A longitudinal study of smoking in year 7 and 8 students speaking English or a language other than English at home in Sydney, Australia

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Abstract

Objective—To compare the rates and predictors of smoking uptake between adolescents speaking English and those speaking a language other than English (LOTE) at home.

Design—A cross-sectional survey of year 7 and 8 students (aged 12 and 13 years) was conducted in 1994 and repeated 12 months later. A cohort of students was identified with respondents at baseline matched at follow up. χ^2 and logistic regression were used for analysis.

Setting—38 schools in southern, east, and northern Sydney, Australia.

Subjects—Year 7 and 8 students in the schools were included and examined on two occasions, with complete data for 5947 (80%) students at baseline and 6177 (98%) students at a 12-month follow up. Records were able to be matched perfectly for 3513 respondents (59%).

Main outcome measures—Smoking rates and predictors of smoking uptake among students speaking English or a LOTE at home.

Results—At baseline, 6.1% of students surveyed were smokers. Twelve months later, 15.8% of student surveyed were smokers. There were significantly lower smoking rates among students speaking a LOTE at home compared with those speaking English at home at baseline and at 12 months. Using matched data, for students speaking English at home, five variables were significant predictors of smoking uptake: thinking it acceptable to smoke, perceived benefits of smoking, and having a brother, sister, or close friend who smokes. For students speaking a LOTE, the only predictor was the smoking status of close friends.

Conclusions—Despite the higher smoking prevalence among men with a non-English-speaking background, and the reported strong association between fathers' smoking status and smoking onset of their children, adolescents speaking a LOTE at home were significantly less likely to be smokers than their English-speaking counterparts. Thus, there would seem to be a delay of smoking onset among students speaking a LOTE at home. The smoking rates among respondents speaking a LOTE at home in this study are lower than those obtained from the studies conducted in Europe and the United States. Effective smoking prevention interventions need to be implemented at an early stage of adolescence.

Introduction

Considerable evidence suggests that the smoking status of peers, older siblings, parents, and close adults; perceived benefits of smoking; age; and perceived acceptability of smoking are important predictors of smoking uptake among year 7 and 8 students (aged 12 and 13 years).[1–12] Ethnicity has sometimes been found to be positively associated with smoking but not consistently.[13–17]

In Australia, although cross-sectional correlates of smoking have been examined, research studies examining predictors of smoking and smoking status among early and late adolescents using a cohort design are not available. Studies targeting adolescents speaking a language other than English (LOTE) at home are also needed because of the high prevalence of smoking among some migrant groups and the positive association between parental smoking status and adolescent smoking. In Sydney at the 1991 census, about 25% of the total population spoke a language other than English at home.[18] The smoking prevalence among Australians speaking a LOTE at home was 31.5% for men aged 20–69, which was higher than the overall prevalence among Australian men of the same age (27.0%).[19] The high smoking rates among Australians speaking a LOTE is principally due to the high smoking rates in the larger ethnic groups. Of the 66 language groups tabulated by the Australian Bureau of Statistics, those who speak Chinese (14.2%), Arabic including Lebanese (14.2%), Italian (11.5%), Greek (11.2%), and Vietnamese (5.1%) accounted for about 57% of those speaking a LOTE at home. As revealed through ethnic-specific prevalence studies within defined geographical areas, the smoking rates among men in these major ethnic groups are higher than the total Australian prevalence in men, with 53% for Vietnamese, 44% for Greek, 43% for Arabic, 33% for Italians, and 26% for Chinese.[20–24]

Despite the higher smoking prevalence among adults with a non-English speaking background and the previously reported strong

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Table 1 Participating and non-participating schools by type of school

	Government		Non-government		Total	
	Participant n	Non-participant n	Participant n	Non-participant n	n	%
South Eastern Sydney	22	11	9	26	68	79
North Sydney*†	7	11	NA	NA	18	21
Total	29	22	9	26	86	100

*One school dropped out from the follow-up survey.
†Only Government schools located within the beachside suburbs were invited because of the need to approximate the socioeconomic student profile of the schools included in the intervention group.
NA = not applicable.

positive association between fathers' smoking status and onset of smoking among adolescents as reported in many studies, Tang and colleagues[25] found that adolescents speaking a language other than English at home were significantly less likely to be smokers than students speaking English at home in a cross-sectional study conducted in Sydney. However, Nutbeam and colleagues[26] found that, apart from Israel and Sweden, the smoking rates of students aged 11 and 13 years in many non-English-speaking European countries were much higher than in the English-speaking countries. Research in the United States also revealed that there were high smoking rates among adolescents in some minority populations.[27 28]

Using longitudinal data from a sample of adolescents in Sydney, this study aims to compare the rates and predictors of smoking between adolescents speaking English and a language other than English at home, and to highlight the implications of these findings for the development of effective preventive interventions.

Methods
Data for this study were collected as baseline and at follow up 12 months later for the "Kick-butts" smoking prevention programme. The programme aims to reduce smoking uptake among year 7 and 8 high-school students through a combination of school-based strategies, parental support, and supply-reduction strategies. Respondents at baseline were students in years 7 and 8 (approximately 12 and 13 years old) in 38 schools in the South Eastern and Northern Sydney Area Health Services, two area health services with generally similar socioeconomic profiles.

SELECTION OF SCHOOLS
Eighty-six schools were invited to participate and 38 schools (44.2%) agreed to take part in the baseline study. To participate in the study, schools were asked to assign a teacher to deliver a designated school-based smoking prevention package for their year 7 and 8 students. The main reason for non-participation was the practical difficulties the schools faced in implementing the intervention. There appear to be no other factors that might have biased the selection. Although the school participation rate was much lower than that of the 1992 statewide survey in New South Wales (NSW), the ratio between government

and non-government schools in this sample was the same as that of the statewide survey.[29] Of the 38 participating schools, one school dropped out from the follow-up study. A profile of the participating and non-participating schools is given in table 1.

RESPONSE RATE OF STUDENTS
Of students enrolled in years 7 and 8 in the study schools (n = 8598), baseline data were collected from 7394 (86%). Absentees accounted for about 6% of eligible students. Non-participants accounted for the remaining 8% of students. The response rate was again similar to that of the 1992 New South Wales statewide survey in which respondents comprised 89% of those eligible to participate. Complete data were available from 5947 respondents (80%). At 12 months, there were 6296 responses from a total of 7321 students, of which 6177 (98% of respondents) had complete data. Records were able to be matched perfectly for 3513 respondents (59% of the baseline sample) using respondent-generated identity codes. No attempt was made to classify absentee students at baseline or follow up.

INSTRUMENT
Identical baseline and follow-up questionnaires consisted of 42 items concerning self-reported cigarette smoking behaviour, peer and family smoking behaviour, perceptions of the benefits of smoking (a four-point scale), language spoken at home, and demographic data. Most questions used were single items drawn from the NSW Drug and Alcohol Directorate's 1989 survey of drug use by NSW secondary students.[30]

Smoking status of students was assessed by asking students to indicate whether they were regular smokers (at least one cigarette a day), occasional smokers (smoked once or twice only, smoked occasionally in the past, occasionally now but not regularly), ex-smokers (smoked regularly in the past), or never-smokers. Students were also asked to indicate the smoking status of their family members, close friends and other adults who were close to them.

The assessment of perceived benefits of smoking consisted of four questions. Respondents were asked to indicate on a four-point scale (strongly agree, agree, disagree, or strongly disagree) their agreement with the following statements: smoking helps people keep thin, smokers are usually more popular than non-smokers, people who smoke are usually more mature than non-smokers, and smokers usually look better than non-smokers.

Language spoken at home was assessed by the question "What language do you speak at home?". Respondents who spoke a LOTE were then asked to specify the language. Responses were coded as English or a LOTE.

Additional questions developed by the research team asked whether respondents thought it acceptable for people their own age to be smoking cigarettes and whether parents had discussed smoking with them. Parental discussions with children consisted of two

Table 2 Percentage of students smoking in years 7 and 8, 12 months later, and a sub-sample of these students with matched data

	n	Overall %	ES %	LOTE %	χ^2	p
1994 survey	5947	6.1	7.1	3.0	32.4	<0.001
1995 survey	6177	15.8	17.2	11.0	29.6	<0.001
1994 subsample (matched data)	3513	4.6	5.6	0.8	30.3	<0.001
1995 subsample (matched data)	3513	12.1	13.4	7.3	23.8	<0.001

ES = English speaking; LOTE = language other than English.

questions. Students were asked whether their mother or father talked to them about how to say "no" to other people offering them cigarettes and whether their mother or father discussed smoking with them within 12 months before the interview. The questionnaire was piloted among approximately 100 year 7 and 8 students from schools that declined to participate in the programme.

QUESTIONNAIRE ADMINISTRATION
Baseline data were collected consecutively as schools were recruited. Students were invited to fill in a baseline questionnaire in either term 1 or 2 in 1994, and another identical questionnaire again in term 2 in the 1995 follow-up study. Administration of the questionnaire was carried out by project officers and a strict protocol was followed. The need for silence and no discussion of questions with peers was emphasised. Where the school felt it necessary for discipline, a teacher was also on hand. The teacher was asked to remain in the front or at the back of the school hall or classroom. The project officer described the purpose of the survey to the students, gave standardised instructions for completing the questionnaire, and emphasised the confidentiality and anonymity of responses. These procedures were based on the Department of Community Services guidelines for comparability of drug use surveys.[31]

CODING AND COHORT IDENTIFICATION
Questionnaires were coded by university students and clerical assistants under the supervision of a project officer in accordance with the coding specifications. Coding was then audited by three project officers before being entered by a data processing firm, which entered and rechecked all entries with an accuracy rate of 99.95%. Data were coded and entered in different data sets.

Although data were collected in two independent cross-sectional surveys, a cohort was determined by matching baseline and follow-up records using unique and anonymous respondent-generated identification codes: name code; year of study; and gender. The name code consisted of four letters, beginning with the first letter of the student's given name, followed by the first three letters of his or her family name. To this alpha-numeric string was added a three-digit school identification code. Records with perfect matches and no duplications were included in the longitudinal analysis.

DATA ANALYSIS
The dependent variable, smoking status, was dichotomised into "current smoker" and "non-smoker", with "current smoker" including regular smokers of one or more cigarettes a day and those who smoked "occasionally now but not regularly". The primary independent variable was whether English or a language other than English was spoken at home. Additional independent variables were selected according to social learning theory, which posits that an individual's susceptibility to perform a particular behaviour is influenced by three types of factors that interact with each other in complex ways—personal, environmental, and behavioural influences.[10] The four items concerning perceived benefits of smoking were totalled to yield an aggregate score. Cronbach's α for the four items in the scale at baseline was 0.69. Frequencies and cross-tabulations of variables were computed to estimate the rates of smoking for the total samples at baseline and at 12 months, and at 12 months for the cohort with complete data at both time points. Using data for baseline non-smokers, simultaneous logistic regression was used to calculate the odds of becoming a smoker. Predictors of smoking were baseline values of language use and social-environmental variables. Records with missing data for the dependent and independent variables were excluded from the logistic regression analysis.

Results
At baseline, 6.1% of the sample were smoking. Twelve months later 15.8% of the sample were smoking. The proportion of students smoking at follow up in the matched cohort was 12.1%. Students speaking English at home were consistently more likely to be smokers than students speaking a language other than English at home (table 2). Three quarters of the students (73.5%) spoke English at home. The most frequently spoken LOTE at home was Arabic (7.7%), followed by Chinese (3.9%), Greek (2.7%), and Macedonian (1.5%). The remaining students spoke at least one of 47 other languages. The population of students speaking a LOTE was similar in the cohort and cross-sectional samples. The proportion of males was slightly lower (51%) in the cohort than in the cross-sectional sample (55%). There were only 23 smoking students who spoke Arabic, Chinese, Greek, Italian, or Vietnamese in the cross-sectional study.

Among the students in the cohort, the prevalence of smoking among girls and boys was similar, with girls slightly more likely to be smokers than boys at baseline and follow up, whether speaking English or another language at home. At baseline, 5.8% of English-speaking girls were smokers compared with 5.3% of boys, and at follow up 13.8% of English-speaking girls were smokers compared with 12.9% of boys. At baseline, 1.0% of girls speaking a language other than English were smokers compared with 0.6% of boys. At follow up 7.9% of girls speaking a language other than English were smokers compared with 6.5% of boys.

Fathers speaking a language other than English at home were significantly more likely to be smokers (37.7%) than fathers speaking English

Table 3 Language use and social environmental predictors of smoking status among baseline non-smokers between years 7–8 and years 8–9 among Sydney students (n = 3353)

Variables	%	Odds ratio	95% CI
Year 7	52.7	1.00	
Year 8	47.3	1.17	0.92–1.51
Female	48.7	1.00	
Male	51.3	1.04	0.81–1.32
Think not acceptable to smoke	10.6	1.00	
Think acceptable to smoke	89.4	1.81	1.32–2.49
Perceived benefits of smoking	*	1.12	1.06–1.19
Parents not discussed smoking	36.4	1.00	
Parents discuss smoking with student	63.6	1.18	0.92–1.53
Father does not smoke	74.2	1.00	
Father smokes	25.8	0.94	0.70–1.26
Mother does not smoke	81.4	1.00	
Mother smokes	18.6	0.93	0.67–1.28
Brother does not smoke	92.6	1.00	
Brother(s) smokes	7.4	1.73	1.19–2.52
Sister does not smoke	93.8	1.00	
Sister(s) smokes	6.2	1.73	1.10–2.57
Close friends do not smoke	70.4	1.00	
Close friend(s) smokes	29.6	2.32	1.80–3.00
Other close adults do not smoke	44.2	1.00	
Other close adult(s) smokes	55.8	1.18	0.92–1.52
Speaks language other than English at home	21.9	1.00	
Speaks English at home	78.1	1.42	1.01–1.99

*Continuous variable.
CI = confidence interval.

Table 4 Social environmental predictors of smoking status by language use among a cohort of years 7 and 8 Sydney students (3352)

	LOTE (n=734)		ES (n=2618)	
Variables	OR	95% CI	OR	95% CI
Year 7		1.00		
Year 8	1.42	0.75–2.71	1.13	0.86–1.48
Female		1.00		
Male	1.19	0.64–2.21	1.01	0.78–1.32
Think not acceptable to smoke		1.00		
Think acceptable to smoke	1.14	0.38–3.45	1.92	1.38–2.69
Perceived benefits of smoking	1.13	0.98–1.31	1.12	1.05–1.20
Parents not discussed smoking		1.00		
Parents discuss smoking with student	1.24	0.64–2.45	1.17	0.89–1.55
Father does not smoke		1.00		
Father smokes	1.45	0.76–2.77	0.82	0.59–1.15
Mother does not smoke		1.00		
Mother smokes	1.17	0.54–2.54	0.89	0.62–1.26
Brother does not smoke		1.00		
Brother(s) smokes	1.93	0.20–5.05	1.77	1.18–2.67
Sister does not smoke		1.00		
Sister(s) smokes	1.36	0.40–4.65	1.78	1.17–2.70
Close friends do not smoke		1.00		
Close friend(s) smokes	2.17	1.09–4.29	2.35	1.78–3.12
Other close adults do not smoke		1.00		
Other close adult(s) smokes	0.76	0.47–1.67	1.26	0.95–1.66

ES = English speaking ; LOTE = language other than English; OR = odds ratio; CI = confidence interval.

at home (23.2%) (χ^2 = 63.1, p<0.001), although there was no significant difference between mothers by language spoken at home, with 19.6% of English-speaking mothers smoking compared with 18.4% of mothers speaking a language other than English at home. Students at baseline and follow up were more likely to be smokers if a parent smoked, especially the mother. If a mother speaking English at home smoked at baseline, 17.6% of students were smokers at follow up compared with 12.3% if the mother was a non-smoker (χ^2 = 10.6, p<0.001), and 16.3% of students were smokers if the father smoked compared with 12.5% if the father was a non-smoker (χ^2 = 6.0, p = 0.014). If a mother speaking a language other than English at home was a smoker, 11.9% of students were smokers compared with 6.2% if the mother was a non-smoker (χ^2 = 5.3, p = 0.021), and 9.5% of students were smokers if the father smoked

compared with 5.9% if the father was a non-smoker (χ^2 = 3.5, p = 0.061).

There was a significant increase in the prevalence of smoking in children if one parent smoked (13.3%) or both parents smoked (17.2%) compared with neither parent smoking (10.8%) (Mantel-Haenszel χ^2 = 14.3, p = 0.001). This trend was consistent for children speaking a language other than English at home (Mantel-Haenszel χ^2 = 12.1, p = 0.001) or English (Mantel-Haenszel χ^2 = 6.5, p = 0.011) but did not remain an independent predictor of smoking after adjustment for other variables in multivariate analyses.

Using only the data which was able to be matched perfectly at baseline and follow up (n = 3513), 160 (4.6%) students smoked and 3353 (95.5%) were non-smokers at baseline. Of baseline non-smokers, 308 (9.2%) were smokers one year later. When these new smokers were compared with never-smokers (3045), six variables proved to be significant independent predictors of smoking status (table 3). These variables were thinking it acceptable to smoke; perceiving there to be benefits of smoking; having a brother, sister, or close friend who smokes; and speaking English at home. The strongest predictor of smoking was having a close friend(s) who smokes.

Language spoken at home was independently and significantly associated with smoking using cross-sectional data at baseline (OR = 1.47; 95% confidence interval (CI) = 1.02 to 2.11) and at follow up (OR = 1.27; 95% CI = 1.00 to 1.61), although the strength of this association was weaker at follow up.

As revealed in table 4, logistic regression analysis identified five significant variables associated with smoking status after adjusting for all variables in the model for students speaking English at home, but only one was identified for students speaking a language other than English at home.

Discussion

The proportion of students smoking at baseline had doubled at follow up. Language spoken at home emerged as an independent predictor of smoking status 12 months later after adjusting for other social environment variables. The lower smoking prevalence among respondents speaking a LOTE at home was unexpected given the higher male smoking prevalence among the major non-English-speaking migrant population, the strong positive association between fathers' smoking status and smoking onset of their children, and high rates of adolescent smoking demonstrated previously in many European countries[26] and some minority populations in the United States.[27 28] However, findings of this study support the argument of Conrad and colleagues[7] that parental smoking behaviour plays a much less consistently important role in predicting onset among adolescents, and that one parent may have influence and not the other, as revealed in the bivariate analyses between parental smoking status and student smoking prevalence.

The lower smoking rate in students speaking a language other than English at home may be due to three reasons. First, these adolescents may be responding to strong parental control in which parents take a strict stance against smoking regardless of their own actual smoking behaviour. In a separate but related analysis yet to be published, we found that mothers of students speaking English at home were less likely to have enforced strict rules about not smoking (χ^2 = 11.2, p = 0.001) than mothers of those respondents speaking a language other than English at home. (Maternal action data from the same project were analysed separately to examine this question.) Literature is available that shows that strictness of parents leads to a lower prevalence of cigarette uptake among adolescents, regardless of parents' own smoking behaviour.[9 13] The low smoking rates among students speaking a LOTE despite parental smoking, may be consistent with data from black American families, where adults, even those who smoke, have significant more negative views on cigarette smoking than white Americans.[32]

Second, students speaking a language other than English at home may also socialise with peers of their own language group, all of whom may have a strong family restriction on adolescent smoking. More importantly, findings of this study reveal that close friends' smoking status was the only predictor of smoking onset among students speaking a language other than English. It is possible that students speaking a language other than English at home smoke less because they have fewer close friends who are smokers, compared with their counterparts speaking English at home.

A third explanation for the lower smoking rates among students speaking a LOTE may be that they have not yet been targeted specifically by the advertising campaigns of the tobacco industry as has been the case for young women over the past 10 years in Australia.

Despite the relatively lower smoking rate among students speaking a language other than English at home, compared with the students speaking English at home, there was a relatively greater increase in uptake among students speaking a language other than English at home using either the matched or unmatched data. The lower prevalence among students speaking a LOTE at home may reflect a temporary response to strong parental control in which parents take a rigid stance against smoking regardless of their actual smoking behaviour: "Do as I say, not as I do." Once these students become older, parental supervision is less effective. As reported by Quine and Stephenson,[32] parental influence will likely be especially strong in pre-adolescents. Klesges and Robinson[33] also reported that the negative views on cigarette smoking held by African American parents may be temporarily effective in delaying the uptake of cigarette smoking in their children, but not in preventing it. This phenomenon might explain the Israeli experience, in which smoking rates among Israeli teenagers increase most markedly at 18 years of age when they are required to join the army where smoking is common among their peers (personal communication with Professor Don Nutbeam, 1988).

As the data collection was in English, it was not known whether the rates of smoking were under-reported for two reasons. It is not known if English proficiency of students having a non-English-speaking background influenced their responses. In addition, the validity and reliability of self-reported smoking behaviour in these students is not known.

The moderate matching of students in the cohort meant some differences between the cohort and the cross-sectional samples. Fewer males in the cohort group may have reduced their smoking rate but the overall proportion of students speaking a LOTE was similar in the cohort and cross-sectional samples.

Findings of the baseline, follow up, and cohort study also revealed that a strong positive association exists between adolescent tobacco use and thinking that it is acceptable to smoke. The baseline 1994 survey and follow-up 1995 survey show that thinking smoking was acceptable was associated with a 5–7-fold increase in actual smoking, although the cross-sectional design does not allow a conclusion as whether the relationship was causal. We had suspected that this belief could be a rationalisation among respondents of this study of their smoking behaviour. However, findings from table 3 reveal that this belief was not merely a rationalisation of their smoking but a significant causal factor contributing to smoking uptake among adolescents.

Consistent with theoretical expectations,[4 6–8] findings of this study, as shown in table 3, also revealed that the smoking status of peer and siblings, and perceived benefits of smoking, were antecedent predictors of smoking onset among adolescents.

It is important to note that, as shown in table 4, only one predictor of smoking uptake was identified among students speaking a language other than English at home. Reasons for this may include smaller numbers and hence reduced statistical power, and the necessity to aggregate data for all non-English-speaking groups. There may be other aetiological variables for smoking uptake among these students that need to be identified in future Australian studies. Parents' rules and attitudes towards adolescent smoking have been found to significantly influence the uptake of smoking in migrant groups.[13 14 28 34]

A limitation of this study relates to the small numbers of students from specific ethnic backgrounds and the need to aggregate data by whether students speak English or some other language at home. As the number of smoking students speaking either Chinese, Arabic, Italian, Greek, and Vietnamese was very small, the assessment of rates and factors of cigarette smoking among specific ethnic communities was not feasible. However, this aggregation did not mask the low adolescent smoking rates of student speaking a LOTE. As a result of this study, the smoking rates among students speaking a LOTE in the 1986, 1989, and 1992 New South Wales Statewide Surveys were

examined and the low smoking rates among students speaking a LOTE in this study have been confirmed (Chen et al, unpublished observations).

IMPLICATIONS FOR PRACTICE

The understanding of changes in predictors of smoking uptake and smoking status of the respondents of this study is useful for the development of effective interventions in the reduction of smoking rates among adolescents. The messages that smoking is not acceptable and that there are no benefits of smoking must be passed onto adolescents clearly, strongly, and appropriately. Role modelling by close friends and possibly siblings would seem to be more important than that by parents. Regardless of their smoking status, parents need to adopt strict rules about not smoking. Parental disapproval of smoking in the forms of feeling upset, threatening to punish, and warning never to smoke may lead to a lower prevalence of cigarette uptake among adolescents.[9] However, strict parental supervision may be a double-edged sword and may lead to a sharp increase in smoking onset among adolescents at a later stage. Therefore, parents may need to adopt an alternative approach which involves discussion and sharing opinions when their children become older.

To prevent smoking uptake among adolescents, it would seem important to develop early and effective interventions. A comprehensive approach which aims to develop personal skills and knowledge of adolescents on the one hand and to provide a supportive environment on the other is recommended.[26] While prevention may be the best strategy (in terms of value for money) to reduce the onset of cigarette smoking, it is also important to consider effective cessation programmes for adolescents.[35] Prevention programmes may not help adolescents who have already begun to smoke.

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