

# Cigarette smoking among secondary schoolchildren in 1975

## Prevalence of respiratory symptoms, knowledge of health hazards, and attitudes to smoking and health

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**SUMMARY** A questionnaire relating to smoking habits, respiratory symptoms, and health attitudes was administered to 10 498 secondary schoolchildren in 1975. The results reported in this paper indicate that children who smoke regularly have a higher prevalence of upper respiratory tract infections and a higher incidence of the respiratory symptoms, cough, phlegm production with a cold, and shortness of breath, compared with non-smokers. Children are aware of the risks of lung cancer when smoking, but less aware of the other more immediate health risks, and this is particularly so in the younger age groups. It is suggested that health education should be directed towards younger children and that more use should be made of the fact that smoking clearly makes them less healthy.

Despite the existence of more information concerning the health risks associated with regular smoking since the publication of the reports by the Royal College of Physicians (1962, 1971), the number of schoolchildren starting to smoke would appear to have been little affected. One reason for the morbidity statistics, and related health education, having such a small effect on teenagers may be that the figures quoted nearly always relate to adults and to lung cancer in particular. It should not be surprising that the health and illness of people two or three times their own age appear irrelevant to young people and although the decision to take up smoking is multifactorial (Bewley *et al.*, 1973a), it is possible that children would be more influenced by the health risks if it were demonstrated that smoking could impair the health of people within their own age group.

A relationship between smoking and chest symptoms in primary and secondary schoolchildren has already been demonstrated by Bewley *et al.* (1973b), and Holland and Elliott (1968b). We have further investigated this relationship by means of a self-administered questionnaire and attempted to discover how the children's smoking habits and health have affected their attitudes to issues concerning smoking, and their knowledge of the risks associated with smoking.

### Method

A detailed survey relating to smoking habits, respiratory symptoms, and health attitudes has been carried out at secondary schools in the outer London borough of Hounslow.

There are about 15 200 children at 15 secondary schools. Two schools (1700 children) were not included in the survey; one had taken part in a pilot study and the other did not take part because of administrative difficulties. Details of the project were circulated to children's parents who were given the opportunity of seeing the questionnaire and of withdrawing their child from the study. The questionnaire was administered during March 1975 on one of two consecutive days. It was answered anonymously under the supervision of form teachers who had previously had discussions with the research team. On completion of the questionnaire each child sealed his own response in a plain envelope to ensure confidentiality and the envelopes were collected by the research team on the same day. Each questionnaire was finally scrutinised to ensure that it had been completed satisfactorily and could be transcribed to punch cards for computer analysis. This was carried out on a CDC 6600 computer at the University of London Computer Centre using a statistical

package for the social sciences (Nie *et al.*, 1975).

### Statistics

Statistical analyses were performed using either a binomial expansion to calculate the SE of the difference from proportionate results or a  $\chi^2$  test, with age correction if appropriate, when group data were being analysed. Chi-squared values with more than one degree of freedom were partitioned according to the method described by Maxwell (1961). The level of significance has been taken as  $P < 0.05$ .

### Results

Children were asked to place themselves into one of the following seven categories:

- (a) I have never smoked a cigarette;
- (b) I have tried a cigarette once;
- (c) I smoke occasionally but not as much as one a week;
- (d) I used to smoke but I don't at all now;
- (e) I usually smoke between one and six cigarettes a week;
- (f) I usually smoke at least seven cigarettes a week but less than 40;
- (g) I usually smoke more than 40 cigarettes a week.

To enable comparison to be made with other studies, these seven categories were initially reduced to four.

- (1) Non-smoker (*a*);
- (2) Experimental smoker (*b* and *c*);
- (3) Ex-smoker (*d*);
- (4) Regular smoker (*e*, *f*, and *g*).

The number of children in these four categories (by age and sex) is shown in Table 1.

For the three areas of study sought for this paper: (*a*) the prevalence of respiratory symptoms, (*b*) the knowledge of health hazards arising from smoking, and (*c*) attitudes to smoking, the experimental and ex-smoking groups were combined.

### RESPIRATORY SYMPTOMS

The response to a question asking the children to indicate the most appropriate of the following statements:

I hardly ever cough

I cough a little on most days

I cough a little every day

showed that 74.8% pupils (74% boys and 75% girls) coughed a little on some days, 18.4% (19% boys and 17.7% girls) coughed a little on most days, and 6.2% (6.5% boys and 6% girls) coughed a little every day. An analysis of the symptoms of cough according to smoking habits is shown in Table 2. It can be seen that the incidence of frequent coughing is significantly higher in regular smokers, both boys and girls, than in either of the non-smoking or 'experimental' smoking groups. There was no significant difference between these two last groups, nor was there any significant difference between the boys' and girls' answers. In Table 3,

Table 1 *Distribution of children between the four groups (non-smokers, experimental smokers, ex-smokers, and regular smokers) according to age and sex*

Age (years)	All children (no.)		Percentage of children							
			Non-smokers		Experimental smokers		Ex-smokers		Regular smokers	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
11	569	481	48	63	34	24	12	7	5	3
12	1102	1063	40	53	34	30	17	11	8	5
13	1080	961	33	42	35	31	16	15	15	11
14	1033	856	27	35	35	31	18	13	19	20
15	849	672	30	31	29	30	14	14	26	23
16	556	513	32	27	32	37	12	12	24	22
17	230	176	38	47	34	34	7	8	20	10

Table 2 *Prevalence of cough by smoking habit in boys and girls*

Children	All children (no.)		Percentage of children who cough					
			Hardly ever		A little on most days		A little every day	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
Non-smokers	1922	2034	77.2	78.7	17.8	16.3	4.6	4.6
Experimental smokers	2708	2081	77.4	78.7	16.9	16.1	5.2	4.9
Regular smokers	912	640	58.2**	59.7**	26.6*	24.8*	14.7*	14.6*

\*\* Significantly less ( $P < 0.05$ ) than either non-smokers or experimental smokers.

\* Significantly greater ( $P < 0.05$ ) than either non-smokers or experimental smokers.

the prevalence of those children who cough a little on most days and those who cough a little every day is shown in relation to age and smoking habit. It can be seen that the incidence of cough tends to be higher among the smokers at all ages, but interestingly the younger children reported a higher incidence of cough than the other children within most of the smoking groups.

Further questions were:

Do you often suffer from a cold?

When suffering from a cold, do you normally cough up phlegm (spit)?

Do you get short of breath when hurrying on level ground or walking up a slight hill?

The responses to these questions, analysed in terms of smoking habit and sex, are shown in Table 4.

There was a significantly higher incidence of all symptoms in the group of children who regularly smoked, particularly in the response to the question concerning phlegm production during a respiratory tract infection. There was no difference between the non-smokers and 'experimental' smokers for the incidence of colds and the symptom of dyspnoea, but there was a significant difference for the symptoms of phlegm. A breakdown of these results in respect of age for those giving a positive response is shown in Table 5. As with the age breakdown for cough symptoms, it can be seen that the younger children, particularly those who were regular smokers, tended to show a higher incidence of symptoms than the older children, although the results did not reach statistical significance except in the case of dyspnoea.

Table 3 Prevalence of children who cough by age and smoking habit

Category	Total no.			Percentage of children who cough a little					
				Most days			Every day		
	11 years	13 years	15 years	11 years	13 years	15 years	11 years	13 years	15 years
Non-smokers	575	761	470	26.4†	16.7	13.4	7.3†	4.2	4.7
Experimental smokers	309	676	449	20.5	17.3	11.3‡	7.0†	4.7	3.5
Regular smokers	41	270	379	24.3	25.9*	27.4*	29.2†*	17.8*	13.4*

\* Significantly different from non-smokers and experimental smokers in same age group ( $P < 0.05$ ).

† Significantly different from 13 and 15-year-old children in same group ( $P < 0.05$ ).

‡ Significantly different from 11 and 13-year-old children in same group ( $P < 0.05$ ).

Table 4 Prevalence of 'frequent' colds, cough, and effort dyspnoea by smoking habit

Children	Percentage often suffering from cold		Percentage with phlegm production with cold		Percentage short of breath on exertion	
	Boys	Girls	Boys	Girls	Boys	Girls
Non-smokers	32.5	34.4	26.1	19.7	13.9	21.7
Experimental smokers	33.2	37.3	33.5**	27.0**	15.3	22.7
Regular smokers	39.5*	46.4*	55.0*	42.7*	25.3*	44.7*

\* Significantly greater ( $P < 0.05$ ) than both non-smokers and experimental smokers.

\*\* Significantly greater ( $P < 0.05$ ) than non-smokers.

Total numbers as in Table 2.

Table 5 Proportion reported with 'frequent colds', cough and effort dyspnoea, by age and smoking habit

Category	Percentage often suffering from cold			Percentage with phlegm production with cold			Percentage short of breath on exertion		
	11 years	13 years	15 years	11 years	13 years	15 years	11 years	13 years	15 years
Non-smokers	36.0	32.3	34.3	22.8	25.3	24.5	26.3†	15.6	13.4
Experimental smokers	42.2*	36.1	36.3	32.3*	31.2*	29.6	26.5†	18.1	16.3
Regular smokers	51.1*	50.4**	39.8‡	56.1**	49.6**	53.6**	46.3**	38.1**	34.0*

\* Significantly different from non-smokers in same age group ( $P < 0.05$ ).

\*\* Significantly different from non-smokers and experimental smokers in same age group ( $P < 0.05$ ).

† Significantly different from 13- and 15-year-old children in same group ( $P < 0.05$ ).

‡ Significantly different from 11- and 13-year-old children in same group ( $P < 0.05$ ).

Total numbers as in Table 3.

A further question was asked to estimate how much time children had spent absent from school for sickness during the previous year. They were asked to indicate one of the following categories:

- No time off;
- About one week;
- Between one week and one month;
- More than one month;
- Don't know.

When we examined the replies according to smoking category, it was seen that 21.7% of children who did not smoke thought they had spent no time away from school because of sickness, in comparison with 16.9% of 'experimental' smokers ( $P < 0.05$ ) and 9.7% of regular smokers ( $P < 0.05$ ). On the other hand, 12.6% of regular smokers had spent more than a month off sick, compared with 5.3% of 'experimental' smokers ( $P < 0.05$ ) and 4.3% of non-smokers ( $P < 0.05$ ).

#### HEALTH HAZARDS

Pupils were asked to indicate, from a list of diseases, those which they considered could be caused by smoking. The list consisted of the following conditions: appendicitis, chestiness (wheezing), heart disease, stroke, lung cancer, deafness, and bronchitis. 'Appendicitis' and 'deafness' were included in an attempt to prevent children ticking every condition indiscriminately; in fact only 0.9% of them ticked everything. Altogether 97.7% of pupils thought that smoking could cause lung cancer, 77.0% chestiness (wheezing), 61.2% bronchitis, 42.7% heart disease, 13.0% stroke, 3.3% appendicitis, and 3% deafness. The analysis of response in terms of smoking habit for the four items most relevant to smoking plus one other listed item—deafness, is shown in Table 6. It can be seen that there was little difference between the groups, but non-smokers appeared to be more aware of the risks of heart disease while girls who smoked were more aware of the relationship with bronchitis. When the results are looked at in terms of age, there was an

equally high degree of knowledge about lung cancer over the age range. Knowledge about other major conditions related to smoking however increased with age; thus 66.2% of 11-year-old, 76.3% of 13-year-old, and 85% of 15-year-old children considered chestiness (wheezing) to be caused by smoking; these differences are significant ( $P < 0.05$ ). Thirty-eight per cent of 11-year-old children associated smoking with bronchitis and heart disease, and this figure increased to 47% for heart disease and to 72% for bronchitis at the age of 15; both increases are again significant ( $P < 0.05$ ).

#### OPINIONS ABOUT SOME ISSUES RELATING TO SMOKING

In the final question of the questionnaire a series of statements were presented, and the children were asked to indicate in the appropriate box their agreement, disagreement, or 'indifference' to each statement. The replies to a few of these statements which are particularly relevant to health are presented in Table 7.

As one might predict, non-smokers predominantly agreed that 'smoking is a dirty habit' (81.6%,  $P < 0.05$ ) and to a lesser extent that 'cigarettes should be made more expensive' (61%,  $P < 0.05$ ) while smokers believed that 'smoking can help people when they feel nervous or embarrassed' (75%,  $P < 0.05$ ). There was a more uniform response to the statements 'smoking is only bad when you smoke a lot' and 'plain cigarettes are worse than filter tips', but the older smokers particularly appeared to be well-informed. The statements relating directly to health education in schools again showed fairly uniform response with a low degree of agreement, but the older children and particularly the smokers appeared to be more doubtful about its value ( $P < 0.05$ ).

#### Discussion

Within our study population, we found that an overall 14.9% of secondary schoolchildren were

Table 6 *Proportion reported knowledge that smoking causes the following diseases*

Children	Sex	Lung cancer (%)	Heart disease (%)	Bronchitis (%)	Wheeziness (%)	Deafness (%)
Non-smoker	Boys	87.0	46.1	56.8	73.4	3.9
	Girls	88.8	42.1	57.4	75.5	2.8
Experimental smoker	Boys	84.4	39.6*	60.9	74.8	4.3
	Girls	87.9	35.0*	65.3*	81.8*	1.7*
Regular smoker	Boys	83.7	38.0*	61.0	76.2	3.1
	Girls	86.2	39.6*	74.3**	84.4*	1.5*

\* Significantly different from non-smokers.

\*\* Significantly different from non-smokers and experimental smokers.

Total number as in Table 2.

Table 7 Proportion reported personal reaction to smoking

	Age (years)	Non-smokers (%)	Experimental smokers (%)	Regular smokers (%)
Smoking can help people when they feel nervous or embarrassed	11	23.1	49.8	63.4
	13	46.9	61.0	74.6
	15	48.8	63.3	87.4
Smoking is a dirty habit	11	82.3	71.1	53.7
	13	82.3	66.7	35.3
	15	80.8	67.7	40.4
Smoking is only bad for you when you smoke a lot	11	42.0	58.2	46.3
	13	37.3	52.6	62.9
	15	30.4	38.5	53.5
Plain cigarettes are worse for your health than filter tips	11	20.3	30.5	48.8
	13	25.8	42.7	69.5
	15	37.0	57.9	76.1
Films and discussions at school about cigarettes discourage pupils from smoking	11	34.6	42.4	41.5
	13	30.0	25.5	28.3
	15	22.4	23.2	16.3
Cigarettes should be made more expensive	11	56.9	54.3	24.4
	13	61.6	53.0	19.1
	15	62.2	50.8	17.1

Total numbers as in Table 3.

smoking regularly. The prevalence, however, varied widely with age rising from less than 5% in 11-year-old children to over 20% at the age of 15. Compared with other large-scale studies in which the results were obtained by self-administered questionnaire (Bothwell, 1959; Holland and Elliott, 1968a; O'Rourke *et al.*, 1968; O'Rourke and Wilson Davis, 1970), it would appear that the smoking rates among boys had fallen, particularly in the younger age groups, while among girls there had been little change, or possibly a slight increase, so that the smoking rates of the two sexes are now closer. This may be a reflection of recent changes in patterns of education and social structure resulting from the move towards sexual equality but the results still suggest that boys smoke more and earlier than do girls.

The analysis of respiratory symptoms and smoking habits supports the results of Bewley *et al.* (1973b) and Holland and Elliott (1968b) in showing a significantly higher incidence of cough and phlegm production in regular smokers compared with non-smokers. In addition we noted that smokers admit to more exertional dyspnoea than non-smokers and that they more often suffer respiratory tract infections. The prevalence of respiratory symptoms in non-smokers would appear to be high compared with the other reports, but some workers, notably Lunn *et al.* (1970) in a study of respiratory illness of Sheffield schoolchildren relating to pollution levels, found similarly high levels. When the results for respiratory symptoms are analysed in terms of age, the differences between non-smokers and

regular smokers persist, but within each group of smokers the younger children had a higher incidence of symptoms than the older ones (with the exception of phlegm production). This is contrary to what one might expect, particularly as younger children are generally lighter smokers. This finding could be owing to the fact that the younger children are more acutely aware of deviating from the norm, the smokers in particular feeling more guilty about their smoking habits and thus considering themselves less healthy.

Considering the results of respiratory symptom prevalence overall, it would appear that the production of phlegm with a cold is the best arbiter of impaired health in smokers and this would seem to agree with the findings of Fridy *et al.* (1974) that 'healthy' smokers appear to be more vulnerable to the effects of common chest colds than non-smokers. The finding of a high incidence of knowledge concerning the relationship between lung cancer and smoking is in agreement with other studies (Bynner, 1969; Bewley *et al.*, 1974); however, other health risks are not so well known, particularly by younger children. The responses to the 'attitude' statements indicate that children, and smokers in particular, are aware of the ways to 'safer smoking'—that is, smoking fewer cigarettes and smoking filter-tipped rather than plain cigarettes. These findings might suggest that although children have some knowledge regarding health risks, they are not put off by this knowledge, a proposal discussed by Bynner (1969). Reports of health education programmes in children have shown

little success (Watson, 1966; Jefferys *et al.*, 1967; Holland and Elliott, 1968b) and the response of children in the present study to the statement relating to 'the value of films and discussions at school about cigarettes in discouraging pupils to smoke' is of interest in revealing that only 28% of children agreed that these might be of value. More important than this is the marked age difference in response to this statement, the younger children believing that such films and discussions might be worth while.

We believe that health education regarding the dangers of smoking may be improved by increasing a child's awareness of the many conditions related to smoking and by making full use of the knowledge concerning the higher incidence of respiratory symptoms in children who are regular smokers. Furthermore, this information must be presented early, even at primary school level, as the younger children would appear to be more receptive to this type of information.

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#### References

- Bewley, B. R., Bland, J. M., and Harris, R. (1974). Factors associated with the starting of cigarette smoking by primary schoolchildren. *British Journal of Preventive and Social Medicine*, **28**, 37-44.
- Bewley, B. R., Day, I., and Ide, L. (1973a). *Smoking by Children in Great Britain—A Review of the Literature*. Social Science Research Council and Medical Research Council: London.
- Bewley, B. R., Halil, T., and Snaith, A. H. (1973b). Smoking by primary schoolchildren. Prevalence and associated respiratory symptoms. *British Journal of Preventive and Social Medicine*, **27**, 150-153.
- Bothwell, P. W. (1959). The epidemiology of cigarette smoking in rural school children. *The Medical Officer*, **102**, 125-132.
- Bynner, J. M. (1969). *The Young Smoker*. Government Social Survey Report No. SS383, p. 55. HMSO: London.
- Fridy, W. W., Ingram, R. H., Hierholzer, J. C., and Coleman, M. T. (1974). Airways function during mild viral respiratory illnesses. The effect of rhinovirus infection in cigarette smokers. *Annals of Internal Medicine*, **80**, 150-155.
- Holland, W. W., and Elliott, A. (1968a). Cited by B. R. Bewley, I. Day, and L. Ide 1973 in *Smoking by Children in Great Britain—A Review of the Literature*. Social Science Research Council and Medical Research Council: London.
- Holland, W. W., and Elliott, A. (1968b). Cigarette smoking, respiratory symptoms, and anti-smoking propaganda. An experiment. *Lancet*, **1**, 41-43.
- Jefferys, M., Norman-Taylor, W., and Griffiths, G. (1967). Longer-term results of an anti-smoking educational campaign. *The Medical Officer*, **117**, 93-95.
- Lunn, J. E., Knowelden, J., and Roe, J. W. (1970). Patterns of respiratory illness in Sheffield junior schoolchildren. *British Journal of Preventive and Social Medicine*, **24**, 223-228.
- Maxwell, A. E. (1961). *Analysing Qualitative Data*. Chapman and Hall: London.
- Nie, N. H., Hull, C. H., Jenkins, J. G., Steinbrenner, K., and Bent, D. H. (1975). *Statistical Package for the Social Sciences*, second edition. McGraw Hill: New York.
- O'Rourke, A., O'Sullivan, N., and Wilson Davis, K. (1968). A Dublin schools smoking survey: Part I. *Irish Journal of Medical Science*, **1**, 123-130.
- O'Rourke, A., and Wilson Davis, K. (1970). Smoking and schoolchildren. *Journal of the Royal College of General Practitioners*, **20**, 354-360.
- Royal College of Physicians (1962). *Smoking and Health*. Pitman: London.
- Royal College of Physicians (1971). *Smoking and Health Now*. Pitman: London.
- Watson, L. M. (1966). Cigarette smoking in schoolchildren: A study of the effectiveness of different health education methods in modifying behaviour, knowledge, and attitudes. *Health Bulletin (Edinburgh)*, **24**, 5-12.