ORIGINAL ARTICLES

Tobacco and alcohol use among Australian secondary schoolchildren

(for editorial comment, see page 121)

David Hill, Sharon Willcox, Godfrey Gardner and Julie Houston

ABSTRACT A national survey of 23 359 Australian schoolchildren who were predominantly in the age range of 12–17 years was undertaken in 1984 to determine their levels of use of tobacco and alcohol. The prevalence of current smoking behaviour (that is, at least one cigarette in the past week) rose with age to 34% among girls and 29% among boys at 15 years of age. The prevalence of current drinking behaviour (that is, at least one drink in the past week) rose with age to 49% among girls and 56% among boys at 17 years of age. Very few pupils reported daily drinking but from 15 years of age between 12% and 14% of the sampled students reported smoking every day. Boys who currently smoked and drank reported higher consumptions of tobacco and alcohol than did girls who currently smoked and drank. Most smoking and drinking took place at weekends. Normal responses for intention to smoke in the future, and for drinkers and smokers "self-referent labels" are also reported, and it is suggested that health education programmes for schoolchildren usefully could be focused on these psychological factors. (Med J Aust 1987; 146: 125-130)

Deaths from smoking tobacco and the abuse of alcohol form the major part of the total number of estimated drug-related deaths in Australia.[1] The origins of both of these major public health problems are to be found in childhood and adolescence. Therefore, it is important to know the age- and sex-specific prevalence of smoking and drinking behaviour among Australian schoolchildren as a basis for planned, coordinated interventions and to measure any changes that result from them. Here we describe the results of a large, national self-report survey that was carried out in 1984 to provide accurate estimates of the prevalence and amount of smoking and drinking among students aged 12–17 years in schools throughout Australia. The survey was conducted as a collaborative project by state member organizations of the Australian Cancer Society.

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Subjects and methods

A total of 23 359 students in school-year levels 7 to 12 (that included 21 904 students who were 12–17 years old) was sampled from schools in every state and the Northern Territory during 1984; the Australian Capital Territory was not sampled.

The Survey Analysis and Services Unit of the Australian Council for Educational Research (ACER) advised on the sample frame and procedures. A stratified two-stage sample was used within each state or territory. In the first stage, a random sample of secondary schools with an enrolment of more than 100 pupils was drawn separately from government, Catholic and independent systems with a probability that was proportional to the number of 14-year-old children who attended the schools. This provided an almost complete coverage, since only 1.2% of Australian secondary schoolchildren attend schools with an enrolment of fewer than 100 pupils.

Of 313 secondary schools that were approached initially, 296 agreed to participate, which gave a response rate by schools of 95%. Fourteen of the 17 schools from a previously-drawn replacement sample agreed to participate, which made a total number of 310 schools that participated in the survey. Proportionately more schools were sampled in smaller states to permit reliable state-specific estimates to be made. The national results that are presented below have been corrected for these disproportions with an appropriate weighting procedure.

In the second stage of sampling, 80 students in each school were selected at random, in advance, from the school roll. The 80 pupils comprised 20 from each of four year levels (either years 7, 8, 9 and 10 [pattern A], years 9, 10, 11 and 12 [pattern B] or years 7, 8, 11 and 12 [pattern C]), with each pattern being spread approximately equally among the schools that were sampled. Additional names were also drawn as replacements in the case of students who were absent.

In the case of schools which did not have year-7 children enrolled, notably schools in Queensland, South Australia, Western Australia and the Northern Territory, year-7 children were sampled from the main primary schools that directed children to the selected secondary schools. In this way, an additional 75 primary schools were involved in the survey.

Procedure

Evidence from our own pilot studies and from elsewhere[2] indicates that orderly behaviour and valid responses from students are enhanced by testing children who are assembled in unfamiliar groups. The random selection of 20 students from across a year level was aimed at preventing the inclusion of intact school classes in the study. In addition, each survey group of 20 students was formed by the combination of two groups of 10 students from consecutive levels, that is, years 7 and 8, years 9 and 10, and years 11 and 12.

Field workers in each state were trained to administer the survey to students in accordance with a detailed written protocol. Every effort was made to ensure that students did not have prior knowledge of the survey. All testing was carried out within a period that included no lunch break or recess so that students who had been tested could not communicate with those yet to be tested. The protocol also called for teachers to be absent during the test in case their presence led to under-reporting by the pupils. Students completed anonymous questionnaires which were placed in plain envelopes to safeguard confidentiality further.

Questionnaire

In the construction of the questionnaire, we followed as closely as possible the recommendations of Drew et al. for improved comparability of surveys of drug abuse.[3] The final version of the questionnaire was pilot tested extensively in Victoria, and was found to have high test–retest reliability.

Students filled out a six-page booklet of questions on age, sex, year level and various questions on smoking and drinking. They also indicated whether they had been at school on the preceding school-day so that the smoking and drinking behaviour of absentees on the previous day could be compared with those who were present on both days.

In the questions on the use of tobacco, students were asked: to choose for themselves a "self-referent label"[4] from among "chain smoker", "heavy smoker", "light smoker", "occasional smoker", "ex-smoker" and "non-smoker"; if they had ever tried smoking, had experienced only a few puffs, or had smoked fewer than 10 cigarettes or more than 10 cigarettes; whether they had smoked in the past 12 months; whether they had smoked in the past four weeks; to complete a "diary" question by filling in for each of the days of the preceding week the number of cigarettes that were smoked; to answer an "intention" question using a seven-point scale to rate the likelihood that they would be smoking in one year hence; and to state the brand of cigarette that they smoked usually.

The questions on the use of alcohol followed a similar pattern: choice of "self-referent label", from among "heavy drinker", "light drinker", "occasional drinker", "party drinker" and "non-drinker"; whether they had never tried alcohol, had tried only a few sips, had had fewer than 10 drinks, or more than 10 drinks; if they had drunk alcohol in the past 12 months; if they had drunk alcohol in the past four weeks; and the number of drinks that they had consumed each day of the preceding week.

Weighting

The composition of the population of Australian

secondary schoolchildren in terms of state of residence, school type, age and sex was available independently from the ACER. Therefore, it was possible to assess the extent of over- and under-sampling on each of these variables. Weighting was carried out to adjust for imbalances in sampling with procedures in the Statistical Package for the Social Sciences (release 2.1).[5] All prevalence estimates that are presented below are based on weighted data.

Accuracy of estimates

This is the largest study of the smoking and drinking behaviour of Australian schoolchildren that has been undertaken to date. It should provide reliable estimates of the self-reported prevalence of these behaviours. Given the procedures that were followed in this study, it is reasonable to suppose that the students' self-reports were, in the main, valid representations of their actual behaviour. Since every age and sex category contained at least 1300 and up to 2000 individuals, the standard errors of estimates for each category are small. In practice, this means that the prevalence estimates that are based on this survey are within 2.7% of the true population value ($P<0.05$). Because of the large sample size, many of the statistical tests of association resulted in very low P-values; for simplicity these are all reported as $P<0.001$.

Results

Cigarette smoking behaviour

Table 1 sets out all the prevalence estimates that were obtained for smoking. The proportion of both boys and girls who had never smoked fell steadily from the age of 12 years before levelling out at about one-fifth of the sample at the age of 15 years. About one-third of children in every age/sex category in the sample reported only minimal experience with tobacco; that is, somewhere between a few puffs and 10 cigarettes. The prevalence of smoking peaked at 15–16 years of age for both boys and girls, whether the measure related to smoking in the past year, past month, past week or daily. Sex differences in the prevalence of current smoking (that is, at least one cigarette a week) were not significant at the ages of 12 and 13 years but there were significantly more girls who smoked than boys at the ages of 14 years ($P<0.001$), 15 years ($P<0.005$) and 16 years ($P<0.001$). As Table 1 shows, at the ages of 14, 15 and 16 years, the prevalence of current smoking among girls was 5% higher than that among boys, which reached a maximum of 34% (95% confidence limits, 32%–36%) at the ages of 15 and 16 years compared with the maximum for boys of 29% (95% confidence limits, 27%–31%) at the ages of 15 and 16 years. From the age of 13 years onwards, there were more girls smoking currently than boys, but no significant sex difference was observed at any age for daily cigarette smoking. Daily smoking reached its highest levels at the ages of 15 and 16 years for boys (13%) and at the age of 16 years for girls (14%)

The mean number of cigarettes that were smoked by those who reported having smoked in the past week rose in a linear fashion from 14 cigarettes for boys and from seven cigarettes for girls at the age of 12 years, to 42 and 34 cigarettes, respectively, at the age of 17 years (Figure 1). At all ages except that of 16 years, the mean cigarette consumption of boys who smoked currently was significantly higher than that of girls (Student's t-tests, $P<0.01$ in each case). The day-by-day pattern of smoking was identical for boys and girls and showed that much of the current cigarette consumption took place at weekends. The mean daily consumption of cigarettes on Fridays and on Sundays was 70% greater than the daily consumption on any weekday (Monday to Thursday). Consumption of cigarettes on Saturday was nearly twice the level of consumption on any weekday. Nearly one-quarter of current smokers had smoked only at the weekend of the previous week, with the proportion of weekend-only smokers being related inversely to age.

TABLE 1: Past and current cigarette smoking by secondary schoolchildren according to age and sex

Smoker category	Sex	Age (years) 12	13	14	15	16	17
Sample size (n)	M	1704	2059	2006	1987	1883	1419
	F	1780	2038	1999	1915	1792	1322
Never smoked	M	41%	31%	26%	22%	22%	19%
	F	53%	37%	27%	21%	20%	23%
A few puffs only	M	33%	31%	25%	23%	21%	21%
	F	29%	29%	24%	19%	20%	21%
Up to 10 cigarettes	M	10%	13%	14%	12%	15%	14%
	F	8%	11%	12%	13%	12%	11%
More than 10 cigarettes	M	16%	25%	35%	43%	42%	46%
	F	10%	23%	38%	47%	49%	45%
Smoked in past year	M	29%	38%	46%	48%	48%	45%
	F	24%	39%	52%	57%	57%	49%
Smoked in past month	M	15%	22%	29%	33%	34%	32%
	F	13%	23%	34%	39%	40%	34%
Smoked in past week (current)	M	10%	17%	24%	29%	29%	27%
	F	8%	18%	29%	34%	34%	30%
Smoked daily in past week	M	2%	4%	7%	13%	13%	12%
	F	1%	3%	8%	12%	14%	13%

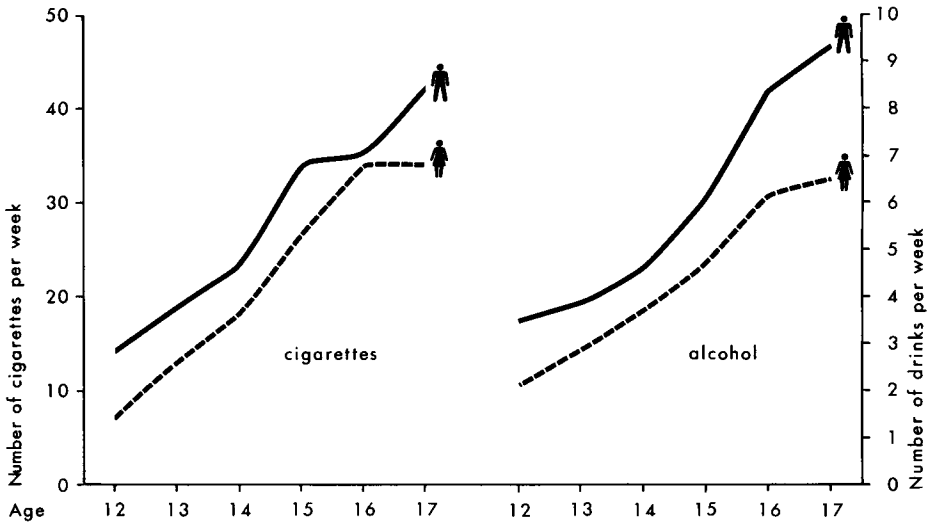

FIGURE 1: Mean number of cigarettes and alcoholic drinks that were consumed each week among users in the past week.

Among current smokers of both sexes who were aged 12–17 years, the most popular cigarette brands were "Winfield" (33%) and "Peter Jackson" (15%). However, there was a striking sex-related difference in the preference for "Alpine", which was preferred by 9% of girls, but only by 1% of boys. "Escort" was preferred by 6% of both sexes, "Benson and Hedges" by 5% and "John Player" by 3%.

Drinking behaviour

Table 2 provides prevalence estimates for the use of alcohol. At the age of 16 years, 97% of the schoolchildren who were sampled had tried alcohol. All of the prevalence estimates for alcohol were strongly age-related; that is, whatever the measure, the use of alcohol became more common with increasing age. At the age of 12 years, 23% of boys and 14% of girls reported that they had drunk alcohol in the past week, and the prevalence of current drinking then rose steadily to 56%

(95% confidence limits, 53%-59%) of boys and 49% (95% confidence limits, 46%-52%) of girls at the age of 17 years. With the chi-squared test, significantly more boys than girls were current drinkers at the ages of 12 years ($P<0.001$), 13 years ($P<0.001$), 16 years ($P<0.005$) and 17 years ($P<0.005$). Only a very small number (less than 1% of the sample) reported that they had drunk daily in the past week.

The mean number of alcoholic drinks that were consumed in the past week by current drinkers rose steadily with age from 3.5 drinks for boys and 2.1 drinks for girls at the age of 12 years, to 9.3 drinks and 6.5 drinks, respectively, at the age of 17 years (Figure 1). At every age the mean weekly consumption of alcohol that was reported by boys exceeded that reported by girls at a high level of statistical significance on Student's *t*-tests ($P<0.005$ in each case).

Drinking took place mostly at weekends in a pattern that was shared by both boys and girls. Compared with the average for any of the weekdays (Monday to Thursday), the average consumption of alcohol by current drinkers on Fridays and on Sundays was three to four times higher, while on Saturdays it was about eight times higher.

TABLE 2: Past and current use of alcohol by secondary schoolchildren according to age and sex*

Drinker category	Sex	Age (years) 12	13	14	15	16	17
Never drank	M	13%	9%	6%	5%	3%	3%
	F	19%	14%	8%	4%	3%	3%
A few sips only	M	52%	44%	34%	21%	13%	8%
	F	63%	53%	37%	25%	18%	15%
Up to 10 drinks	M	18%	21%	21%	20%	15%	11%
	F	11%	17%	24%	23%	19%	15%
More than 10 drinks	M	18%	26%	39%	55%	68%	78%
	F	7%	16%	30%	47%	59%	68%
Drank in past year	M	64%	70%	76%	84%	89%	91%
	F	51%	63%	76%	86%	90%	90%
Drank in past month	M	33%	40%	46%	58%	65%	73%
	F	22%	33%	45%	56%	63%	68%
Drank in past week (current)	M	23%	29%	33%	44%	52%	56%
	F	14%	24%	32%	44%	45%	49%

*Sample sizes as in Table 1.

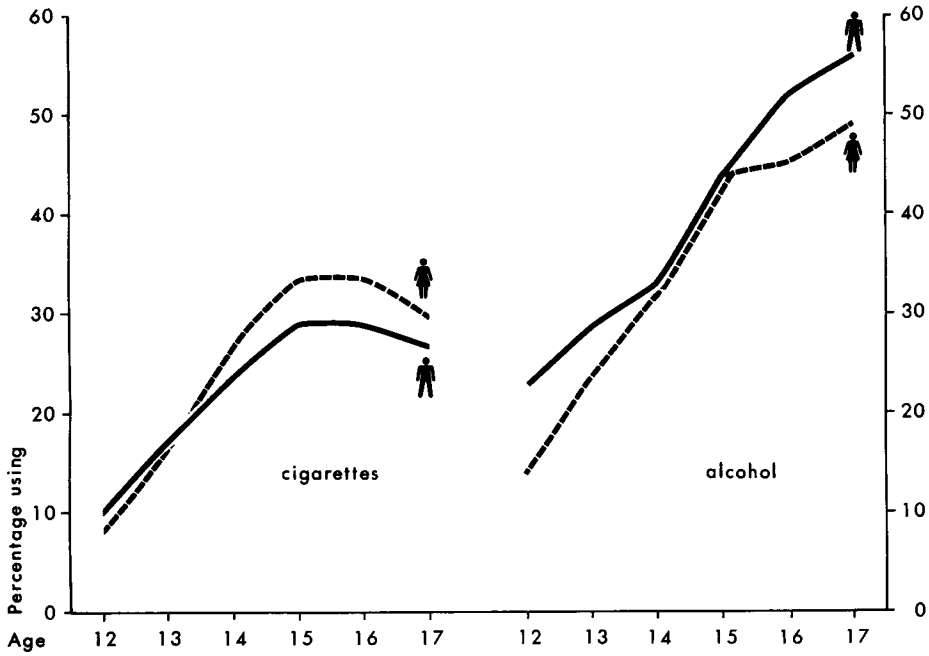

FIGURE 2: Percentage of sampled schoolchildren who had used tobacco and alcohol in the preceding week.

TABLE 3: Relationship between current smoking and current drinking by secondary schoolchildren according to age and sex

Classification	Sex	Age (years) 12	13	14	15	16	17
Neither current smoker nor current drinker	M	73%	64%	57%	48%	43%	39%
	F	82%	68%	55%	47%	45%	44%
Current smoker only	M	4%	6%	11%	9%	6%	5%
	F	5%	8%	12%	11%	10%	7%
Current drinker only	M	18%	19%	20%	24%	29%	35%
	F	10%	15%	17%	21%	22%	27%
Current drinker and current smoker	M	5%	10%	12%	19%	22%	21%
	F	3%	9%	16%	21%	23%	23%

Drinking took place mostly at weekends in a pattern that was shared by both boys and girls. Compared with the average for any of the weekdays (Monday to Thursday), the average consumption of alcohol by current drinkers on Fridays and on Sundays was three to four times higher, while on Saturdays it was about eight times higher.

Comparison of drinking and smoking behaviour

Figure 2 plots by age and sex the percentages of Australian secondary schoolchildren who were current smokers and current drinkers. Three important features emerge from this comparison. First, drinking is more common in every age and sex category than is smoking. Secondly, while the proportion of girls who smoke tobacco is greater than that of boys, proportionately more boys drink alcohol. Thirdly, the relationship of age to smoking is curvilinear, whereas it is linear for the prevalence of alcohol use. The curvilinear pattern for smoking is possibly due to the loss from school of those most likely to be smoking at the ages of 16 and 17 years.

Figure 1 plots the mean number of cigarettes and alcoholic drinks that were consumed by students each week by current users. A striking feature is the near-linear relationship for both substances and for both sexes between the amount consumed and age. Although these are cross-sectional data that cannot prove changes that occur over time, they do suggest strongly a classic pattern of habituation with higher consumption that is associated with increased duration of the habit. Also of note is the greater consumption of both alcohol and tobacco by boys than girls at all ages between 12 and 17 years.

The results set out in Table 3 show that whereas current smokers were also likely to drink, the majority of current drinkers were not smokers. The largest proportion of students at every age reported that they had neither smoked nor drunk in the past week; the next largest group reported that they drank but did not smoke. The proportion of students who both smoked and drank rose sharply to the age of 16 years before levelling out in both sexes, whereas the percentage of those who smoked but did not drink peaked at the age of 14 years in both sexes and fell sharply in the older age groups.

Self-referent labels

The results of choices of self-referent labels varied with age and sex, but for brevity the full details are omitted. Over all, 62% of the

12- to 17-year-old boys and 59% of the girls chose the "non-smoker" label, and a further 11% of boys and 10% of girls chose "ex-smoker". Most of the smokers saw themselves as "occasional" (12% of boys, 15% of girls) or "light" (10% boys, 12% girls) smokers and only 4% of both boys and girls saw themselves as "heavy" smokers. Less than 1% of the students chose the "chain-smoker" label; however the interpretation of this figure is doubtful since it has come to our attention subsequently that this term was understood by some children to mean smoking in a chain (that is, passing a cigarette around in a group).

Of those aged 12 to 17 years, only 40% of the boys and 47% of the girls saw themselves as "non-drinkers". "Occasional drinker" was chosen by 28% of both boys and girls; 10% of boys and 7% of girls chose "light drinker", 21% of boys and 18% of girls "party drinker", and 2% of boys and less than 1% of girls chose "heavy drinker". The strongest relationship between age and self-referent label category was for "party drinker". At the age of 12 years, 8% of boys and 4% of girls saw themselves as "party drinkers" but the percentage rose to 35% of boys and 29% of girls at the age of 17 years.

Table 4 presents aggregations by age and sex of all the smoker and drinker categories (that is, "occasional", "light", "heavy" and "chain" smokers, and "occasional", "light", "party" and "heavy" drinkers). For boys and girls the greatest proportions of students who perceived themselves as smokers were found at the ages of 15 and 16 years, while the greatest percentage who perceived themselves as drinkers was found at the age of 17 years.

As expected, the consumption of cigarettes and of alcohol was strongly related to the respective categories of self-referent labels. For instance, 98% of respondents who classified themselves as "non-smokers" or "ex-smokers" had not smoked in the week before the survey, and 91% of "non-drinkers" had not consumed an alcoholic drink. At the other extreme, it was found that 83% of those who chose "heavy" or "chain" smoker labels had smoked more than the median consumption of current smokers (13 cigarettes in the last week), and 74% of "heavy drinkers" had consumed more than the median consumption of current drinkers (three alcoholic drinks in the last week). The consistency between current behaviour and self-referent label is greater for smoking than it is for drinking; the contingency coefficient of correlation was 0.68 for smoking and 0.49 for drinking ($P<0.001$ in both cases).

Smoking intention

Behavioural intention, which is defined as the subjective probability of taking an action, has been shown to be an important determinant of volitional action in general[6] and of smoking behaviour in particular.[7]

TABLE 4: Summed smoker and drinker self-referent labels chosen by secondary schoolchildren according to age and sex

Classification	Sex	Age (years) 12	13	14	15	16	17
Smoker labels*	M	15%	22%	28%	33%	31%	29%
combined	F	12%	24%	36%	40%	40%	34%
Drinker labels†	M	42%	46%	55%	66%	75%	80%
combined	F	23%	36%	52%	65%	74%	78%

*"Occasional", "light", "heavy" or "chain" smoker. †"Occasional", "light", "party" or "heavy" drinker.

TABLE 5: Mean "intention-to-smoke" scores of secondary schoolchildren according to age and sex

Sex	Age (years) 12	13	14	15	16	17
Male	0.9	1.1	1.3	1.4	1.3	1.2
Female	0.9	1.3	1.6	1.7	1.6	1.4
P-value (Student's *t*-test)	NS	0.001	0.001	0.001	0.001	0.001

NS = not significant.

Respondents were asked, "Do you think you will be smoking cigarettes at this time next year?". Their responses were given on a seven-point scale and scored from 0 ("certain not to be smoking") to 6 ("certain to be smoking") with a midpoint value of 3 ("can't decide"). The mean intention-to-smoke scores that are given in Table 5 show that from the age of 13 years onwards, girls had significantly stronger intentions to smoke in a year's time than did boys. However, the mean scores for both boys and girls at each age were below the midpoint value of 3 and therefore indicated that, on the whole, the children believed they were unlikely to be smoking in a year's time.

The mean intention score of current smokers was 3.43 compared with 0.69 for those who had not smoked in the past week ($P<0.001$, Student's *t*-test). This indicates that current smokers thought that in general it was more likely than unlikely that they would be smoking in a year's time, while for those who were not current smokers the reverse was true.

Absenteeism

In an effort to assess the effect of absenteeism upon estimates of prevalence, the proportions of current smokers and current drinkers among those who were present and among those who were absent on the day preceding the test were compared. Of course, this method provides no data on children who were absent on both days but at least it gives information on a sample of absentees. In every comparison of all boys and girls who smoked and drank currently, the prevalence rates were 2%–4% higher among children who were absent on the preceding day. However, it was only in the case of current smoking in boys that the difference (4%) was statistically significant on a chi-squared test ($P<0.01$).

A full account of the methods that were employed, and detailed results of this research are available from the first author.[8]

Discussion

Substantial consumption of tobacco and alcohol by Australian secondary schoolchildren occurs. A separate analysis of a group of "absentees" suggests that to the extent that the estimates for this study are not accurate, they are likely to be slight underestimates for the entire school population (which would include those who were not at school on the date of the survey).

In many respects, the patterns of consumption mirror adult behaviour. Thus, the use of alcohol is more prevalent than is the use of tobacco among children just as it is among adults.[9] As well, there are similarities between adult and late secondary schoolchildren's levels of "current" use of both tobacco and alcohol. At the age of 15 years, when most Australian schoolchildren are old enough to leave school legally, about one-third of students report having smoked in the past week. This is approximately the proportion of Australian adults who smoke although most of these adults smoke daily and more heavily.[10] Nevertheless, it seems clear that by the time children are ready to leave school, the stage is set for the rapid acquisition of adult smoking prevalence and consumption levels. With alcohol, too, it is clear that usage is already high among schoolchildren by the age of 15 years; however, unlike tobacco, the prevalence continues to increase to the age of 17 years when the sample is composed of the more academically inclined students who are still at school. This suggests that the greater social acceptability of drinking alcohol (as compared to smoking) that is found among adults is also to be found among teenagers at school. It is of interest that nearly the same proportion of girls who were aged 15 to 17 years as of adult women in a 1977 survey, drank alcohol in the past week; however, the prevalence of drinking in boys aged 15 to 17 years was much lower than that of adult men.[9]

Up to the age at which children can leave school, our age-specific prevalence and consumption estimates are likely to represent all children reliably; however, the estimates for children who were aged 15, 16 and 17 years apply only to the selected group which remained at school. It seems highly likely that those children who were aged 15 to 17 years and were still at school would smoke and drink less than those who had left school. Current smoking behaviour (that is, weekly) was more common among girls than boys, although there was little difference between the sexes in the proportion of daily smokers. Boys who smoked daily also consumed more cigarettes each week than did girls who smoked daily. These findings suggest that while more girls than boys who are aged 12 to 17 years are using tobacco, the depth of their involvement is not as great. The fact that teen-age girls smoke less than do teen-age boys is also paralleled in adult levels of tobacco consumption. In contrast with smoking, current drinking was generally more common among boys than girls; however, as for smoking, boys who drank currently consumed more alcohol than did girls who drank currently.

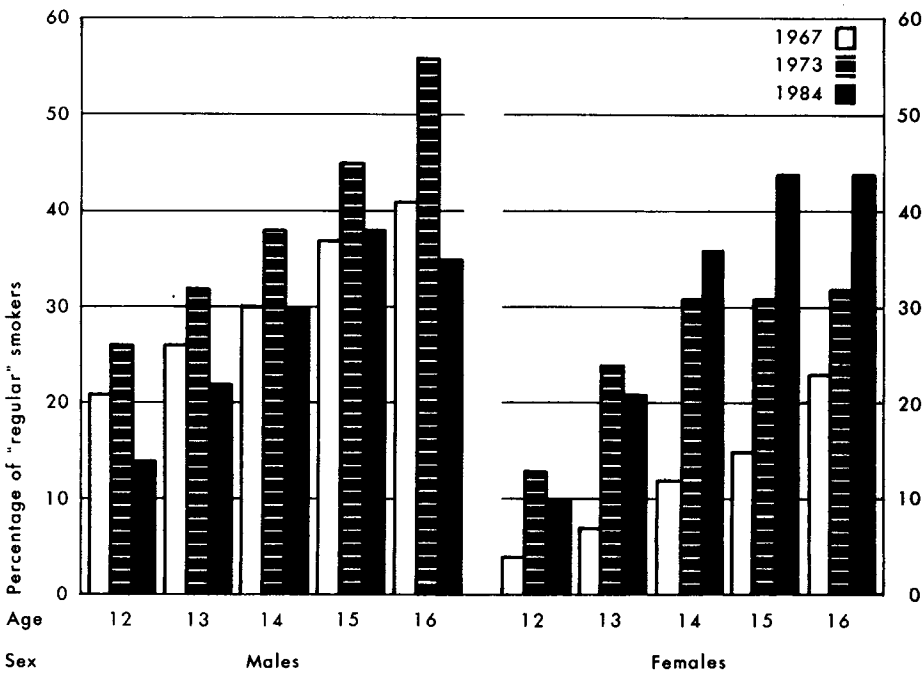

FIGURE 3: Percentage of "regular" smokers among Australian 12- to 16-year-old schoolchildren in 1967, 1973 and 1984.

This is the first national study of schoolchildren that we have undertaken; thus, we have no earlier data that is directly comparable from which to infer trends. However, in both 1967 and 1973 the National Health and Medical Research Council (NHMRC) sponsored large studies of smoking among Australian schoolchildren.[11,12] Although the questions that were asked were not identical, it is possible to collapse categories in our survey data to construct a close approximation to the NHMRC's definition of a "regular smoker", and thereby to facilitate comparisons across time. The NHMRC defined "regular" smokers as those who had smoked more than 10 cigarettes during their lives and who thought of themselves as smokers.

Figure 3 gives the percentages of boys and girls who were so defined "regular" smokers and aged 12 to 16 years in 1967, 1973 and 1984. It shows a striking change in the prevalence of smoking for boys and girls between 1973 and 1984. Whereas the proportions of boys and girls who were regular smokers increased between 1967 and 1973, from 1973 to 1984 regular smoking in boys decreased in every age group while regular smoking in girls continued to increase among those aged 14 to 16 years and fell marginally among 12- to 13-year-old girls in 1984. Perhaps more remarkable than the increase by girls is the decline in prevalence in boys. It may be more fruitful to seek an explanation of this reversal than to speculate on the causes of the increase in prevalence of smoking by girls, since the explanation of the fall in smoking in boys may provide valuable insights into the design of programmes that would initiate or accelerate a similar downward trend among girls. It is unfortunate that since we have no data between 1973 and 1984 we do not know if the girls' prevalence rates had peaked already during this period. Indeed, it is possible that the slightly lower percentage of 12- to 13-year-old girls who smoked regularly in 1984 signifies the beginning of a downward trend in smoking among schoolgirls. Therefore, we consider it a priority to replicate our 1984 survey to determine the current direction of change in smoking prevalence, particularly among schoolgirls.

The expected relationships between choice of self-referent label and behaviour, and intention and behaviour were confirmed. Self-referent label and intention are conceived as variables that mediate psychological determinants of behaviour, on the one hand, and the subsequent expression of observable behaviour on the other. As such, they are important theoretical concepts in their own right but also have practical value for health education practitioners and researchers.

Both measures are useful "diagnostically", that is, they can be used to quantify the size of a health education problem in a population and to identify specific target groups that require remedial action. For instance, children who were shown by the question on their intention to be undecided about smoking in future would be a particularly important and receptive group to reach with educational intervention. The intention scale is also an easy-to-use measure of the immediate effect of educational programmes and could be employed widely by those practitioners who do not have the resources to carry out extensive follow-up studies.

The self-referent label is thought to forecast future behaviour, even before it becomes habitual.[4] Thus, children who are not smoking or drinking or consume trivial amounts but who choose smoker or drinker self-referent labels are at high risk of an escalation in their behavioural involvement with tobacco or alcohol. Therefore, it follows that an appropriate immediate goal of an educational programme could be to change students' self-perceptions. For instance, if students who had chosen a "smoker" label could be taught to see themselves instead as a "non-smoker" or an "ex-smoker", this changed perception of themselves could become instrumental in influencing their subsequent behaviour. As with intention, the self-referent label could be used by health educators in short-term evaluations of the programmes.

What do the prevalence estimates that are provided by this survey mean socially, politically and economically? First, it must be recognized that there are large numbers of schoolchildren who use the two substances that contribute most to the nation's load of drug-related morbidity and mortality. Extrapolations from the results of this survey indicate that over half-a-million Australian schoolchildren have smoked in the past 12 months, nearly 350 000 in the past month and 280 000 in the past week. Just under 100 000 schoolchildren have smoked every day of the past week. The results on the consumption of alcohol indicate that nearly one million schoolchildren had consumed alcohol in the past year, half-a-million children had consumed alcohol in the past month and over 400 000 children had

consumed alcohol in the past week, which includes 8000 schoolchildren who drank alcohol every day of that week. Not only is the sheer number of children who use tobacco and alcohol a concern, but also is the fact that the pattern of use parallels closely that in adults. This suggests the obvious, if unpalatable, truth that children, who are encouraged energetically to do so by cigarette and alcohol advertising, are modelling their smoking and drinking behaviour on the example of adult society.

It was possible to link our detailed information on tobacco consumption and brand that was smoked with known pricing and tax structures to estimate the size of the cigarette market. These estimates of annual cigarette consumption are likely to understate the total market because they do not take into account the effect of absenteeism on the survey results or the possibly higher rates of smoking during the school-holidays. On the basis of 1984 prevalence rates, we estimate that Australian secondary schoolchildren are spending currently at least $30 million annually on cigarettes. Of this amount, $8.5 million is taken in excise by the Federal Government and varying amounts by state governments which have different state tobacco tax provisions.

It is clear from these figures that governments in Australia gain much revenue from children of school age who consume tobacco and they are presumably profiting from teenagers who consume alcohol as well. However, compared with the amount of tax revenue that is collected as a result of schoolchildren who consume these drugs, the amount that governments allocate towards tobacco and alcohol education is relatively small.

Acknowledgements

The idea for this survey came from Dr Nigel Gray, Director of the Anti-Cancer Council of Victoria and it was carried out under the national auspices of the Australian Cancer Society. We are deeply grateful to the state member organizations of the Australian Cancer Society for their generous commitment of funds and of the time of members of staff to this project. Design, pilot testing, coordination and analysis were carried out at the Anti-Cancer Council of Victoria by the authors of this paper, assisted by Ms Judy Rassaby and Miss Isobel Larcombe. Dr Malcolm Rosier at the Australian Council for Educational Research advised on all aspects of sampling. Mr Peter Homel, Dr Bruce Armstrong, Mrs Hilary Alexander, Mrs Deborah Lloyd and Professor Stephen Leeder gave helpful advice on the design of the questionnaire. At the state level, various organizations funded the project and various individuals who worked in them coordinated the field work. These were: Anti-Cancer Council of Victoria (Ms Sharon Willcox); Anti-Cancer Foundation of the Universities of South Australia (Mrs Pamela Grant); Cancer Foundation of Western Australia, WA Alcohol and Drug Authority and Australian Council on Smoking and Health Western Australia (Ms Ruth Shean); NSW State Cancer Council (Ms Ann McClintock); NT Anti-Cancer Foundation (Mrs Lyn Finch); Queensland Cancer Fund and Alcohol and Drug Programs Unit of the Education Department (Mr Rod Ballard); and University of Tasmania (Professor Ian Lewis and Dr P. Lynch). We also thank government and non-government education authorities in all states, and the school principals, teachers and students who cooperated to make this study possible.

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(Received July 1; accepted November 5, 1986)

Guillain-Barré syndrome in Western Australia, 1980-1985

(for editorial comment, see page 122)

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ABSTRACT A clinicoepidemiological study of 109 patients with Guillain-Barré syndrome who were admitted to the four major teaching hospitals in Perth between January 1, 1980 and December 31, 1985 was conducted through the Hospital Morbidity Data System. The annual incidence rate of Guillain-Barré syndrome was 1.35 cases per 100 000 population. The age-adjusted incidence rates were 1.49 cases per 100 000 men and 1.20 cases per 100 000 women. A minor peak in the sex-adjusted incidence rate was present in young adult life with a larger peak in later life. Twenty-two (20%) patients presented in the five-month period from July 1984 to November 1984 ($P<0.05$) but a common infectious agent or geographical area of residence was not discovered during this period. Immune function had been affected potentially before the onset of Guillain-Barré syndrome in 12 (11%) patients, which raises further speculation as to the role of immunological mechanisms in the pathogenesis of Guillain-Barré syndrome. In order to enhance our understanding of this disorder, it is recommended that an assessment of immune function be considered in cases of Guillain-Barré syndrome and also chronic inflammatory demyelinating polyneuropathy.

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(Med J Aust 1987; 146: 130-133)

The Guillain-Barré syndrome is an acute inflammatory polyradiculoneuropathy. It is one of the most common forms of acute polyneuropathy in Australia, yet many major facets of the disease remain imperfectly defined, which include its aetiology, pathogenesis, nosological limits and specific therapy.

Since the original report of Landry in 1859[1] and that of Guillain et al. in 1916,[2] the diagnostic criteria for the Guillain-Barré syndrome have varied. After the occurrence of more than 1000 cases of Guillain-Barré syndrome in the United States in the wake of the mass inoculation programme for swine influenza in late 1976, an ad hoc committee of the US National Institute of Neurological and Communicative Disorders and Stroke determined the current definition and criteria for the diagnosis of Guillain-Barré syndrome,[3] and this was later revised by Asbury in 1981.[4] Hence the validity of comparisons among epidemiological studies remains questionable.

The purpose of this study was to review the clinicoepidemiological features of patients with Guillain-Barré syndrome in Western Australia during the period January 1, 1980 to December 31, 1985 with the more rigid diagnostic criteria[3,4] and to seek a possible relationship with geographical, infectious or immunological factors.

Patients and methods

The epidemiological branch of the Health Department of Western Australia has access to the Hospital Morbidity Data System which is a uniform coding index that records all medical, surgical and pathological diagnoses of patients who are admitted to the four major teaching hospitals in Perth. The case records which contained clinical and laboratory reports of patients who were indexed during the study period January 1, 1980 to December 31, 1985 under the codes "polyneuritis", "polyneuropathy", or "Guillain-Barré syndrome" were reviewed.

Features that were required for the diagnosis of Guillain-Barré syndrome were those that were outlined by Asbury.[4] The medical records were evaluated and the diagnosis of 109 suitable cases had been confirmed in 73% of cases by a neurologist and in 27% by a specialist general physician. All patients were resident in Western Australia at the time of diagnosis. Nine cases were excluded from the study, of whom five had polyradiculopathy that was due to other causes, three had chronic inflammatory demyelinating polyneuropathy and one had an intramedullary