



**Prevalence and correlates of
smoking behaviour among Victorian
secondary school students in 1999**

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Abstract

Objective

To determine prevalence estimates for smoking among Victorian secondary school students in 1999, and to examine the impact of parental smoking and academic orientation on current smoking status.

Design

A random selection of 80 students from a random sample of schools throughout Victoria completed a questionnaire anonymously. Questionnaires were administered to students on the school premises by research staff.

Participants

Victorian students in Years 7 to 12.

Key measures

The key outcome measure was current smoking status (smoked on at least one day of the seven days prior to the survey). We related smoking status to age and sex, parental smoking (smoking status of mother and father) and academic orientation (intention to finish Year 12).

Results

The proportion of students who were current smokers in 1999 increased with age from around 8% among 12-year-olds to 33% among males and 36% among females aged 17. Parental smoking was significantly associated with current smoking status, with students who came from families where both parents smoke being up to three times more likely to be smokers than students who came from families with non-smoking parents. Intention to complete Year 12 was associated with adolescents' current smoking, especially among younger students.

Conclusions

This study provides support for measures that encourage parents to quit smoking and that improve students' school involvement.

Introduction

Preventing adolescents from experimenting with tobacco and preventing experimenters from progressing to regular smoking have been two of the aims of tobacco control programs throughout the western world. However, attempts to reduce smoking among young people have had little continued impact on the prevalence of smoking in successive generations of adolescents. For example, in Australia, the proportion of 12-to-15-year-olds smoking in 1996 was considerably higher than in 1987 (Hill, White & Letcher 1999).

A dynamic interplay of socio-demographic, environmental, behavioural and personal factors influences tobacco use, with these psychosocial factors increasing or decreasing a person's chance of both beginning to use tobacco and continuing tobacco use. Socio-demographic factors involve the economic, political, social and educational systems of a society. The influence of socio-demographic factors on smoking initiation needs continual investigation, as changes in living standards among a population and changes to opportunities for specific groups within a society may alter their relationship with smoking initiation. For instance, while gender was an important factor in determining whether an adolescent growing up in the 1960s or 1970s would take up smoking, in the late 1990s, girls were just as likely to smoke as boys.

Environmental factors, such as parental smoking, are those that are external to the adolescent and yet may influence and affect their behaviour. Social learning models of behaviour suggest that people learn behaviours by modelling those of important others (Bandura 1986). Thus, social influence models suggest that the smoking behaviours of important role models (peers and parents) may influence the adolescent's use of tobacco. Cross-sectional studies have consistently shown that the smoking behaviours of parents have a positive association with the smoking behaviours of their adolescent children, particularly adolescents aged 12 to 14 years. For example, Bauman et al. (1990) found that adolescents whose parents currently smoked were almost twice as likely to smoke, compared to adolescents whose parents had never smoked. In this chapter we explore the association between an adolescent's smoking and the smoking behaviours of his or her parents.

Behavioural factors involve patterns of behaviours that are directly related to cigarette use, such as academic achievement, health-compromising and health-enhancing behaviours and smoking-related skills, such as refusing cigarettes. Conrad, Flay and Hill's 1992 review of the factors predicting adolescent smoking showed academic achievement to be a significant predictor of smoking uptake: 80% of prospective studies on the onset of

smoking indicated a positive relationship between low academic achievement (and other school-related factors) and smoking onset. Newcomb, McCarthy and Bentler (1989) also concluded that an adolescent's 'academic lifestyle' (measured by grades, educational aspirations and personal and professional plans) was the central organising influence on teenage smoking behaviour. A recent longitudinal study by Bryant et al. (2000) showed that low academic achievement and school misbehaviour contribute to increased use of cigarettes over time. These findings suggest that a feeling of being involved with school and enjoying school is protective against beginning to smoke.

Understanding the relationships between adolescent smoking and the smoking behaviours of their parents and their academic orientation, in addition to identifying trends and patterns of tobacco use among adolescents, is crucial to the public health effort to reduce tobacco-related morbidity and mortality. This information can help elucidate historical patterns, suggest target groups for programs to prevent tobacco use, determine the need for future interventions and assess the effect of anti-tobacco campaigns.

In 1999, the sixth in a series of surveys on alcohol and smoking behaviour among Australian secondary school students was conducted. The survey was first conducted in 1984 and has since been repeated at three-yearly intervals. The aim of the survey is to provide up-to-date estimates of the prevalence of smoking and drinking among school students in Years 7 through 12. This paper outlines some of the key findings relating to smoking use obtained from the 1999 data, including prevalence estimates and psychosocial risk factors thought to contribute to adolescent smoking. The data were collected on behalf of The Cancer Council Victoria, in collaboration with the Victorian Department of Human Services and the Commonwealth Department of Health and Ageing.

Method

In 1999, data were collected by survey from Victorian secondary students in Years 7 to 12. The methods of sampling and data collection were the same as those reported for 1996 and are described elsewhere (Hill, White & Effendi 2002). Two samples of schools were drawn to reflect changes in the composition of schools which began in the late 1980s, that is, the distinction between junior secondary (up to Year 10) and senior secondary (Years 11 and 12) campuses. The probability of individual students from any year level being selected by this sampling procedure was the same as that of earlier studies; thus, comparisons of data from the different survey years are valid.

Of the 70 secondary schools initially selected to participate in the survey, 29 refused, giving a response rate of 59%. From a sample of replacement schools, 26 schools agreed to take part in the study. Only three schools could not be replaced. Thus, a total of 67 secondary schools (96% of the desired number) participated in the study.

Participating schools supplied the school roll for relevant year levels. Twenty students (and six replacements) were randomly selected by a member of the research team from each of the four year levels for the junior secondary schools, while 40 students (and six replacements) were sampled from each of Years 11 and 12. In total, 4288 students were surveyed.

Following the protocol established in previous surveys, members of the research team administered the pencil-and-paper questionnaire on the school premises to groups of up to 20 students, who answered the questionnaire anonymously. Students from different year levels were surveyed together. The presence of teachers during the survey was discouraged but, because of individual school policy, 23% of students completed the questionnaire in the presence of a teacher.

The students completed a 22-page core questionnaire and a seven-page supplementary questionnaire. Items relating to smoking covered lifetime experience of smoking (including whether they had smoked more than 100 cigarettes in total) and smoking within the last 12 months, last four weeks and last seven days. As in the previous surveys, smoking in the last week was assessed by the use of a day-by-day record in which students indicated the number of cigarettes they smoked, if any, on each of the prior seven days. Students indicated the smoking status of their mother and father. Academic involvement was assessed by asking students whether they intended to finish Year 12. Students indicated yes or no in response to this question. Other more detailed questions on smoking, alcohol use, sun-related behaviour and the use of illicit substances were also asked, but are not described here.

Statistical analysis

To test for the significance of relationships between variables, a number of statistical procedures were used, including the chi-square test and logistic regression. Only relationships significant at the $P < .05$ level are reported as significant.

Analyses looking at changes in smoking prevalence over time and associations between adolescent and parental smoking were conducted separately for

students aged 12 to 15 years and 16 to 17 years. The remaining analyses report the proportion of students smoking in each of the age and gender groups between 12 and 17 years. Some students younger and older than this were surveyed but their numbers were too few to enable reliable estimates to be calculated, so they were excluded from analyses for this paper. To ensure that disproportionate sampling of any school type, age or sex grouping did not bias the estimates, data were weighted to bring the achieved sample into line with the population distribution. The prevalence estimates reported here are based on these weighted data.

Results

Prevalence of cigarette consumption

The estimated prevalence of various levels of smoking experience in 1999 are shown in Table 1 for each age and sex grouping.

Following patterns seen in earlier reports, experience with smoking was more likely to increase with age. While around 60% of 12-year-old boys and 70% of 12-year-old girls had never smoked, the proportion of students who had no experience of smoking decreased to around 30% among boys and girls aged 15. This proportion continued to decrease, so that by the age of 17 about a quarter of boys and one-fifth of girls had never smoked. Furthermore, as would be expected, the proportion of students indicating they had smoked more than 100 cigarettes increased with age to reach a peak frequency of 30% among boys and girls aged 17 years.

The proportion of students who had smoked in the past month was not much larger than the proportion who had smoked in the past week. The exception to this was among 17-year-old girls, where the results suggest that casual or intermittent smoking was more common among this group.

Students who had smoked on at least one of the seven days prior to the survey were defined as ‘current smokers’ and are a particular focus in comparative analyses. Among 12-year-olds, 9% of boys and 7% of girls were current smokers. The proportion of current smokers among students increased with age, so that, by 17 years, 34% of boys and 36% of girls had smoked in the last seven days.

Reflecting findings from previous surveys for both monthly and weekly cigarette use, from the age of 13 the prevalence of smoking among girls was greater than or equal to that for boys of the same age.

Table 1 Past and current cigarette smoking by Victorian secondary students according to age and sex, 1999

	Responses by age					
	12 yrs	13 yrs	14 yrs	15 yrs	16 yrs	17 yrs
Sample size (n)						
Males	241	429	417	376	333	303
Females	256	394	373	352	332	292
Smoker category and sex						
<i>Never smoked</i>						
Males	60%	56%	41%	35%	30%	26%
Females	66%	53%	43%	31%	33%	17%
<i>More than 100 cigarettes</i>						
Males	1%	4%	13%	18%	17%	30%
Females	1%	3%	7%	15%	22%	30%
<i>Smoked in past month</i>						
Males	10%	13%	24%	31%	31%	36%
Females	11%	21%	27%	32%	37%	46%
<i>Smoked in last week (current smoker)</i>						
Males	9%	10%	21%	26%	26%	34%
Females	7%	16%	21%	26%	31%	36%
Mean number of cigarettes smoked per week among current smokers						
Males	11.3	16.2	24.0	35.1	32.0	41.0
(se)	(4.6)	(3.6)	(2.7)	(4.4)	(3.9)	(3.7)
Females	5.7	11.9	16.3	30.3	34.9	33.4
(se)	(1.5)	(2.2)	(2.6)	(3.4)	(3.5)	(3.5)

se = standard error

Students were asked to write down the number of cigarettes they had smoked on each day in the last week. The average number of cigarettes consumed per week was calculated from these amounts and is also shown in Table 1. The average number of cigarettes smoked per week by current smokers was slightly higher in boys than girls. Furthermore, the average number of cigarettes smoked per week by boys rose from 11 at the age of 12 to 41 at the age of 17. Among girls, 12-year-olds smoked an average of six cigarettes per week and 17-year-olds smoked an average of 33 cigarettes per week. However, the only significant difference in the number of cigarettes smoked by boys and girls was among the 14-year-olds, where, on average, boys smoked a greater number of cigarettes per week than did girls.

Brand of cigarettes most often smoked

Students who had smoked a cigarette in the past week were asked what brand of cigarette they usually smoked. A summary of the most common responses is presented in Table 2.

Table 2 Cigarette brand preference of those who smoked in the last week, Victoria, 1999

Brand	Brand preference (%) by age and sex				
	12–15 yrs		16–17 yrs		12–17 yrs Total
	M (n=384)	F (n=298)	M (n=225)	F (n=229)	
Alpine	4	3	1	1	2
Benson & Hedges	12	4	14	7	9
Dunhill	10	3	8	3	6
Holiday	7	7	1	2	4
Horizon	10	9	5	5	8
Longbeach	18	14	11	9	13
Marlboro	10	4	6	4	6
Peter Jackson	58	67	37	50	54
Peter Stuyvesant	2	1	2	7	3
Winfield	26	16	38	27	26

Percentages are of the total in each age and sex category. They include responses from students who gave more than one brand. Percentages do not add to 100 as only the most frequent responses are listed.

Overall, Peter Jackson was by far the most popular brand of cigarette smoked by students, with about 60% of 12-to-15-year-olds and around 40% of 16-to-17-year-olds regularly smoking this brand. Winfield was the second most popular brand among boys and girls of all ages, capturing about 20% of the 12-to-15-year-old market and 30% of the 16-to-17-year-old market. The third most commonly smoked brand of cigarette among 12-to-15-year-old males was Longbeach (18%), while 16-to-17-year-old males preferred Benson and Hedges (14%). Among girls aged 12 to 15, Longbeach was the third most preferred brand of cigarette (14%); this was also the case among 16-to-17-year-old females (9%).

Preferred cigarette pack size

Students who had smoked in the week prior to the survey were asked to indicate which packet size the cigarettes they usually smoked came from. Results are presented in Table 3.

Table 3 Packet size preference of those who smoked in the last week, Victoria, 1999

Packet size	Packet size preference (%) by age and sex			
	12–15 yrs		16–17 yrs	
	M (n=286)	F (n=260)	M (n=191)	F (n=210)
20s	30	34	17	30
25s	34	22	42	31
30s	35	37	31	35
35s	2	1	3	0
40s	12	13	12	7
50s	7	6	3	2

Percentages are of total in each age and sex category. They include responses from students who gave more than one packet size.

Overall, there was not a large difference in the proportion of current smokers getting their cigarettes from packets of 30s, 25s and 20s. Generally, 30s were the slightly more common cigarette pack size used by 12-to-17-year-old current smokers (34% compared to 32% for 25s and 28% for 20s), with the exception of males aged 16 to 17 years. In this group, 25s were the most common cigarette pack size. Males and females generally smoked cigarettes from similar size packets.

Source of cigarettes

Students who had smoked a cigarette in the week prior to the survey were asked to indicate whether or not they had bought their last cigarette. A summary of results is shown for current smokers in Figure 1.

Overall, the proportion of males and females who had bought their last cigarette increased with age, from 3% of 12-year-olds through to 56% of 17-year-olds. Males were more likely to have purchased their last cigarette (31%), compared to females (22%). This was particularly true for males aged 14 and 15 years who were almost twice as likely to have purchased their last cigarette (41%) in comparison to females of the same age (22%).

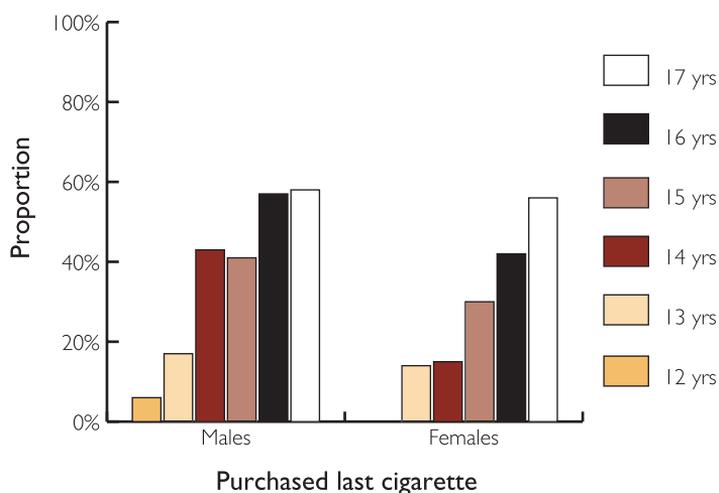


Figure 1 Proportion of current smokers who purchased their last cigarette, by age and sex

Comparison of current smoking behaviour between 1984 and 1999

To gain an understanding of how the smoking behaviours of Victorian secondary students in 1999 compared to the smoking behaviours of students in previous years, the 1999 prevalence estimates (for current smokers) were compared against those found in the 1984, 1987, 1990, 1993 and 1996 surveys. The proportion of schools accepting the invitation to participate in the survey was similar in all five survey years. Furthermore, the proportion of students absent on the day preceding the survey was similar across survey years. The school retention rates increased from 43% in 1984 to a high of 79% in 1993. Due to changing retention rates and differences in the type of students staying in school until Year 12 over the survey years, trends in current smoking for students aged 12 to 15 years (populations that should not be affected by changing school retention rates) and 16 to 17 years (populations affected by changing school retention rates) were examined separately.

Figure 2 shows the proportion of students who smoked in the past seven days (current smokers) for all five survey periods. Predictably, given the relationship of age to uptake of smoking, the proportion of 16-to-17-year-olds who are current smokers was higher than the proportion of smokers among 12-to-15-year-olds in all survey years. For the younger students (aged 12 to 15 years) the prevalence of current tobacco use was higher in 1984

than in any subsequent year, with 22% of students being current smokers in 1984 compared to 17% in 1999. The proportion of current smokers remained fairly stable from 1990 through to 1996. The decrease in the proportion of 12-to-15 year olds smoking weekly between 1996 and 1999 was statistically significant at the $P < .05$ level. The proportion of 16-to-17-year-olds who were current smokers remained fairly consistent over the 15-year period of this survey series. The lowest estimates were found in 1990, with 27% of students indicating they were current smokers. This proportion rose only slightly to 33% in 1993 and 1996 and remained fairly stable in 1999, with 32% of students indicating they were current smokers.

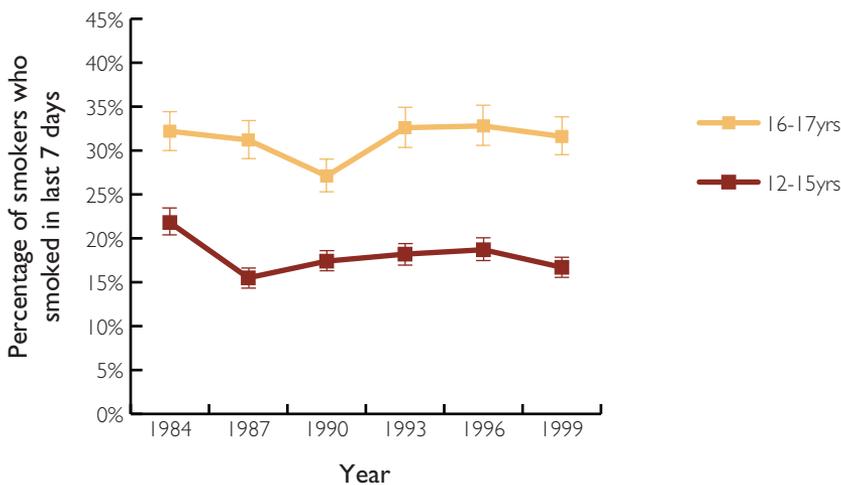


Figure 2 Percentage of Victorian students who are current smokers across survey years, with 95% CI

Factors associated with cigarette use among Victorian students in 1999

Students were asked to indicate whether their mother and father smoked. The proportion of current smokers with either one, both or no parents who smoke is presented in Table 4.

Table 4 Proportion of current smokers by parents' smoking status

Age	Parents' smoking status (%)		
	Non-smokers	One smoker	Both smokers
12-15 yrs	12	19	31
16-17 yrs	25	36	50

As can be seen from Table 4, students from families where at least one parent was a smoker were more likely to be current smokers than were students from families where no parent smoked. Among 12-to-15-year-olds, 12% of students from families where neither parent smoked were current smokers, compared to 31% of students from families where both parents smoked. Similarly, 25% of 16-to-17-year-olds from families where neither parent smoked were current smokers, compared to 50% of students from families where both parents smoked.

To investigate the impact of parental smoking further, a multivariate logistic regression analysis examined the predictive nature of parental smoking on current smoking among students. In these analyses, gender, age and school type were controlled. Results are presented in Table 5.

Table 5 Association between student's current use of cigarette and parental smoking after controlling for sex, age and school type

Parental smoking	OR	95% CI	n
None	1.00	–	2425
One	1.78	1.37–2.31	1009
Both	2.68	1.95–3.69	481

After controlling for school type, age and sex, students from families where both parents smoked were almost three times more likely to be current smokers, compared to students with no parents who smoke (OR=2.68, 95% CI 1.95–3.69). Furthermore, when one parent was a smoker, students were one-and-a-half times more likely to be current smokers, compared to students with no parents who smoke (OR=1.78, 95% CI 1.37–2.31).

The relationship between academic involvement and current smoking status was investigated by asking students whether they thought they would finish Year 12. The proportion of current smokers among those who thought they would finish Year 12 and the proportion of current smokers among those who thought they would not finish Year 12 are presented in Table 6.

Overall, students who did not think they would complete Year 12 were more likely to be current smokers than were students who thought they would complete Year 12, and this was particularly true among 12-to-15-year-olds. In this age group, approximately 40% of those who thought they would not complete Year 12 were current smokers, compared to only 15% of students

who thought they would finish Year 12. The largest difference observed was among 14-year-olds. Among this group, of those who said they would finish Year 12, 16% were current smokers, compared to 51% who thought they would not finish Year 12.

Table 6 Association between current cigarette use and intent to finish Year 12 by age group

Age	Intend to finish Year 12	% of current smokers	OR [#]	95% CI	n
12	Yes	6	–		
	No	20	4.43	1.67–11.80	438
13	Yes	11	–		
	No	24	3.34	1.81–6.15	750
14	Yes	16	–		
	No	51	5.47	3.26–9.15	730
15	Yes	22	–		
	No	54	3.95	2.31–6.75	697
16	Yes	26	–		
	No	44	2.95	1.67–5.22	640
17	Yes	34	–		
	No	46	1.62	0.73–3.64	581

[#] Odds ratio has been adjusted for sex and school type.

Multivariate logistic regression analyses were performed to examine the relationship between intention to finish Year 12 and current smoking. As can be seen from Table 6, students who thought they would not finish Year 12 were more likely to be current smokers, compared to students who thought they would finish Year 12. This difference was most evident among 14-year-olds, with those who thought they would not finish Year 12 being over five times more likely to be a current smoker, compared to those who thought they would finish Year 12 (OR=5.47, 95% CI 3.26–9.15). Similarly, 12-year-olds who thought they would not finish Year 12 were four-and-a-half times more likely to be a current smoker, compared to 12-year-olds who thought they would finish Year 12 (OR=4.43, 95% CI 1.67–11.80). The difference in the proportion of current smokers among 17-year-olds who thought they would finish Year 12 and those who thought they would not finish Year 12 was not statistically significant. This finding was anticipated, however, given that (a) students aged 16 and 17 years had a higher proportion of current

smokers compared to any other age group, and (b) many students in this age group were already completing Year 12 (or would be completing Year 12 during the following school year).

Discussion

This report has given an indication of the extent of smoking among Victorian secondary school students in 1999. As in previous years, the scale of tobacco use among secondary students was large and represented a sizeable market. Extrapolating from our findings, we estimate that during the week before the survey, just under 73,800 Victorian secondary students aged 12 to 17 years smoked around 2,069,700 cigarettes between them. This was down on the 1996 estimates of just over 77,100 students smoking just over 2,090,100 cigarettes in a week.

A large proportion of Victorian secondary school students had smoked in the seven days prior to the survey, particularly among 16-to-17-year-olds where one-third indicated they were current smokers. Although more girls than boys were found to be smoking in the month preceding the survey, there was no difference in the proportion of boys and girls smoking in the week preceding the survey. In general, male and female current smokers were found to smoke a similar number of cigarettes per week. These findings indicate that while the smoking behaviours of male and female current smokers were similar in 1999, girls may be more likely than boys to engage in casual or occasional smoking.

Peter Jackson still dominated the adolescent market and the pack of 30s was the most common pack size. However, packs of 20 and 25 were also popular among current smokers.

Despite changes to the law that raised the legal age for buying cigarettes from 16 to 18 in January 1994, 42% of all current smokers aged 12 to 17 years had bought their last cigarette. This was a very small improvement on the 46% reported for the 1996 survey, and indicates that the law is being flouted. These findings provide further support for the increased penalties introduced in Victoria in November 2000 as part of the legislation designed to reduce the sale of tobacco products to adolescents under the age of 18.

The long-term trends in students' level of involvement with smoking gives us reason to believe that some progress has been made over the period of these six surveys. Among boys and girls aged 12 to 15 years, there were more current smokers in 1984 than in any subsequent year. Although this proportion remained stable from 1990 through to 1996, a small yet

encouraging decline was observed in the proportion of current smokers from 1996 to 1999. Among 16- and 17-year-olds, however, the proportion of current smokers did not vary much over the period of this survey series, with these students being most at risk for addiction and consequent later harm. These trends are cause for concern and call for further investigation and continuing remedial action.

The influence of the smoking behaviours of important others on an adolescent's own smoking behaviours cannot be ignored. Students from families where both parents smoked were almost three times more likely to be current smokers than students with no parents who smoke. As there is some evidence that by quitting smoking, parents can reduce the likelihood of their adolescent child smoking (Farkas et al. 1999), strategies to encourage parents to stop smoking are warranted. If parents cannot quit, tobacco control programs could look at providing them with the skills to talk to their children about smoking without seeming hypocritical. Recent work from the US suggests that by making smoking less socially desirable, parents who smoke can discourage their children from smoking (Jackson & Henriksen 1997; Jackson et al. 1997). This work has attempted to assist parents to establish an anti-smoking environment within their homes, regardless of the parents' smoking status. To achieve this, parents who smoke are advised to smoke outside the home, to develop strategies by which their own smoking is seen as undesirable, and are given strategies on how to talk to their children regarding the social, financial and health effects of smoking. Evidence from cross-sectional studies showing that smoking prevalence is lower among adolescents who live in a smokefree home, regardless of parental smoking status, also supports this approach (Farkas et al. 2000; Wakefield et al. 2000).

Students who thought they would not finish Year 12 were up to five times more likely to be current smokers, compared to those who thought they would finish Year 12. The strong association between school involvement and smoking status suggests that prevention programs could benefit by working with schools and education groups to develop strategies that encourage students to remain at school. That this association was found among Year 7 students suggests that such programs need to commence in primary school and continue into secondary school. While this cross-sectional finding needs to be confirmed in longitudinal studies conducted in Australia, it supports the results of longitudinal studies from the US (Bryant et al. 2000).

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