td>
<td>11.6</td>
<td>0.9 - 154.8</td>
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<tr>
<td><strong>Self-efficacy beliefs</strong></td>
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<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disagreed with 3-4 beliefs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disagreed with 1-2 beliefs</td>
<td>1.1260</td>
<td>0.5130</td>
<td>3.1</td>
<td>1.1 - 8.4*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disagreed with no beliefs</td>
<td>0.5020</td>
<td>0.3910</td>
<td>1.6</td>
<td>0.8 - 3.6</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td><strong>Perceived peer norms</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disagreed with 2-3 norms</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disagreed with 0-1 norms</td>
<td>1.3680</td>
<td>0.2520</td>
<td>3.9</td>
<td>2.4 - 6.4*</td>
<td>29.5</td>
<td>0.0026</td>
<td></td>
</tr>
</tbody>
</table>

*Significant odds ratio difference compared to reference group. Note n=1398 (207 observations were excluded due to missing data).

Students with poor knowledge of the safe level of drinking for females and males and of the laws regarding purchasing alcohol had greater odds of being binge drinkers (OR = 1.9; 95% CI: 1.1 – 3.0) than students who knew the correct, safe, recommended drinking levels and current laws. The odds of being a binge drinker were nearly four times greater in
students who perceived that alcohol use was widespread among people their age (OR = 1.9; 95% CI: 1.1 – 3.0) and three times greater in students who disagreed with either one or two drinking self-efficacy beliefs (OR = 3.1; 95% CI: 1.1 – 8.4), compared to students who disagreed with the subjective peer norms of widespread alcohol use and three or four drinking self-efficacy beliefs.

**Experienced effects of alcohol use**

Results of chi-square analyses for association with the second measure of 'unsafe alcohol use' – having felt very drunk, sick or passed out in the last 12 months - indicated that 11 of the 17 variables were significant at p<0.2 level. (See Appendix 5.4) All of these, with the exception of age because of its correlation with school year, were subsequently entered into backward, stepwise, logistic regression analyses in SAS. Four variables remained in the final model which were significantly associated with having experienced effects of alcohol use. The four variables were: number of close friends who drank, intention to drink in one's year time, alcohol self-efficacy beliefs and perceived peer norms of alcohol use. These four variables were entered into logistic regression analyses in SUDAAN, both non-adjusted and adjusted for clustering. All four variables remained significant after adjusting for clustering, as shown in Table 5.14.
### Table 5.14 Backward stepwise logistic regression for variables associated with HAVING FELT DRUNK OR PASSED OUT in last 12 months, adjusted for clustering by school

<table>
<thead>
<tr>
<th>Variable</th>
<th>Beta Coefficient</th>
<th>Standard Error</th>
<th>Odds Ratio</th>
<th>95% Confidence interval</th>
<th>Wald F</th>
<th>P-value Wald F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>-3.2660</td>
<td>0.3400</td>
<td>0.04</td>
<td>0.02 - 0.07</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. of friends drinking</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>0 – 2 friends drink</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 or more friends drink</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intention to drink</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intend not to drink</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intend to drink safely</td>
<td>0.2560</td>
<td>0.1290</td>
<td>1.3</td>
<td>1.0 - 1.7*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intend to drink unsafely</td>
<td>1.6100</td>
<td>0.2310</td>
<td>5.0</td>
<td>3.2 - 7.9*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-efficacy beliefs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disagreed with 3-4 beliefs</td>
<td>1.0480</td>
<td>0.3470</td>
<td>2.9</td>
<td>1.4 - 5.6*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disagreed with 1-2 beliefs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disagreed with no beliefs</td>
<td>0.4810</td>
<td>0.3930</td>
<td>1.6</td>
<td>0.7 - 3.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived peer norms</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disagreed with 2-3 norms</td>
<td>0.8550</td>
<td>0.2380</td>
<td>2.4</td>
<td>1.5 - 3.7*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disagreed with 0-1 norms</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

*Significant odds ratio difference compared to reference group.

Note n=750 (855 observations were excluded due to missing data).

As with binge drinking, response options to the question pertaining to number of close friends who drank were collapsed to two categories. The odds of having experienced effects of alcohol use was greater in students who had three or more close friends who drank, in comparison to students who had less than three close friends who drank (OR = 2.3; 95% CI: 1.7 – 3.0). The odds of being having felt drunk or passed out in the last 12 months were greater in both students who held intended to drink safely (OR = 1.3; 95% CI: 1.0 – 1.7) or in students who intended to drink unsafely (OR = 5.0; 95% CI: 3.2 – 7.9) in one year’s time compared with students who intended to be not drinking at all.
The odds of having experienced effects of alcohol use was twice as great in students who perceived that alcohol use was widespread among people their age (OR = 2.4; 95% CI: 1.5 – 3.7) and nearly three times greater in students who disagreed with either one or two drinking self-efficacy beliefs (OR = 2.9; 95% CI: 1.4 – 5.6), compared to students who disagreed with the subjective peer norms of widespread alcohol use and three or four drinking self-efficacy beliefs.

### Adequate sun protection

A total of 13 chi-square analyses were conducted to test for association between adequate sun protection behaviour and each of the individual, social and environmental factors. (See Appendix 5.5) Results of these are presented below.

**Socio-demographic factors**

Significantly more boys than girls were classified as using adequate sun protection during school recess periods ($\chi^2 = 100.02$, df=1, $p<0.0001$), but there were no differences between school years ($\chi^2 = 3.35$, df=1, $p=0.0674$) or age groups ($\chi^2 = 4.24$, df=3, $p=0.2363$). Neither of the other demographic variables of socioeconomic status or ethnic origin were associated with sun protection behaviour.

**Knowledge**

Students’ responses to the eight items which measured knowledge of skin cancer and safe sun behaviours were totaled to produce a ‘sun
knowledge' score. Students who responded correctly to five or more questions were categorised as having a high level of knowledge, while correct responses to four or fewer questions were categorised as having a low knowledge level. Knowledge scores on the eight sun-related facts were not significantly associated with having used adequate sun protection ($\chi^2 = 1.54$, df=1, $p=0.2153$).

Attitudes and Beliefs

None of the four attitude factors – perceived influence of parents, perceived benefits of sun exposure, perceived risks associated with sun exposure, and beliefs in the effectiveness of sun protection behaviour – were significantly associated with adequate sun protection behaviour by students during school recess periods.

Intentions

Students' intentions about suntanning in the future were significantly associated with adequate sun protection behaviour ($\chi^2 = 5.49$, df=1, $p=0.0190$), with those intending to protect themselves from the sun or to not think about suntanning, being more likely to be adequately sun protected than students who intend to get a suntan next summer.

History of sunburn

No association was found between students' reported experiences of sunburn over last summer and their current sun protection behaviour during school recess periods ($\chi^2 = 1.95$, df=1, $p=0.1624$).
Skin sensitivity to sun exposure was not significantly associated with adequate sun protection ($\chi^2 = 0.14$, df=1, p=0.7048).

Multivariate Logistic Regression Analysis

Results of chi-square analyses for each of the 13 variables representing individual, social and environmental factors indicated that six variables were statistically associated with adequate sun protection at $p<0.2$ level, and were subsequently entered into backward, stepwise, logistic regression analyses in SAS. In the final model, only two variables (gender and perceived influence of parents in sun behaviour) remained which were significantly associated with adequate sun protection behaviour. These two variables were entered into logistic regression analyses in SUDAAN, both non-adjusted and adjusted for clustering. Only ‘gender’ remained significant after adjusting for clustering, as shown in Table 5.15.
Table 5.15 Backward, stepwise, logistic regression for variables associated with ADEQUATELY SUN PROTECTED, adjusted for clustering by school

<table>
<thead>
<tr>
<th>Variable</th>
<th>Beta Coefficient</th>
<th>Standard Error</th>
<th>Odds Ratio</th>
<th>95% Confidence interval</th>
<th>Wald F</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>-0.584</td>
<td>0.179</td>
<td>0.5577</td>
<td>0.3927 – 0.7920</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender</td>
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<td></td>
<td></td>
<td></td>
<td>60.69</td>
<td>0.0005</td>
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<tr>
<td>Males</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Females</td>
<td>-1.3890</td>
<td>0.1780</td>
<td>0.25</td>
<td>0.18 - 0.35*</td>
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<tr>
<td>Perceived parental influence</td>
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*Significant odds ratio difference compared to reference group.
Note n=1410 (195 observations were excluded due to missing data).

The odds of girls having used adequate sun protection during school recess periods were significantly less than for boys (OR = 0.25, 95% CI: 0.18 – 0.35). There was no significant difference in the odds of students having used adequate sun protection between those who agreed with fewer and those agreed with more statements in regard to the positive influence that parents had on their child's sun protection behaviour.
Discussion

Prevalence of health risk behaviour

Overall, results indicated that rates of smoking, unsafe alcohol use and inadequate sun protection in the study sample were generally consistent with levels recorded elsewhere in NSW and Australia at the time the study was conducted. Compared to a previous Australia-wide survey, the rates of smoking behaviour over the past 12 months and current smoking in the study sample (13%) were similar. Only in relation to smoking in the past four weeks did there appear to be higher proportions of Hunter region adolescents reporting having smoked compared to a national sample. A greater rate of current smoking among girls but heavier use of tobacco by boys also reflected trends found in previous studies.

Rates of lifetime and recent drinking behaviours among Hunter region adolescents were comparable to those found in a NSW state-wide sample. In contrast to the NSW study, however, girls were heavier consumers than boys, with girls averaging 8.6 standard drinks in the past fortnight compared to an average of 6.4 drinks for boys. Students commonly reported having experienced effects of drinking, such as feeling happy or drunk, and/or engaging in harmful behaviour associated with their own or other people’s use of alcohol, consistent with the findings of a more recent study in Western Australia on alcohol-related harms experienced by young adolescents.

A particularly interesting finding from this study was the wide discrepancy in estimates of ‘unsafe alcohol use’ between different measures. Using only the quantity-frequency measure of binge drinking in the past fortnight, which provided an estimate of 4%, might lead to the conclusion that ‘unsafe alcohol use’ is not prevalent and therefore not a priority issue among adolescents. However, employing a measure which takes into account having been involved in one or more harmful behaviours associated with alcohol use dramatically increased the estimate to over
81%, suggesting that 'unsafe alcohol use' is wide-spread and an important problem in this population. Clearly, the disparity can in part be explained by the different time frames included in the measures. Binge drinking only accounted for behaviour in the past fortnight, which is likely to be more sporadic and irregular, while the latter measure covered behaviour over a longer time period of the last 12 months. Related to this issue, was the noteworthy finding that there was no gender effect for 'having felt drunk or passed out in the last 12 months', yet there was a gender effect for binge drinking with the boys having significantly lower odds. This suggests that the different quantities of alcohol used to define binge drinking, which is much more conservative for females (> 2 drinks) than for males (> 4 drinks), may be less accurate in reflecting the physiological effects of alcohol use. The varying estimates highlight the importance of utilising multi-dimensional measures of unsafe alcohol use, as a single, quantity-frequency measure limits the amount of potential information gathered about unsafe adolescent behaviour and may not provide enough sensitivity for measuring the success of health interventions.

Rates of both usual and actual sun protection behaviours were somewhat lower than rates of adequate sun protection found in recent state-wide and national surveys in Australia. For example, results of this study indicated that approximately 24% of all students were adequately protected from the sun during school recess periods, while a NSW survey estimated that 49% of students between the ages of 11 and 16 used adequate sun protection. Differences in estimates may be explained by different age ranges in populations studied and the time lag between the collection of data in this study and more recent research. The NSW survey measured sun protection behaviour during the preceding weekend, while this study measured behaviour during school recess periods. Further, this study was carried out during the Australian winter months, when the sun is less intensely felt, and students may not be as cautious in their sun protection behaviour as during the hot summer months. Lower rates of adequate sun protection in girls and differences in the types of sun
protection methods preferred by boys and girls (boys generally wearing hats while girls preferring sunscreen) were consistent with trends detected in other research.\textsuperscript{9, 10}

\textbf{Factors associated with health risk behaviour}

While initial results of analyses indicated that numerous individual, social and environmental factors were associated with each of the three health risk behaviours, further exploration through multivariate logistic regression analyses reduced the number of predictors to several, and in the case of sun protection, to only one significant variable.

\textbf{Peer behaviour}

One of the most significant findings to emerge from the data was the consistent association between the number of close friends who engaged in smoking and drinking and the students' self-reported rates of these behaviours. The greater the number of friends who smoked or drank, the more likely were students to do the same. This finding suggests strong support for the link between adolescent health risk behaviour and perceived or actual behaviour of peers as demonstrated in a number of previous studies,\textsuperscript{11-14} although the data is not able to determine whether this association is due to 'peer influence' or 'peer selection'.\textsuperscript{15} Adolescents who perceived that alcohol use was very common among people their age and that young people drank a lot when drinking, were also more likely to report high rates of 'unsafe alcohol use' behaviour, providing further support for the 'false consensus effect' described in other research.\textsuperscript{16} These findings indicate that health promotion interventions should challenge young people's perceived norms about health risk behaviours, inform them of true rates of behaviour and develop ways of over-coming the strong influence that peer behaviour has on their behaviour.
Behaviour intentions

Another finding consistent with the literature\textsuperscript{17-19} was the association between smoking and unsafe alcohol use and students’ intentions to smoke or drink in one year’s time. This could be interpreted to mean that those who currently engage in those behaviours intend to keep doing so in the future, or that some students may be ‘experimenting’ with smoking and drinking now because they expect to be doing both behaviours with much greater regularity in one year’s time.

Knowledge

No support for a relationship between accurate knowledge and health risk behaviour was demonstrated, with the exception of poor knowledge of levels of ‘safe drinking’ and alcohol purchase laws being significantly associated with greater rates of binge drinking. This lack of support may be explained by the small number and/or choice of items used to measure knowledge, particularly in the case of smoking and alcohol, and therefore not providing an accurate or valid measure. Though the findings conflict with several models of health behaviour, it reflects the generally weak and inconsistent research evidence base on the importance that knowledge has.

Attitudes and beliefs

For smoking, but not for unsafe alcohol use and sun protection, results indicated a relationship between students’ beliefs about certain risks associated with the health risk behaviour and the odds of them engaging in that behaviour. Beliefs related to potential immediate consequences, such as being short of breath from smoking, rather than more long-term outcomes. This finding was consistent with recent research supporting an
association between perceptions of harm and smoking behaviour\textsuperscript{20}. Results also supported a link between students' beliefs in the self-efficacy of smokers and drinkers and the odds of them engaging in those behaviours. For example, students who disagreed with the statements, *smokers are more relaxed and confident* and *people who smoke do so because they want to and not because their friends do*, had lower odds of being a current smoker.

**Parent behaviour**

Interestingly, the only significant finding in relation to parental behaviour was an effect by fathers' smoking on the odds of students reporting current smoking. Both parental drinking, as reported by students and their perceived influence of parent behaviour on their sun protection behaviour did not appear to have any influence on students' self-reported rates of behaviour, in contrast to the findings of some studies.\textsuperscript{13, 21, 22} Perhaps, the influence of parents and their behaviour and attitudes is stronger on some behaviours (like smoking) and not others. Alternatively, the differential influence of parent behaviour may be a result of the way it was measured for all three behaviours. Parents' alcohol consumption and sun protection behaviours may not be as apparent to students, unlike smoking which is very obvious. For sun protection, students were also asked questions about what their parents tell them to do, rather then to report parents' actual sun protection behaviour.

**Limitations**

A number of limitations in regard to the study design and methodology need to also be considered. First, this was a school-based survey in which students were required by the relevant ethical bodies to obtain active rather than passive parental consent for participation in the study.
Differences between those recruited (i.e. students' whose parents actively consented) and those not recruited may have biased the findings of the study. Students who had left school or were absent on the day the survey was administered may have differed in behaviour and related knowledge, attitudes and beliefs, including those who had a low consent rate. Though only one school had a less than optimal participation rate (54%), the overall consent rate across all schools of 81% can be deemed very good. Given that other studies have reported the use of active parental consent procedures limits consent from between 30% to 60%, the consent rate in this school could still be considered acceptable as it was within this range. Additionally, though only six out of the nine schools initially invited to participate agreed to the study (a consent rate of 67%), all schools were randomly selected from the total population of schools in the region, so any potential biases between consenting and non-consenting schools should have been minimized. This was supported by comparisons of the socio-demographic characteristics of the study sample with local census data, showing no appreciable differences.

Second, measurement of the three health risk behaviours and their determinants was based upon self-report by students. Self-report of smoking, alcohol use and sun protection behaviour is generally accepted as reliable and valid in adolescent populations (as discussed in Chapter Three). The questionnaire was determined to have face, content validity and construct validity based upon its development process involving previous research, discussions with experts and factor analyses of attitude and belief items, as described in Chapter Four. The measurement tool was judged to have good acceptability as a result of pilot testing procedures and high completion rates by students. However, it was not tested for external or criterion validity or test-retest reliability, and therefore, as an estimate of actual health risk behaviour, the results need to be considered with caution. Finally, the questionnaire did not include all potential predictor variables, as discussed in Chapter Four because of a lack of unidentifiable reliable and valid measures or because potential
determinants were not modifiable through a school-based health intervention.

Conclusion

In summary, this study has attempted to address a gap in the knowledge base, by identifying the prevalence and factors significantly associated with smoking, unsafe alcohol use and inadequate sun protection among young adolescents in Hunter region secondary schools, in order to satisfy the requirements of Stage II of the Staged Approach to health promotion research and practice. While there is an extensive body of literature on these topics, much of it is international and may not accurately reflect the situation in Australia. Most studies focus on only one behaviour while this study has considered three behaviours simultaneously. This descriptive study was conducted with the explicit purpose of providing baseline data and identifying important areas to incorporate into the design and development of a school-based health intervention, thus leading to more advanced research.

The estimated rates of each of the three health risk behaviours in the study sample indicate that these behaviours remain at levels comparable with both state and national statistics. These rates suggest that much more could be done to reduce these behaviours and their associated burdens of illness in school-aged populations. Several significant associated factors of each behaviour were also identified, particularly the influence of peers, perceived peer behaviour, future intentions, and perceptions of harm and self-efficacy, providing important information for the design and tailoring of health promotion strategies which can address these factors, increasing the likelihood of their success. Many of these variables appear ideally targeted through school-based interventions and the challenge now is to develop and evaluate the efficacy and
effectiveness of school health interventions that aim to reduce these health risk behaviours in adolescents.
References for Chapter Five


