Children's coughs related to parental smoking

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Abstract

A survey of the smoking habits, attitudes, and background of over 15 000 8-19 year olds in northern England in December 1982 showed a positive correlation between parental smoking and the reporting of frequent coughs by children who had never smoked. This was especially pronounced in the youngest children. Thirty five per cent of boys under 11 who had never smoked and whose parents did not smoke reported frequent coughs; with one parent smoking this increased to 42%, and when both parents smoked the proportion was 48%. Girls under 11 showed the same pattern, with 32%, 40%, and 52% respectively reporting frequent coughs. Fewer older children in general reported frequent coughs. Mothers' smoking had more influence on children's coughs than had fathers' smoking. Social area type had no significant effect. No significant effect of passive smoking was observed when the children themselves were smokers.

These results are clear evidence of a definite link between smoking in the home and coughs in young children, which not only may present immediate problems but may also be a cause of illness in the future.

Introduction

The question of passive smoking is perhaps at its most cogent in children who are constantly subjected to smoke at home. If one or both parents smoke the children may live in an atmosphere of smoke from birth to school age and thereafter spend a considerable proportion of their days in a smoky environment. Because of its possibly important effect on children's health the subject of passive smoking in the home has received considerable attention in recent years, but with conflicting results.

Much of the research has concentrated on young children, especially infants under 1 year of age, and many of the findings have been positive. Increased incidences of pneumonia and bronchitis,[1-5] impaired lung function,[6] coughs[7], and general respiratory disorders[8 9] have been shown in young children with smoking parents. In most of these cases it is the mother's smoking habit that has received special attention because of her greater contact with the child in infancy.

Positive effects of parental smoking have also been detected in older children. Increased incidences of coughs,[10 11] wheeze,[12] asthma,[13 14] general respiratory tract diseases,[15 16] and impaired lung function[17] are among those observed. In the case of asthma the mother's smoking habit appears to be more closely connected than is that of any other family member.[13 14] Several studies on lung function related to passive smoking in children have shown a greater effect of maternal than paternal smoking.[12 18] Conversely, other studies have shown little or no link between parental smoking and childhood respiratory symptoms[19] or lung function.[20-23]

The present study relates the prevalence of frequent coughs to the children's own smoking habits and those of their parents and immediate family. The study was part of a large survey financed by the Cancer Research Campaign.

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Sample and methods

The study was conducted as a questionnaire survey of 15 709 8-19 year olds receiving full or part time education in 65 establishments in Cumbria and Tyne and Wear. State and independent primary schools, state and independent secondary schools, and colleges of further education participated. A stratified random sample allowed each type of establishment to be proportionally represented. The questionnaires were short and administered by teachers to whole classes under examination conditions. Everyone in each school completed the questionnaire at the same time in order to prevent prior discussion of the questions. The questionnaires were anonymous and sealed in plain envelopes by the respondents immediately on completion.

Since the accuracy of self reporting is invariably questionable every effort was made to reduce false bias. The methods used to administer the questionnaires were those which have been shown to elicit the highest—and presumably the most accurate—reporting of smoking by adolescents.[24] As an extra check on accuracy, two questions asked how many cigarettes the respondent had smoked during (*a*) the previous day and (*b*) the previous week. These responses were cross checked with the general reported smoking habit. Physiological validation was not used because tests currently available are not sensitive enough to be cost effective in detecting the low levels of smoking experienced by children.[25]

The questions considered here asked the children if their father, mother, or older or younger sisters or brothers smoked. The children were also asked about their own smoking habits. Further on in the questionnaire (and therefore unrelated to these questions) they were asked "Do you get a lot of coughs?" The responses to this question would include coughs associated with colds and influenza. The considerable difference in reported coughs between children who claimed to be regular smokers and those who claimed to be non-smokers, however, suggested some relation between cigarette smoke and coughs that was acting independently of other causes. It might also have been acting as an exacerbating factor in association with other causes.

The questionnaires were administered during the first week of December 1982, thus avoiding so far as possible variations due to local seasonal epidemics.

Children were categorised by reported smoking habit as: (*a*) those who had never smoked a cigarette; (*b*) those who had tried a cigarette once; (*c*) ex-smokers; (*d*) occasional smokers who did not smoke every week; (*e*) regular smokers of one to six cigarettes a week; and (*f*) regular smokers of more than six cigarettes a week. In this paper the triers, ex-smokers, and occasional smokers are grouped together as "smoked sometime."

A total of 583 children did not respond to the relevant questions, and this study is therefore based on the remaining 15 126 questionnaires suitable for analysis.

The results were analysed by the statistical package for the social sciences[26] and by generalised linear interactive modelling.[27] In the second method the dependent variable (percentage of children reporting frequent coughs) was regressed on a set of independent variables. These variables included the respondent's own smoking habits, region, social area grouping, age, sex, parental smoking habits, maternal and paternal smoking habits separately, and overall family smoking.

Results

PRELIMINARY ANALYSIS

Children's own smoking habits—Preliminary analysis showed that the child's own smoking habit was a most powerful influence on the

frequency of coughs (table I). Moreover, further analysis showed no apparent effect of parental smoking on the frequency of coughs reported by child smokers. As a result of these findings only the 6988 children who reported that they had never smoked a cigarette were included in the subsequent analyses. The "never smokers" decreased from 80% of those under 11 years of age to 55% of the 11-13 year olds and to 29% of those aged 14 and over. These respondents were less likely than the smokers to have parents who smoked (table II). There were very few 8 year olds in the sample; apart from this, however, grouping the never smokers into three age categories showed that within each group the proportions of the constituent ages were roughly equal. In the oldest group one third was made up of 14 year olds, one third 15 year olds, and the remaining third 16-19 year olds. Parental smoking habits were similar for all three groups.

TABLE I—*Percentage of children in each age group (<11, 11-13, ⩾14 years) reporting frequent coughs related to their own smoking habit (n=base, 100%)*

Child's own smoking habit	% Reporting frequent coughs					
	Boys			Girls		
	<11	11-13	⩾14	<11	11-13	⩾14
Never smoked	40 (863)	23 (1635)	9 (1080)	39 (870)	19 (1499)	9 (1041)
Smoked sometime	50 (248)	27 (1297)	11 (1732)	47 (159)	25 (965)	12 (1741)
Smoked 1-6 per week	43 (7)	32 (73)	16 (153)	67 (3)	34 (83)	18 (186)
Smoked >6 per week	50 (2)	42 (94)	29 (689)	0 (2)	49 (66)	32 (638)

TABLE II—*Parental smoking related to children's smoking by social area type. Figures are percentages (n)*

Parental smoking	Children's own smoking habits					
	Social area type: non-industrial			Social area type: industrial		
	Never smoked	Smoked sometime	Regular smokers	Never smoked	Smoked sometime	Regular smokers
Neither	54 (1662)	46 (1199)	31 (228)	38 (1508)	36 (1280)	26 (321)
Father only	14 (438)	17 (449)	20 (143)	18 (702)	18 (644)	19 (237)
Mother only	14 (439)	16 (419)	21 (151)	18 (723)	20 (706)	21 (265)
Both	17 (523)	21 (532)	29 (213)	25 (993)	26 (913)	35 (438)
Base (100%)	3062	2599	735	3926	3543	1261

Geographical region—The proportion of respondents with the same smoking habits who reported frequent coughs in Tyne and Wear was almost identical with that in Cumbria. Region was therefore not included as a variable in the subsequent analyses.

Social area type—Socioeconomic state may be an important factor, but it is not permitted to ask children in school to give this information. As a general measure the 65 participating schools and colleges were therefore divided into two groups according to the socioeconomic areas they served. Table II shows that there was considerable variation in parental smoking habits in the two groups, and hence a social area type variable was included in the subsequent analyses.

MAIN ANALYSIS OF COUGHS RELATED TO PARENTAL AND FAMILY SMOKING

Influence of age—In all the following analyses age group was the variable which had the most significant effect on the frequency of coughs ($\chi^2=511{\cdot}41$; $p<0{\cdot}00001$). The proportion of children reporting frequent coughs decreased steadily with increasing age (table I).

Influence of number of smoking parents—After age came parental smoking as having the most significant effect on the frequency of children's coughs ($\chi^2=41{\cdot}94$; $p<0{\cdot}0001$). Table III shows that the prevalence of coughs increased with the numbers of parents smoking. This was particularly striking in children aged under 11, of whom 35% of the boys and 32% of the girls with no smoking parents, 42% of the boys and 40% of the girls with one smoking parent, and 48% of the boys and 52% of the girls with two smoking parents reported frequent coughs. Figure 1 shows the proportions predicted by generalised linear interactive modelling together with the observed proportions reporting frequent coughs. Sex and social area type had no significant effect.

TABLE III—*Percentage of never smoking children in each age group (<11, 11-13, ⩾14 years) reporting frequent coughs related to number of parents who smoked (n=base, 100%)*

No of parents who smoked cigarettes	% Reporting frequent coughs					
	Never smoking boys			Never smoking girls		
	<11	11-13	⩾14	<11	11-13	⩾14
Neither	35 (386)	18 (739)	10 (482)	32 (412)	17 (667)	7 (484)
One	42 (291)	28 (548)	7 (381)	40 (257)	20 (482)	10 (343)
Both	48 (186)	25 (348)	10 (217)	52 (201)	23 (350)	12 (214)

FIG 1—Proportions of never smoking children reporting frequent coughs related to number of parents who smoked.

Influence of maternal and paternal smoking—Mothers' smoking ($\chi^2=29{\cdot}75$; $p<0{\cdot}00001$) was the most influential variable after age, followed by fathers' smoking ($\chi^2=13{\cdot}14$; $p=0{\cdot}0003$) when maternal and paternal smoking were considered separately. Table IV shows the distribution. After age, maternal smoking, and paternal smoking had been taken into account the only other significant effect was the interaction between the father's smoking and the age of the child ($\chi^2=5{\cdot}4$; $p=0{\cdot}02$). The proportion of reported coughs decreased more quickly with increasing age if father smoked than if he did not, possibly indicating reduced contact with father during the teenage years. Again sex and social area type showed no significant influence.

TABLE IV—*Percentage of never smoking children in each age group (<11, 11-13, ⩾14 years) reporting frequent coughs related to maternal and paternal smoking when only one parent smoked (n=base, 100%)*

Individual parent who smoked cigarettes	% Reporting frequent coughs					
	Never smoking boys			Never smoking girls		
	<11	11-13	⩾14	<11	11-13	⩾14
Only father smoked	43 (155)	29 (269)	4 (193)	37 (119)	22 (248)	8 (156)
Only mother smoked	40 (136)	26 (279)	10 (188)	43 (138)	18 (234)	12 (187)

Influence of number of family smokers—A separate analysis was carried out to include the variable of the number of family smokers rather than selecting specifically for parents. The reporting of frequent coughs rose slightly less steeply as the number of family smokers increased from none to two than it did when these smokers were known to be the parents. For example, in the youngest age group the proportions of boys reporting frequent coughs were 36%, 40%, and 45% and the proportions of girls 32%, 39%, and 50%. This

less steep rise might be due to several factors. In some cases the one or two smokers were siblings who perhaps smoked largely outside the home, or possibly the child had been exposed to siblings' smoke for a shorter period than to parental smoke. Some households in which one or both parents smoked also contained sibling smokers. Age was again the strongest variable, with family smoking next ($\chi^2=51{\cdot}36$; $p<0{\cdot}0001$). As with parental smoking the effect was greatest in the youngest age group. It was also slightly greater in the girls than in the boys ($\chi^2=6{\cdot}38$; $p<0{\cdot}05$). There was a general but irregular tendency for the proportion of respondents reporting frequent coughs to continue to increase as the number of family smokers rose above two. Figure 2 shows the predicted generalised linear interactive model and the observed results.

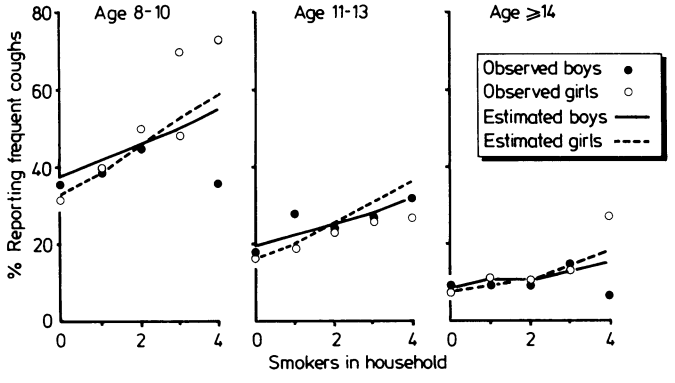

FIG 2—Proportions of never smoking children reporting frequent coughs related to number of smokers in household.

Discussion

This study showed a significant link between parental smoking, general family smoking, and self reported frequent coughs in children who had never smoked—particularly those aged under 11—the prevalence being slightly greater when the parents were represented among the family smokers. The effect was not observed in children who were themselves smokers.

It has been suggested that infections transmitted to children by the coughs of smoking parents[8] are responsible for increased respiratory illness, and that may have been the case in this study. Also impaired lung function caused during early childhood may predispose to respiratory diseases such as bronchitis later in life.[6 28 29]

It must be borne in mind that the coughs were self reported by the children, and what is considered to be "a lot of coughs" may vary from one child to another. Nevertheless, the term is probably a reasonably good measure because it expresses the child's own feelings. If he or she coughs enough to be aware of it and considers it to be frequent, it is clearly a health problem.

The effects of frequent coughs in children present immediate as well as long term problems, absence from school and possible lung damage being only two of them. The long term harm from passive smoking in childhood has not been fully assessed, but recent findings indicate that it may be far reaching.[30]

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