School structural and policy variables associated with student smoking

Valerie Clarke, Victoria White, David Hill, Ron Borland

Abstract

Objective **– To assess the relationships between school structural and smoking policy variables and students' self-reported smoking.**

Design **– Questionnaire data relating to schools were collected from teachers and data relating to self-reported smoking were collected from students.**

Setting **– Australian secondary schools.**

Participants **– One teacher from each of 347 schools and 26429 students from these schools.**

Main outcome measure **– Self-reports of smoking.**

Results **– For each school the percentages of students who had smoked in the last week, month, and year were obtained for three groups of students: (*a*) years 7 and 8, (*b*) years 9 and 10, and (*c*) years 11 and 12. For consistency across time periods, reporting was limited to smoking in the last week. Schools varied in the proportions of students who reported smoking. School-based variables related to smoking more consistently for the younger students, for whom smoking was more prevalent in schools which were (*a*) co-educational rather than single-sex, (*b*) government rather than non-government, (*c*) had a student representative on the school council, (*d*) did not have a house system, and (*e*) did not have a past students' association. For older students smoking prevalence was positively related to non-English speaking background. For all groups, smoking prevalence was unrelated to (*a*) school location (rural or urban), (*b*) school size, (*c*) means of selecting prefects, (*d*) student smoking policy, (*e*) staff smoking policy, (*f*) staff smoking prevalence, (*g*) visitor smoking policy, and (*h*) school no-smoking signs. Specialised health education programmes related positively to smoking, probably as these programmes were introduced into the schools with greater smoking prevalences. When the variables which were significant individually were entered into regression analyses to predict smoking there were few significant relationships.**

Conclusion **– School-based structural and smoking policy variables have minimal association with students' reported smoking behaviour.**

(*Tobacco Control* 1994; 3: 339–346)

Centre for Behavioural Research in Cancer, Anti Cancer Council of Victoria, 1 Rathdowne Street, Carlton South, Victoria, Australia, 3053
V Clarke
V White
D Hill
R Borland

School of Psychology, Deakin University, Geelong, Victoria, Australia 3217
V Clarke

As mortality rates related to tobacco use are higher among those who begin smoking at younger ages,[1] smoking among secondary students is a serious health problem. In addition, because teenage smoking is a major determinant of adult consumption,[2] with most adults who smoke taking up smoking by the age of 18 years,[3] reducing the number of teenagers who smoke is one way to reduce the number of adult smokers. Identifying factors that influence teenagers to smoke has become a focus of considerable research activity.

Of the many agencies of socialisation that influence the developing teenager, the family, school, peers, and the mass media all play a significant role. While the roles of the family, peers, and media in teenage smoking behaviour have been studied extensively, the impact of the school environment on smoking behaviour has been neglected by most researchers. Recently the influence of school characteristics and policies (particularly those regarding student and staff smoking) on the smoking behaviour of students has begun to gain attention. This is in part due to health authorities encouraging schools to develop policies on smoking as a way of raising the issue of teenage smoking in schools. School policies on smoking may be as simple as stating whether smoking is permitted on school grounds by students or teachers, including the types of disciplinary procedures taken if smoking regulations are transgressed; or they may be more complex by addressing the type of smoking education included in the school's curriculum. While there appears to be an increase in the number of schools developing these policies, there is little research describing school policies. Thus it is hard to determine the types of policies schools are developing and the numbers of schools which have smoking policies. The present paper sets out to describe the types of policies and educational programmes related to smoking currently operating in schools throughout Australia.

Although research has shown that smoking prevalence rates vary greatly across schools,[4] there has been little consideration of school-structural or smoking policy factors in relation to smoking prevalence. Research that has focused on school variables has reported conflicting results. Conrad, Flay, and Hill[5] identified eight studies which found that smoking onset related to school climate variables, such as academic values and achievement, problem behaviour, attitudes about discipline, and involvement in extra-curricular

activities. However, these variables were related to the climate of the individual school and thus shed little light on the impact of school structural and policy variables on adolescent smoking.

Research in the UK which has investigated school structural variables has shown smoking prevalence to be higher in secondary modern schools than in grammar schools,[6,7] in single-sex than in co-educational schools,[7] and in schools where both students and staff could smoke.[6] On the other hand, Australian data suggest that smoking was more prevalent in government than non-government schools and in co-educational rather than single-sex schools.[4]

Research conducted in the UK has also found smoking prevalence to be positively related to the number of teachers who smoke[8] and negatively related to optional school uniform,[7] and school discipline policy related to smoking.[9] However, smoking was unrelated to catchment area (rural, suburban, urban),[7] presence or absence of a sixth form (catering for 17- and 18-year-old students), or type of pastoral care programme (vertical or year grouping).[7] In both Australia and the UK no relationship has been found between smoking and the provision of health education,[4,6] or school size.[4,7]

Research in the US looking at the impact of smoking policies in schools on the smoking behaviour of students is limited. Pentz *et al*[10] examined the effects of smoking policy on the prevalence of smoking and amount smoked by year 7 students. Results of this study suggest that more comprehensive smoking policies are marginally related to lower prevalence rates of smoking among students. Policies which tended to be more punitive had no effect on the smoking behaviour of students. This study showed that policy was related more to the amount year 7 students smoked than to smoking prevalence.

Given the limited and somewhat conflicting research findings cited above, we have little knowledge about the impact of such policies or even structural factors on the smoking behaviour of students. Determining whether school structural characteristics or policies relate to the smoking behaviour of secondary students has practical relevance in identifying the types of schools and policies which might be the target of smoking prevention education programmes. In addition, any relationship between policies and students' smoking would add to our theoretical understanding of adolescents' smoking behaviour.

The present paper also aims to relate these policies and structural characteristics to prevalence of smoking in the schools. It describes the prevalence and types of smoking policies and education programmes occurring in Australian secondary schools. In addition, particular school structural variables are reported. The paper then examines the relationship between school characteristics and prevalence of smoking among secondary students. Data for this report were collected in 1990 in conjunction with a survey of smoking and alcohol use among Australian secondary schoolchildren (SSASS). In addition to the survey of students, a school-based survey was used to collect data about the characteristics of the school structure, organisation, and health education curriculum. Due to the inconsistencies in previous research, no clear predictions were made.

Method

SAMPLE

A total of 351 secondary schools participated in the SSASS survey in 1990. Detailed descriptions of both the sampling and administration procedures are provided elsewhere.[11] In brief, a stratified two-stage sample design was used. In the first stage, two random samples of secondary schools were drawn, one from schools enrolling students in years 7 to 10 and the other from schools enrolling students in years 11 and 12. Schools were selected on a probability proportional to the school size as indicated by the number of year 8 to 10 students in the junior sample and the number of year 11 and 12 students in the senior sample. The schools were selected so that the number of schools of each type reflected the proportion of schools of that type within each state. Eighty students were then drawn randomly from each school selected. In the years 7 to 10 sample there were 20 students from each year level. In the year 11 and 12 sample there were 40 students from each year level.

QUESTIONNAIRES

Questionnaires addressing school-based issues were obtained from 347 of the schools participating in the SSASS study. This questionnaire addressed objective facts about the general characteristics of the school, issues of organisation, the provision of health education within the school curriculum and the inclusion of smoking within this curriculum, the use of Anti-Cancer Council (ACC) materials, and the existence of school policies in relation to smoking for students, staff, and visitors.

Student questionnaires addressing issues of smoking and alcohol use were completed by 26429 students. These provided the basis of estimating the percentages of students who smoked in each school by various year levels. The questions of relevance here asked students if they had smoked in the last week, the last month, and the last year. Students also indicated whether they had had any lessons about smoking in the previous school year. Although student self-reports of smoking were not verified, studies assessing the relationship between self-reports and physiological measures show that self-reports of smoking in questionnaires are reliable.[12,13]

ANALYSES

The results are presented in two sections. The first section provides a description of the schools' policies and practices. Frequencies and cross-tabulation procedures were used to

analyse the data from the school survey. Due to rounding, percentages may not add to 100. The second section examines the relationship between these variables and student smoking prevalence. To relate school-based variables to smoking prevalence, the data from the students' survey were aggregated at the school level and the percentages of students smoking in year levels 7 and 8, 9 and 10, and 11 and 12 for each school were determined. Similarly, the percentages of students recalling lessons about smoking were calculated for each school for the three year-level groups. For the categorical variables analysis of variance procedures were used to examine the relationships between school factors and smoking prevalence. For the continuous variables, Pearson correlations were used to avoid losing data. The prevalence of smoking in the past week was then employed as the dependent variable in multiple regression analyses to determine the relative contribution of the variables found to relate to smoking in the independent analyses.

The significance level was set at 0.05. Given the number of comparisons we recognise that some significant results may be Type 1 errors. However, as this is an exploratory study we thought it desirable to identify the majority of factors which may influence smoking in schools.

Results

THE NATURE OF THE SCHOOLS

School characteristics

Sixty-one per cent of participating schools were government schools, 23% were Catholic, and 16% were independent. Eighty-one per cent of schools were co-educational, 10% were girls' schools, and 9% were boys' schools. Locations varied from inner capital city (18%) and capital city (41%), to large provincial city (5%), small provincial city (16%), large town (9%), and small town (11%). A quarter of the schools contained some primary level classes. Total enrolments varied from 110 students to 930 students, with an average of 740 students. Ethnic composition also varied. Although it was estimated that for 82% of schools there were less than 20% of students from non-English speaking backgrounds (NESB), this figure exceeded 60% of years 7 to 10 students in 8% of schools and exceeded 60% of years 11 and 12 students in 5% of schools.

School organisation

Over three-quarters (76%) of the schools had a compulsory school uniform, while in 18% of schools wearing of the uniform was optional, and 4% of schools did not have a school uniform. Sixty-two per cent of schools had some form of prefect (school orderly) system. The students had a major role in the selection of prefects in most schools (94%), with very few schools having prefects appointed solely by the principal and/or staff (6%). Eighty-six per cent of all schools had a student representative on the school council, with these being elected solely by the students in 85% of schools. Most schools (79%) had some form of house system, which organised students into groups for social and/or sporting purposes. House meetings were relatively infrequent, being held several times a week (3%) or weekly (3%) in very few schools, with 22% having meetings several times a term, 17% having them once a term, 16% rarely, and 31% not indicating a regular pattern.

Health education

Most schools (98%) had some health education at some stage during their secondary programme. However, there was considerable variation in the years in which it was taught and whether or not such courses were compulsory. The percentages of schools which provided health education at each of the levels from year 7 to year 12 are shown in the upper part of table 1. Approximately 90% of schools offered a health education programme at each year level from years 7 to 10, 75% of schools offered one in year 11, and 59% of schools in year 12. Most schools (82%) had a teacher assigned to health education.

The length of time smoking education had been included in the curriculum of schools varied from 1 to 20 years, with a mean of 6.4, a median of 5.0, and a standard deviation of 3.7. Smoking education was more common in years 7 to 10 than in years 11 and 12.

Health education was located in different parts of the curriculum in different schools, and in many cases was included within more than one discipline. Of the 322 schools teaching some component of health education, 54% had at least one specialised subject devoted to health education, while 52% included it as part of physical education, 31% as part of science, 23% within pastoral care, 3% in drama, and 23% in other unspecified subject areas.

Materials

Seventy per cent of schools made some use of smoking materials developed by one of the cancer organisations, and a further 21% of schools make extensive use of these materials. Only 6% of schools stated that they made no use of these materials while for a further 3% of schools the question was not applicable, presumably as they do not teach about smoking.

Table 1 Percentages of schools offering health education programmes at each year level and percentages of schools which include smoking as part of that programme

	Year level					
Health education	*7*	*8*	*9*	*10*	*11*	*12*
Presence of programme						
none	10	11	10	9	35	41
at least one	90	89	90	91	75	59
Type of programme						
elective	4	5	14	22	60	47
compulsory	86	84	76	69	15	12
Includes smoking	43	53	46	39	17	12

Smoking awareness

In the 12 months preceding the survey, 42% of the schools had not used any special activities to raise students' awareness of the health hazards of smoking, while 58% had tried to raise awareness, using a variety of techniques. The most popular was the use of displays, mentioned by 33% of schools, although a few schools had used drama (8%), social situations (3%), or other unspecified techniques (15%).

Smoking policy for students

Nearly all schools (97%) prohibited smoking for all students on all occasions, although two schools allowed smoking in certain areas, one school allowed it off the school premises, and six schools have other unspecified policies. All schools took some form of action when students were caught smoking. However, there were many different types of action taken, and many schools took different types of actions on different occasions, often depending on whether it was a first, second, third, or later offence. The most frequently reported actions were: contacting the pupil's parents (74% of schools), suspending students (52%), detention (50%), issuing a warning (26%), and providing or recommending health education counselling (29%). Relatively few schools required additional assignments (7%), or expelled students from the school (5%). Generally, a within-school punishment was followed by parental contact, with suspension or expulsion occurring in response to a third or fourth offence.

Staff

In 48% of schools teachers were prohibited from smoking, while there were no restrictions on staff smoking in only 6% of schools. In 89% of schools it was estimated that less than 20% of the teachers were smokers, while in the remaining 11% of schools it was estimated that between 21% and 40% of teachers were smokers.

Visitors

A fifth of the schools had no restrictions on smoking by visitors to the school while 32% allowed visitors to smoke in some areas; 41% did not allow visitors to smoke at all, and the remaining 7% had some other unspecified policy in relation to visitors. Very few schools claimed to have "no smoking" signs in "most parts" of the school (7%), although 63% of schools had such signs in some parts of the school, and the remaining 30% of schools did not have any signs.

SCHOOL-BASED VARIABLES AND STUDENT SMOKING

To relate school-based variables to student smoking the six year-levels were combined into three groups: years 7 and 8, years 9 and 10, and years 11 and 12. Percentages of students who had smoked in the three time periods for each age group within each school were calculated, and means were calculated across schools. The means and standard deviations obtained are presented in table 2. An examination of this table shows that smoking increases from years 7 and 8 to years 9 and 10 and further increases from years 9 and 10 to years 11 and 12. This pattern is consistent across smoking in the last week, the last month, and the last year.

The large standard deviations suggest that there is considerable variability between schools. The remainder of this paper will attempt to identify the factors which may relate to this variability.

For each year level group, three one-way analyses of variance were computed to identify the relationship between the school-based variables and the proportion of students who said they were smokers. As the findings within each age group were consistent across the three time periods and as smoking in the last week gives an indication of regular smoking, in the interests of brevity and clarity further discussion will focus on this one dependent variable. The mean scores and associated F values for smoking in the last week are presented in table 3. For continuous variables, Pearson correlation coefficients were computed. These are reported in the text.

School type

For students in years 7 to 10, school type was related to smoking with a higher proportion of students smoking in government schools than in independent or Catholic schools. However, this relationship was not found among senior students.

Sex composition

The sex composition of the school was only related to the proportion of years 7 and 8 students reporting having smoked. The results indicate that there was more smoking in co-educational schools than in boys' schools and more smoking in boys' schools than in girls' schools.

Uniform

The prevalence of smoking in years 7 to 10 was lower in schools with a compulsory school uniform than in schools where there was no uniform or it was optional. However, the prevalence of smoking among senior students was not related to the school's uniform policy.

Table 2 Percentages of students reporting smoking: means (standard deviations)

Year levels	*Smoked last week*	*Smoked last month*	*Smoked last year*
7 and 8	8.75 (9.26)	11.28 (10.09)	21.48 (13.19)
9 and 10	22.85 (9.87)	26.42 (10.82)	40.76 (12.50)
11 and 12	27.34 (15.85)	31.57 (15.84)	46.51 (15.90)

Table 3 Mean percentages of students in years 7 and 8, 9 and 10, and 11 and 12, who have smoked in the last week in relation to each of the categorical school-based variables

	Years 7 & 8		Years 9 & 10		Years 11 & 12	
School variables	*Mean*	*F (df)*	*Mean*	*F (df)*	*Mean*	*F (df)*
Sex composition						
Girls	4.5		20.4		24.2	
Boys	6.8	3.37*	21.3	< 1	24.1	< 1
Co-educational	8.7	(2,238)	22.8		28.3	
School location						
City	8.3	< 1	22.5	< 1	28.4	< 1
Rural	8.1		22.0		21.0	
School type						
Government	9.8		24.0		28.3	
Catholic	5.7	9.79***	19.6	5.20***	26.9	< 1
Independent	5.4	(2,235)	19.8	(2,208)	26.9	
Proportion of years 7 to 10 from NESB						
0–20%	8.6	2.01	23.1	< 1	29.7	2.70
21–100%	6.8	(1,209)	21.5		22.7	(1,87)
Proportion of years 11 and 12 from NESB						
0–20%	9.0	2.57	22.9	< 1	31.2	4.81*
21–100%	6.5	(1,165)	21.3		22.2	(1,97)
School uniform						
Not compulsory	10.4	6.37*	25.5	4.75*	25.9	< 1
Compulsory	7.6	(1,235)	21.7	(1,208)	28.1	
Selection of prefects						
Principal	6.0		20.5		20.8	
Staff	9.2	3.16	22.1	< 1	29.4	< 1
Students	6.3	(2,139)	20.5		26.4	
Student representative on school council						
No	5.8	6.05*	22.0	< 1	27.6	2.07
Yes	9.0	(1,221)	22.8		21.7	(1,90)
Houses						
No	10.6	6.38*	23.2	< 1	31.4	2.09
Yes	7.6	(1,237)	22.2		26.6	(1,108)
Past students' association						
No	8.8	4.16*	23.5	6.30*	27.4	< 1
Yes	6.7	(1,237)	20.0	(1,210)	27.9	
Staff smoking policy						
Not allowed	7.5		22.6		27.2	
Some areas	9.1	1.54	22.6	< 1	27.8	< 1
No restrictions	6.9	(2,237)	20.4		30.9	
Proportion of staff who are smokers						
0–20%	8.0	< 1	22.0	2.18	27.9	< 1
21–100%	9.1		25.2	(1,207)	25.9	
Visitor smoking policy						
Not allowed	8.8		22.9		30.6	
Some areas	8.5	< 1	24.3	1.91	26.2	1.64
No restrictions	7.4		20.5	(2,191)	24.1	(2,99)
Smoking signs around the school						
None	8.1		21.7		26.3	
Few	8.3	< 1	22.2	2.35	28.5	< 1
Most parts	7.8		28.1	(2,210)	27.3	
Health education teacher						
No	5.3	8.71**	18.8	5.10*	25.1	< 1
Yes	8.8	(1,239)	23.0	(1,212)	28.1	

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

School size

School size was not significantly related to the proportion of students in years 7 and 8, ($r = 0.02$), years 9 and 10 ($r = 0.04$), or years 11 and 12 ($r = 0.14$) who smoked.

School location

Whether the school was located in an urban or rural area was unrelated to the proportion of students who smoked at any year level.

Language spoken at home

The teachers were asked to estimate the proportions of students in years 7 to 10 and in years 11 and 12 who were from non-English speaking backgrounds (NESB). NESB was unrelated to smoking for students in years 7 to 10 but, for the senior students, smoking was less prevalent where there were more NESB students.

School organisation

Among students in years 7 and 8 there was less smoking where (*a*) there was not a student representative on the school council, (*b*) there was a house system, and (*c*) there was a past students' association. None of these variables related to smoking prevalence for students in years 11 and 12.

Health education

Smoking was greater among students in years 7 to 10 where the school employed a health education teacher but this factor was unrelated to smoking for students in years 11 and 12. Smoking was more prevalent among year 9 and 10 students in schools where the year 9 health education programme included a component on smoking (smoking component included: mean = 24.5, smoking component not included: mean = 20.4; $t(206) = 3.0$, $p < 0.01$). The relationship between smoking prevalence and including a smoking component in health education was not significant for other year levels.

For year 7 and 8 students, the number of years for which the school had included smoking education as part of its health edu-

cation curriculum had a significant positive association with the proportion of students who had smoked in the last week ($r = 0.15$, $p < 0.05$). A similar association was found between the proportion of year 11 and 12 students who smoked in the last week ($r = 0.23$, $p < 0.01$), but this variable was unrelated to smoking prevalence for students in years 9 and 10 ($r = -0.13$, ns). The possible reasons for this unexpected positive association were explored further. To test the hypothesis that smoking education had been introduced into the schools with a greater smoking prevalence, comparisons were made between those schools for which smoking education had been introduced during the last six years, and those which had had smoking education for a longer period of time. Six years was selected as the cut-off as this was the period of time for which the eldest members of the sample had been at secondary school. There were no significant differences for students in years 7 to 10, but for students in years 11 and 12 smoking was more prevalent where smoking education had been taught for more than six years (mean = 37.41) than where it had been taught for six years or less (mean = 23.48): $t(80) = 3.53$, $p = 0.001$. As students in years 7 and 8 had only been at the school for one or two years, and students in years 9 and 10 for three or four years, the analyses were repeated using the appropriate number of years as the dividing point, but no significant differences were found.

The relationship between the location of health lessons and the percentage of students who recall lessons about smoking was also examined. As recall of lessons in the previous school year was the focus of the question, it is worth noting that some students may not have been at their current school and so associations will be weakened. However, this analysis may help to gain an understanding as to whether the location of health lessons in particular subjects is associated with greater recall. No significant associations were found between location of health education and recall of lessons for students at any year level.

The proportion of year 7 and 8 students recalling lessons about smoking was not related to the proportion of students in these years smoking, and no association between these variables was found for students in year 9 and 10. However, a positive relationship was found between the proportion of year 11 and 12 students recalling lessons and the proportion of these students smoking in the last week ($r = 0.29$, $p < 0.01$).

Smoking policies for adults

Staff smoking policies and visitor smoking policies, and the presence or absence of "No smoking" signs were unrelated to reported student smoking.

OVERALL IMPACT OF SCHOOL VARIABLES

As many of the variables examined above are related to one another, the relative impact of the school variables on the prevalence of smoking was assessed by using three, stepwise multiple regression analyses. In each analysis the independent variables were sex composition, school type, non-English speaking background, uniform, selection of prefects, selection of student representative council members, presence of houses, student smoking policy, and presence of smoking education. Separate analyses were conducted for each of the three year groupings.

For students in years 7 and 8 smoking was inversely related to presence of a house system ($F(1,211) = 7.39$, $p < 0.001$), and attending a Catholic school (F change $(2,210) = 6.46$, $p < 0.05$) or an independent school (F change $(3,209) = 6.98$, $p < 0.01$). Collectively these variables explained 8% of the variance (adjusted $R^2 = 0.080$, $F(3,209) = 7.13$, $p < 0.001$). For students in years 9 and 10, only one variable entered into the equation, that of having a smoking component in the health education programme ($F(1,189) = 78.07$, $p < 0.01$). The prevalence of smoking was greater among those schools with a smoking-and-health programme at year 9 level, but this explained less than 4% of the variance (adjusted $R^2 = 0.036$). For years 11 and 12, two variables were significant, explaining 12% of the variance (Adjusted $R^2 = 0.122$, $F(2,95) = 7.76$, $p < 0.001$). Smoking was less prevalent in schools which had a house system ($F(1,96) = 9.48$, $p < 0.01$) and in schools with a higher proportion of NESB students (F change $(2,95) = 5.60$, $p < 0.05$).

Discussion

Smoking was prohibited for all students in the vast majority of schools surveyed. In nearly half the schools (48%) the staff were not permitted to smoke anywhere on campus. If students were caught smoking, generally some form of punitive action was taken by the school. However, there was no significant association between student smoking and staff smoking policy, proportions of staff members who smoke, visitor smoking policy, and placement of no-smoking signs around the school. This may suggest that the school smoking policy has little effect on students' reported smoking behaviour. However, as we did not ask about the length of time these policies had been in place it may be that they were too recent to have had a detectable impact. Further, the extent to which students are aware of these practices and policies was not assessed.

Although health education is currently included in the curriculum of the majority of Australian schools, the length of time for which health education had been taught and where it was included in the curriculum varied greatly between schools. Health education became less common with increasing year levels. Education about the dangers of smoking was a relatively recent phenomenon, and was also more common in the junior than senior year levels. The restriction of health education predominantly to junior-year levels is unfortunate given that many students are taking up smoking in their senior years. The way in

which health education was integrated into the curriculum also varied between schools. However, it is encouraging that in schools where health education occurred, over 50% had a specialised subject devoted to health education.

There was a positive association between the number of years smoking education had been taught in the school and the prevalence of smoking. This result was unexpected and was investigated further. The additional analyses comparing the prevalence of smoking in schools which had had smoking education programmes for six years or less with those which had had them for more than six years showed that, for students in years 11 and 12, smoking was significantly more prevalent in the schools which had had smoking education programmes for more than six years. This finding is consistent with the proposition that schools which see themselves as having a problem with student smoking may be more likely to have introduced smoking education programmes. It is possible that in the absence of such programmes, smoking may have been even more prevalent.

Alternatively, the impact of the programme may depend on its nature. Pentz *et al*[10] found that a punitive school smoking policy had no effect on smoking prevalence. Our data are limited in that there is no information as to the content or quality of the smoking education programmes, or the possibility that students may be rebelling against a perceived strong stand by the school. Finally, we only examined the association between smoking education programmes and prevalence of smoking within schools. Other researchers have shown that while prevalence may not be affected by school policy, amounts smoked may be.[10] Education about smoking may not stop students from experimenting with tobacco but may reduce the number of cigarettes consumed.

When the set of school-based variables was used as independent variables in a series of regression analyses, there were limited effects. For students in years 7 and 8 the most important variables were house system and school type, with smoking being less prevalent in schools with a house system and in catholic and independent schools than in government schools. Although there were additional variables which were significant in the separate analyses (sex composition, school uniform, student representative council, past students' association, and presence of a health education teacher), these variables may all be related to school type, which may also be related to the presence or absence of a house system. The finding of a relationship between school type and smoking prevalence is consistent with earlier research,[4,6,7] although it only explains 8% of the variance.

For students in years 9 and 10, the major variable associated with smoking prevalence was the presence of a smoking education programme at the year 9 level. Although school type, school uniform, and past students' association were significant in the separate analyses, these effects were not evident in the combined analysis. As this is the age group where rebellion against authority is strongest, students may be deliberately experimenting with smoking as they have been encouraged to avoid this behaviour. Again, a consideration of the amount of smoking could be useful.

For students in years 11 and 12, the findings for the composite analysis are consistent with those for years 7 and 8, showing that smoking is less prevalent in schools with a house system. Additionally, the regression analysis confirmed the findings of the analyses of variance, again highlighting NESB as one of the main factors relating to lower smoking prevalence. Although a greater amount of the variance is explained for students at these senior levels than for those at lower levels, part of the variance is due to NESB, which reflects home rather than school characteristics.

Over all year levels, the limited association of these school structural and policy variables confirms the findings of the analyses of variance and simple correlations and substantiates the conclusion that school-based variables have a limited impact on reported student smoking prevalence. To the extent that school variables are relevant, they seem to reflect the extent to which students are encouraged to develop both leadership roles and a sense of identity within a house system, rather than to essentially structural characteristics of the school. This may suggest that structural variables are less consequential than school climate variables.[5]

The relative paucity of significant relationships between school structural and policy variables and reported student smoking is consistent with earlier Australian research.[4] Due to the tendency for editors to choose not to publish reports of non-significant findings,[14] this may account for the small number of research papers addressing this issue. Alternatively, the lack of significant results may be due to the use of school data as reported by teachers and student smoking data as reported by students. Problems in this type of reporting have been identified in relation to studies of gender differences in computing participation, attitudes, and achievement, which have shown that there are few differences reported in studies relying on teacher-supplied data and quite marked differences in studies relying on student self-report data.[15] Often students have limited awareness of the school policy unless this is reinforced by signs around the school, information in school communications, and teaching within related curriculum areas. Before it is concluded that school structural variables have limited influence on students' reported smoking, these variables should be explored using student reports of school policies and practices, and measures of amounts as well as prevalence of smoking. If school structural variables again show limited association with student smoking behaviour this would clearly indicate that this is one set of variables that may not require further research, leading to the re-direction of research efforts towards other factors, such as the roles of school climate, the family, media, and peer group. On the evidence presented here and the

limited evidence from other studies it seems that what students bring to the school is more important than what the school brings to the students in determining smoking prevalence among secondary school students.

1 Welte JW, Barnes GM. Alcohol: The gateway to other drug use among secondary-school students. *J Youth Adolescence* 1985;**14**: 487–98.
2 US Department of Health, Education, and Welfare. *Smoking and health: a report of the Surgeon General.* Washington, DC: US Govt. Printing Office, 1979.
3 Hill DJ. Factors influencing the development and maintenance of smoking in children in industrialised countries. Paper presented at the *International Workshop on Children and Tobacco in Industrialised Countries*, Toronto, Canada. 6–8 February 1989.
4 Clarke VA, White VM, Hill DJ, Pain M. School based variables in smoking. In: B Durston, K Jamzrozik, eds. *Tobacco & health 1990: the global war.* Perth: Organising committee of the seventh world conference on tobacco and health, 1990, pp 596–8.
5 Conrad KM, Flay BR, Hill D. Why children start smoking cigarettes: predictors of onset. *Br J Addict* 1992; **87**: 1711–24.
6 Johnson MRD, Bewley BR, Banks MH, Bland JM, Clyde DV. Schools and smoking: school features and variations in cigarette smoking by children and teachers. *Br J Educ Psychol* 1985; **55**: 34–44.
7 Murray M, Kiryluk S, Swan AV. School characteristics and adolescent smoking. Results from the MRC/Derbyshire smoking study 1974–8 and from a follow up in 1981. *J Epidemiol Community Health* 1984; **38**: 167–72.
8 Bewley BR, Johnson MRD, Banks MH. Teachers' smoking. *J Epidemiol Community Health* 1979; **33**: 219–22.
9 Porter A. Disciplinary attitudes and cigarette smoking: a comparison of two schools. *BMJ* 1982; **285**: 1725–6.
10 Pentz AP, Brannon BR, Charlin VL, Barrett EJ, MacKinnon DP, Flay BR. The power of policy: the relationship of smoking policy to adolescent smoking. *Am J Public Health* 1989; **79**: 857–62.
11 Hill DJ, White VM, Williams R, Gardner G. Tobacco and alcohol use among Australian secondary school students in 1990. *Med J Aust* 1993; **158**: 228–34.
12 Dwyer T, Pierce, JP, Hannam CD, Burke N. Evaluation of the Sydney "Quit for Life" anti-smoking campaign: Part 2. Changes in smoking prevalence. *Med J Aust* 1986; **144**: 344–7.
13 Kozlowski LT, Heatherton TF. Self-report issues in cigarette smoking: state of the art and future directions. *Behav Assess* 1990; **12**: 53–75.
14 Rosenthal R. The "file drawer problem" and tolerance for null results. *Psychol Bull* 1979; **86**: 638–41.
15 Clarke VA. Sex differences in computing participation: concerns, extent, reasons and strategies. *Aust J Educ* 1990; **34**: 52–6.

Santiago Lyon, Associated Press

Women selling cans of baby food on a street in Baghdad, Iraq.