Original articles

Smoking and pursuit of thinness in schoolgirls in London and Ottawa

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Summary

It has been proposed that teenage girls often smoke cigarettes to protect themselves from the impulse to binge eat, with its feared weight-gain consequences, particularly when other measures such as greater dietary restraint have failed. The present study looked at the relationship between body mass index and standardised questionnaire responses concerning smoking, alcohol consumption, moods, weight changes, attitudes to body weight and shape, dietary patterns and menstruation in 1936 British (London) and 832 Canadian (Ottawa) schoolgirls. Data analysis revealed links between cigarette smoking and body weight/shape concerns, and awareness by subjects of these links; there was also a tendency for smokers in these two populations to be overweight but not grossly obese. Smoking was also related at all ages to being postmenarchal. The London population in particular revealed an association between smoking and a weight loss of 7 kg or more at some stage since puberty. Smoking was also linked, in a minority, with regular vomiting undertaken as a further defence against weight gain when overeating had occurred. These associations existed alongside the major and predictable association found between alcohol consumption and smoking. Similarities between the British and Canadian schoolgirls were striking in respect of rank order of reasons given for smoking and consequences of giving it up. Since smoking amongst older women is reportedly associated with below-average body weight it may indeed be effective in helping to curb weight gain. Our study provided little evidence of association between smoking and generalised anxiety or social anxiety (in either population), or depression (in the British cohort). We suggest that any preventive psychological approach to teenage female smoking should include attention to weight gain anxiety and consequent pursuit of thinness.

Keywords: smoking; teenage girls; weight gain

A comprehensive review¹ of 70 studies on the relationship between body weight and smoking behaviour bears out the commercial belief in this association and its marketability in respect of cigarette sales. Such studies often reveal that

adult smokers weigh less than non-smokers, that stopping smoking leads to weight gain and starting it to weight loss and that females including teenagers² believe that smoking helps keep down their body weight and related fatness ('shape'). Klesges *et al*³ suggest that changes in diet and/or metabolism may underlie weight changes consequent on smoking. A major study reported from the US³ noted substantial weight gain in a minority of those who had stopped smoking, proposed that this cosmetic effect might hamper attempts to quit, and recommended that such concerns be addressed as part of smoking cessation programmes.

In contrast to these findings in adults, we have already reported smoking to be commonest in relatively overweight schoolgirls (those between the 75th and 90th percentile for age) in the UK.⁴ It was also significantly related to body weight and shape concerns. This accords with the finding⁵ that overweight females in the US were especially likely to have taken up smoking as a method of weight control; this finding was supported by Townsend *et al*⁶ who also found that adolescent female smokers tended to be overweight. We have suggested that smoking may indeed be effective in reducing body size and shape over the years, since in the early 1970s we found it to be associated with thinness in both urban and rural dwelling older females in the UK⁷; hence perhaps its major psychological 'addictive' potential in young adult females who often seem especially resistant to conventional social and public health pressures to give up smoking.

A strong association between smoking, alcohol consumption, and anorexia nervosa with a binge/vomiting form of low body weight control was reported by Crisp,⁸ who suggested that smoking provided an alternative comfort/oral activity to eating in this population and was harnessed therefore as an additional strategy in the battle against weight gain. But concern about normal postpubertal female 'fatness' and attempts to curb it are obviously not limited to eating-disordered populations. They are widespread amongst teenage girls, biologically normal in respect of body weight and shape. For example, the majority of 16/17-year-old girls have been shown to have such concerns over the last several decades both in the US^{9,10} and Europe.^{11,12} There may even have been some increase in these concerns over this time span.

Reports of teenage smoking emphasise its recent increase in females in many European countries¹³ and recent Office of Population Censuses and Surveys (OPCS) surveys support

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this finding with respect to the UK.¹⁴ Advice from the medical and allied professions¹⁵ continues to emphasise the personal, social and commercial basis of much smoking, and social and legislative solutions have been suggested. However, such approaches fail to address the possible influence of the personal body weight and shape concerns that may also underwrite cigarette smoking in adolescent girls. There is a new high-profile UK government policy which has the goal of significantly reducing the prevalence of smoking amongst teenage girls by the end of the decade,¹⁶ although ambitious shorter term goals have not been achieved. The UK government is coming to recognise the scale of the problem and its complexity.¹⁷ Meanwhile, in Canada, there is the prospect of exceptionally firm legislative control over tobacco sales in an effort to deal with it.

In view of this impasse, the study reported here was undertaken to explore whether weight concerns and related behaviour, such as has previously been detected in eating-disordered populations and in the general female population, continue to exist in association with smoking within 'normal' schoolgirl populations in the UK and Canada during the period 1988–91.

The null hypotheses were that these female smokers (a) will not associate their smoking with weight and shape concerns; (b) there will also be no association with proneness to overeat, preference for sweet and starchy foods, vomiting as another less common defence against weight gain, or significant weight loss since puberty. Moreover, these smokers (c) will not report a belief that smoking protects them from such eating and weight gain, but (d) will report more emphatically that peer pressure and relief from social anxieties and depression accounts for their smoking. Furthermore, (e) smoking will not be related to growth rate as measured by menarchal age (with its sensitising impact on feelings of 'fatness') in those who have achieved it.

Methods

POPULATIONS

Populations of schoolgirls in south west London and its hinterland (within an 8-mile radius of St George's Hospital Medical School), and in the city of Ottawa, Canada, were surveyed to examine their smoking behaviour in association with a number of growth and related experiential and attitudinal characteristics. The London population was the second sample of adolescent females from such schools to be studied, the first having been studied in 1972 exclusively in respect of its weight/shape characteristics, growth rate, related concerns and eating behaviour.¹² There were five local state schools (two comprehensive girls' schools, one mixed comprehensive school and two mixed middle schools) and two private girls' schools, one also local and the other six miles away. The Ottawa schoolgirls, from two inner and two outer city schools, were about to be studied in respect of their anxiety characteristics and the opportunity arose also to study them in the above ways so as to allow some transAtlantic comparisons. In

total, 1936 girls in London and 832 girls in Ottawa took part. Ethical approval for the study was obtained in the usual way at both centres.

The head teacher of each school gave consent for the study, and all parents were given the option of withdrawing their daughters from it. For the Ottawa population, it was necessary to gain approval from the four school boards responsible for education in Ottawa and to secure the express support of individual parents.

MEASURES

Height and weight, in indoor clothes and without shoes, were measured for each subject in a standardised way using accurate instruments. On the basis of this information Body Mass Index (BMI²) was calculated as a measure of body size. Subsequently 'weight status' was defined by age groups in percentile terms: 'very underweight' – BMI 10th percentile and below, 'underweight' – 11th–25th percentile, 'normal weight' – 26th–74th percentile, 'overweight' – 75th–89th percentile, 'very overweight' – 90th percentile and above.

Both populations also completed the same two questionnaires, one concerning body weight/shape, eating and aspects of growth, and the other concerning smoking. The former questionnaire (available on request) was a slightly modified version of that used by the St George's group in a study of a similar population of teenage girls in 1972.^{12, 18} It asks in detail about weight, weight history, attitudes to weight and shape, eating habits and dietary preferences, as well as eliciting information on menstrual history (see below for items specifically used for this study). The second questionnaire addressed smoking behaviour and reasons for smoking. Prevalence rates for smoking amongst school children can be difficult to assess. Young people may perceive smoking as a forbidden activity and be reluctant to reveal it as present or past behaviour or may tend to play down the amount that they smoke. Major studies of smoking amongst school populations carried out by the OPCS have tackled this by using direct questioning about smoking behaviour followed up by a retrospective diary which asks subjects to record all cigarettes smoked during the preceding 7 days.¹⁹ This consistently has given a higher yield of smokers and smoking behaviour. We followed a similar procedure, but used a 4-day diary (including the weekend), and found the same pattern of increased reporting in the diary compared with responses to direct questioning. In this study the definition of a smoker was based on the OPCS-defined smoking categories. A non-smoker was a girl who reported never having smoked or else giving up after trying once or twice. A smoker was a girl who reported either occasional or regular smoking.

The smokers amongst both populations also completed questionnaires allowing them to identify and report their reasons for smoking and the effects they foresaw should they stop. These questionnaires addressed a variety of often cited reasons for smoking by teenage girls and included items to do with eating, hunger, and weight gain. The schoolgirls were also asked about their alcohol consumption in the

Figure 1 Actual —, and preferred ---, mean body weights, displayed in relation to age in years; the squares represent the Ottawa population, circles the London (present study) population, and triangles the population studied in London in 1972

diary questionnaire. For the purpose of regression analysis, any schoolgirl was classified as being a 'drinker' if she reported drinking on any one of the diary occasions.

In addition, aspects of mood were measured by questionnaires. The London population completed one such questionnaire which addressed five major categories of anxiety (concerning weight, food, social anxiety, agoraphobia and generalised anxiety), with the associated scales (5–8 items in each instance with each item allowing scores of 1–4); also a negative mood inventory (including self-report of sadness, hopelessness, low self-esteem and uselessness) designed to detect 'depression'. The weight, food, social and generalised anxiety scales have all demonstrated good discriminatory capacity in respect of normal individuals and those with anorexia nervosa.

The Ottawa schoolgirls received the Revised Childrens' Manifest Anxiety Scale (RCMAS) questionnaire. This highly standardised 37-item self-report questionnaire provides scores on global anxiety and on three subscales (physiological anxiety, worry/over-sensitivity, and social concerns/concentration).^{20 21}

STATISTICAL ANALYSIS

For initial analyses, when distributional assumptions could not be made, the Wilcoxon test for two independent samples with an approximation to the normal distribution was used to test differences between groups. Multiple logistic regression with a backward conditional stepwise selection procedure was used to produce an estimated relative risk for each prognostic factor with all other covariates held constant. In addition, a 95% confidence interval (CI) for the estimated relative risk was computed. The populations from London and Ottawa were analysed separately (and, subsequently, also together). Using the stepwise selection procedure, covariates were selected or deleted from the model based on the grounds of statistical significance ($\alpha = 0.10$). Important biological variables, including weight and age, were left in the final model as had been previously suggested.²² The likelihood ratio test was used to ascertain whether excluding covariates on this basis significantly reduced the fit of the model. A goodness-of-fit test statistic ($-2 \log \text{likelihood}$) was calculated to test the adequacy of the final

model. Plots of the deviance residuals versus fitted values of the logit were used to investigate any observations that might appreciably influence the estimates.²² All statistical analysis was undertaken using the statistical software SAS (SAS Institute Inc, Cary, NC, USA).

None of the interval scaled variables was linear in the estimated logit and they were all therefore reduced to being ordinal scaled. Where necessary, ordinal and nominal scaled covariates were further categorised in order to provide levels with sufficient numbers in the outcome variable 'smoking status'. For those categorical variables with more than two levels, dummy variables were created for the purpose of logistic regression,²² ie, all categories were included in modelling, even when only a subset was significant, following the stepwise procedure.

The outcome variable of smoking status (smoker = 1; non-smoker = 0) was evaluated using a restricted form of the OPCS retrospective diary as already described.¹⁹ Details of the coding of the covariates are given in the Appendix.

Results

Less than 3% of parents of the London schoolgirls did not wish their daughters to participate, and apart from these girls all others present in the school and in classes available for study on the survey day were included. More of the Ottawa schoolgirl parents expressed their wish that their daughters should not take part in the study and this reduced the Canadian study population to 52% of the total.

ACTUAL AND PREFERRED BODY WEIGHT

Figure 1 shows the measured mean body weights by age of the London and Ottawa schoolgirls; also similar measured mean body weights of a cohort of 2000 London schoolgirls studied in 1972 and already referred to.¹² Variation in the three studies between these mean measured body weights can be seen within certain age groups. In contrast, the reported *preferred* mean body weights for the three populations are remarkably similar, ie, both over the 18-year time span within the London groups and in transAtlantic terms.

BMI

It can be seen that the two populations (table 1) are similar in this respect so far as percentile cut-off points (defining the boundaries of our 'body weight' categories) are concerned, except for the 17- and 18-year-olds where the Ottawa girls tend to be heavier. Their heights were similar at all ages. When these data are compared to the recent UK cross-sectional reference data for BMI in teenage girls²³ it is evident that they are similar, eg, the 91st percentile for weight of a 16-year-old girl, 50th percentile for height, is 25.0 in the national data.

AGE AND SMOKING

For chronological age (table 2) smoking was most likely amongst 15-year-old London schoolgirls. This was significant compared with

Table 1 BMI at percentile cut-off points by age (related to subsequent categories of 'very underweight', 'underweight', 'normal weight', 'overweight' and 'very overweight')

	Age (years)						
	10-11	12	13	14	15	16	17+
<i>London schools</i>							
(n)	107	179	306	477	460	223	176
10th	16	15.8	16.7	17.5	17.7	18.4	18.3
25th	16.7	17.2	18.0	18.9	19.1	19.5	19.6
75th	19.5	20.4	21.6	22.9	22.9	23.0	22.7
90th	22.4	22.7	24.8	25.7	25.3	25.3	24.6
<i>Ottawa schools</i>							
(n)	50	153	227	159	106	76	54
10th	15.6	16.2	16.6	17.3	17.9	18.8	19.0
25th	16.7	17.1	18.1	18.5	19.3	19.7	20.6
75th	20.3	22.0	21.6	22.7	23.0	22.8	24.8
90th	22.7	23.9	24.8	24.7	25.5	25.3	28.3

Table 2 Age-related reported cigarette smoking in London and Ottawa schoolgirls

Age (years)	London		Ottawa	
	n	smokers (%)	n	smokers (%)
10-13	596	40 (6.7)	432	46 (10.7)
14	476	92 (19.3)	158	20 (12.7)
15	459	131 (28.5)	107	22 (20.6)
16	222	57 (25.7)	76	22 (29.0)
17-19	176	45 (25.6)	54	15 (27.8)
Total	1929	365 (18.9)	702	125 (15.1)

10-13-year-olds (half as likely) and 14-year-olds (70% as likely), and there was a tendency for 16-year-olds also to have smoked less but not 17- and 18-year-olds (table 3). Smoking was less related to age in the Ottawa population but with a tendency for the 10-14-year-olds to smoke less than their elders.

In respect of biological age, there is a clear relationship with menstruation. When all other

factors are taken into account, these schoolgirls are two to three times more likely to smoke if they are post-menarchal. We found menarchal age, as expected, was associated with 'weight status', being younger in the more overweight part of the populations (eg, $p < 0.0001$, chi squared test, London population).

BODY WEIGHT, MENSTRUATION, INGESTIVE PATTERNS AND SMOKING

In the main regression analysis the tendency for smoking to be associated with being 'overweight', as distinct from 'very overweight' or less than 'overweight', again revealed itself (table 3). Figure 2 shows the noticeable similarities between the London and Ottawa populations in this respect.

There is a significant association in the London schoolgirls, a tendency in the Ottawa schoolgirls, and a significant association in the combined populations, between reported post-menarchal weight loss at some stage since puberty equal to or greater than 7 kg and smoking. For instance, in London, such schoolgirls were 70% more likely to smoke. The Ottawa schoolgirl smokers, in whom the association with weight loss since puberty was less robust, also reported a 90% greater likelihood of smoking in association with major weight fluctuations during this same period.

A striking and highly significant reported association with cigarette smoking was that of alcohol consumption. Schoolgirls were seven times more likely to smoke if they also reported drinking alcohol.

A tendency in both populations for smoking to be associated with 'proneness to overeating' is just significant (30% more likely) when the two populations are combined. A tendency for the London and combined smoking populations also to report a high dietary intake of sweets/starch, etc, fell short of statistical significance.

The relatively high proportion of smokers also reporting frequent vomiting behaviour approached significance for each population in the original model, and was significant (80% more likely to smoke) in the reduced model for the combined population. Such vomiting was significantly associated (chi-square tests) with weight gain concern, both 'over the last three

Table 3 Associations of reported smoking in London and Ottawa schoolgirls. The tabulated values are regression coefficients derived from multiple logistic regression. The variables are included because one or more values within them have at least 95% confidence intervals (the emboldened figures). The other variables (see Appendix) are excluded for the sake of clarity (this information available on request)

	London (n=1936)	Ottawa (n=832)	Combined (n=2768)
Age (years)			
10-13	0.5 (0.3-0.8)	0.8 (0.4-1.6)	0.5 (0.4-0.7)
14	0.7 (0.5-0.9)	0.6 (0.3-1.3)	0.7 (0.5-0.9)
15	(1)	(1)	(1)
16	0.6 (0.4-1.0)	1.1 (0.5-2.5)	0.7 (0.5-1.1)
17+	0.7 (0.5-1.1)	1.0 (0.4-2.5)	0.8 (0.5-1.2)
Weight characteristics			
BMI: very underweight	1.0 (0.6-1.7)	1.0 (0.4-2.5)	0.9 (0.6-1.4)
underweight	0.9 (0.6-1.4)	0.7 (0.3-1.4)	0.8 (0.6-1.2)
normal	(1)	(1)	(1)
overweight	1.2 (0.8-1.7)	1.3 (0.7-2.3)	1.3 (0.9-1.8)
very overweight	0.6 (0.3-1.0)	0.5 (0.2-1.2)	0.7 (0.4-1.0)
Weight loss since puberty ≥ 7 kg	1.7 (1.1-2.5)	1.4 (0.7-2.3)	1.7 (1.2-2.4)
Weight gain since puberty	—	1.8 (0.9-3.5)	—
Weight fluct. since puberty	—	1.9 (1.1-3.3)	—
Dietary patterns			
Proneness to "overeating"	1.3 (1.0-1.8)	1.3 (0.7-2.0)	1.3 (1.1-1.7)
Alcohol consumption "drinker"	7.0 (5.2-9.3)	7.7 (4.7-12.4)	6.7 (5.3-8.6)
Weight anxieties			
High weight anxiety scale score	2.0 (1.4-2.9)	N/A	N/A
Currently worried "too fat"	—	—	1.3 (1.0-1.7)
(Other) Defence against weight gain	—	—	—
Vomiting	—	—	1.8 (1.1-3.0)
Menstruation started	3.0 (1.5-5.7)	2.3 (1.0-5.0)	2.5 (1.5-4.2)
Mixed sex school	0.5 (0.3-0.7)	N/A	N/A
Country	N/A	N/A	0.7 (0.6-1.0)

Figure 2 Relationship of percentile weight categories to smoking

months' (London $p < 0.000$, Ottawa $p < 0.003$) and 'ever' (London $p < 0.006$, Ottawa $p < 0.036$), but not with alcohol consumption (London $p < 0.113$, Ottawa $p < 0.50$).

ANXIETIES AND SMOKING

A preliminary univariate analysis (figure 3) of smoking in the London population in relation to mood revealed significant associations with high levels of weight anxiety ($Z = 6.67$; $p = 0.001$), food/eating anxiety ($Z = 4.27$; $p = 0.001$), depression ($Z = 3.80$; $p = 0.001$), and low levels of agoraphobia ($Z = -5.11$; $p = 0.001$) when compared with non-smokers. There were no differences with respect to generalised anxiety level and social anxiety levels. Nevertheless, all six measures were included in the logistic regression analysis in view of the often cited importance of both generalised and social anxiety as factors contributing to smoking in young people, female as well as male.

Within the logistic regression analysis of the London population data (table 3) the surviving category of anxiety associated with smoking was a twofold one of high levels of 'body weight anxiety' (scores at least one standard deviation above the mean). The combined smoking populations significantly often reported worry about being 'too fat'. Meanwhile, the standardised RCMA measures of generalised and social anxiety used in the Ottawa population and also subject to logistical regression revealed no differences between smokers and non-smokers.

SOCIAL CLASS

It was not possible to examine smoking in relation to parental social class but the London schoolgirls have been studied in relation to their school status (state or private sector). We have already reported⁴ that, in the younger age groups, there was a higher proportion of girls from state schools smoking. This was reversed after the age of 15 when girls from independent schools were more likely to be smokers. However, as the proportion of girls in the sixth forms of the state schools was considerably less than in the independent schools, it might be

supposed that those remaining in the state schools after the age of 16 were an especially self-selected group. The state school group had a higher proportion of ex-smokers, whereas the independent schoolgirls, who started smoking at a later age, were less likely to give up smoking once they had started. Girls in London were significantly less likely to smoke within mixed sex schools. Within the logistic regression of the Ottawa data, no relationships emerged between smoking and school type.

REPORTED REASONS FOR SMOKING

The percentage of 'yes' responses for reasons for smoking, rank ordered within the London population are given in box 1. The reasons given fall reasonably into the two categories 'personal' and 'social' and are displayed as such.

Reasons for smoking		
% responding 'yes definitely'		
	London (%)	Ottawa (%)
<i>Personal</i>		
Like it	59	50
Relaxes you	57	65
Something to do	27	39
Because bored	22	33
Instead of eating	21	33
Makes less hungry	19	36
<i>Social</i>		
Friends smoke	16	21
Boyfriend smokes	7	9
Look older	6	7
Parents smoke	5	14
Siblings smoke	4	4
Someone admired smokes	2	8
Parents don't smoke	2	2

Box 1

REPORTED CONSEQUENCES OF GIVING UP SMOKING

The percentage of smokers responding 'yes, definitely' to a series of questions addressing the anticipated consequences should they give up smoking is shown in box 2, rank ordered by London responses. Once again they fall naturally into three categories. In this table the personal and social questions are kept separate from each other and there is another category to do with health and well-being.

Consequences of giving up smoking		
% responding 'yes definitely'		
	London (%)	Ottawa (%)
<i>Health</i>		
More healthy	80	87
Parents glad	69	63
<i>Personal</i>		
Eat more	30	34
Put on weight	31	33
Get bored	20	30
Happier	14	25
<i>Social</i>		
Encourage others	22	30
Boyfriend glad	21	30
More attractive	14	21
Harder to live with	11	17
Go out less	2	8
Less popular	1	1

Box 2

Figure 3 Smoking and mood scale scores expressed as mean item scores

Discussion

Measurement of cigarette smoking in the general population, especially the secretive smoking of some teenage schoolchildren, is difficult, and we were unable to use biochemical markers. However, our anonymous self-report instruments, including the OPCS diary method, are well established techniques in the smoking survey literature. The relatively poor response rate in the Ottawa study was a cause for concern. In Ottawa all parents were required to provide positive consent rather than to respond only if they wished to indicate the withholding of consent. This explains much of the difference in response rates of the two populations. In the event, our results showed great similarities in the reported associations of smoking within the two populations and we have therefore subjected the combined populations to scrutiny as well as comparing them to each other.

The results of the studies challenge the null hypotheses. In particular, they provide evidence that, for schoolgirls in London and Ottawa, there are associations between smoking and attitudes to and anxieties about body weight and shape. A preferred body weight considerably less than their measured body weights, characterises these schoolgirl populations. This preferred level is very similar for the London and Ottawa populations and to the preferred level revealed two decades earlier in London using the same methodology. It has been suggested²³ that teenage female body weight and shape anxieties stem from enduring concerns about the impact of puberty and its weight-related characteristics on social and emotional development, which girls commonly frame in terms of associated pubertal 'fatness' and which they may then come to experience as egodystonic to some degree.²³ Such 'fatness', not recognisably part of greater obesity, becomes a major and conscious focus of anxiety which transcends the impact of changing 'fashions', though it may drive that industry's goal of idealising 'thinness'.

It is suggested that the individual's consequent and usually ill-fated urge to lose weight by dieting and excessive exercise,¹² may then extend to additional strategies such as smoking to curb food intake, especially if the problem is compounded by a degree of obesity. Anorexia nervosa, which has been construed as a total avoidance response to the maturational challenge of puberty,²⁴ with smoking still being used as one defence against ingestion and weight gain, is an extreme outcome. Both our populations of smokers (still) tended to be overweight (weak association but consolidated by finding it in both populations) and report proneness to overeat, though they also reported their smoking as significantly more often associated with having already lost 7 kg or more at some stage since puberty. Smoking was also significantly more likely in those reporting that they vomited frequently following a meal (a well recognised defence against weight gain in some teenage girls). Smoking may particularly come into play, for those in whom weight gain

is causing belated anxiety, as a means of weight regulation within constitutional limits when other attempts such as dietary restraint have failed. Our study suggests that this group may then begin to achieve its goal of weight control/loss. There is also a group of overweight teenage girls, presumably less concerned about or indifferent and feeling hopeless in relation to further weight gain, who have entered the allegedly ever-increasing category of teenage female massive obesity and contribute thereby to our finding of a low prevalence of smoking in this latter 'very overweight' population.

Surprising but notable, in view of the similarity between the London and Ottawa populations in these respects, was the lack of association of generalised anxiety and social anxiety with smoking. It could be argued that these anxieties had been relieved by the smoking. However, it is the weight anxiety that survives and is also ranked higher than other anxieties amongst the reasons given for smoking, as is awareness that eating more and weight gain would be consequences of stopping smoking. The absence of depression as a factor associated with our London teenage girls is similarly striking. These other mood states may be more important in teenage male smoking.

There is a much greater likelihood that smokers will also report drinking alcohol. Alcohol consumption is a complicating variable in attempting to understand what is going on. It will contribute importantly to calorie intake and hence to the overall picture of body weight associations with smoking and probably also body weight fluctuations. Cigarette smoking and alcohol consumption often go together in social settings. The present study suggests that there is also a longstanding basis to the overweight status of the smoking population since it reports a higher growth rate (early menarche)⁴ in smokers – a known association with being overweight at all ages²⁵. The powerful association between being postmenarchal and smoking may add something to the intensification of female anxieties about body shape consequent on this stage of development.

The similarities between the London and Ottawa populations were notable in their rankings of the reasons for smoking and imagined consequences of giving it up. Both sets of schoolgirl smokers were also aware that they would be more healthy and that their parents (and presumably society at large) would be glad if they gave up smoking. However, they continued to smoke. Personal reasons for smoking and the personal impact of giving up smoking are given emphasis by more of the schoolgirls than are social factors. These personal factors include non-specific statements such as that they like it, that it relaxes them and that it is something to do and relieves boredom; also that it reduces hunger and is an alternative to eating. More report that, were they to give up smoking, they would eat more and put on weight. In the absence of specifically high levels of generalised anxiety, social anxiety and depression, reports that smoking brings relaxation and relief from boredom may also be linked, in some subjects, with anxiety

that they might otherwise eat more and gain weight.

We conclude that anxieties about body weight and shape regulation, the feeling of being too fat, and the fear of losing control of eating, may be important forces at work in sustaining cigarette smoking amongst teenage girls, who often believe that it will help them in their goal of weight control and weight loss. Our study lends support to this proposition, since the London teenage female smokers in our study already reported substantial weight loss at some stage since puberty. A further sinister reinforcement of this attitude may be that smoking amongst older women has been found to be associated with relative thinness. One interpretation of this is that smoking has the desired effect in achieving thinness, a possibility that may not have been overlooked

by observant teenage girls as well as the tobacco industry. Such concerns may reinforce and perpetuate smoking despite clear awareness of the health risks. Education concerning cigarette smoking (how not to start; how to stop; the reasons why) for this resistant group may benefit by addressing this factor²⁶ and the maturational challenges to the individual that underlie it, as well as the other factors commonly addressed within such programmes.

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Appendix

Coding of covariates for logistic regression analyses

The following covariates were common to the analyses for both sets of schools: alcohol status (drinker = 1; nondrinker = 0), weight status (very underweight = 1; underweight = 1; normal = 0; overweight = 1; very overweight = 1), categorised age (10-13 years = 1; 14 years = 1; 15 years = 0; 16 years = 1; 17+ years = 1), menstruation (periods started = 1, periods not yet started = 0), intake of sweets and starch (high intake = 1; low intake = 0), unable to stop eating (once or twice a week or everyday = 1; never or once or twice a month = 0), frequency of vomiting after eating (once a week or more often = 1; never or only sometimes = 0), fluctuation in weight (a lot = 1; a little or none = 0), currently worrying about weight and why (yes, too fat = 1; no, yes, too thin or some other reason = 0), ever worried about weight and why (yes, too fat = 1; no, yes, too thin or some other reason = 0), feel too much weight put on since a child (≥ 7 kg = 1; < 7 kg = 0) and weight lost since childhood (≥ 7 kg = 1; < 7 kg = 0). In addition, the conditional logistic regression for the London schools included weight anxiety ($> 2.82 = 1$; $\leq 2.82 = 0$), eating anxiety ($> 1.99 = 1$; $\leq 1.99 = 0$), social anxiety ($> 2.21 = 1$; $\leq 2.21 = 0$), generalised anxiety ($> 2.59 = 1$; $\leq 2.59 = 0$), agoraphobia ($> 2.27 = 1$; $\leq 2.27 = 0$), negative mood/depression ($> 2.43 = 1$; $\leq 2.43 = 0$). That for the Ottawa schools also included RCMASS ($< 0.63 = 1$; $\leq 0.62 = 0$). The cut-off points for all the above mood measures were taken as 1 SD above the mean. Also, London school type (state school = 1; independent school = 0), and mixed sexes in school (mixed sex school = 1; single sex school = 0); Ottawa school type CRCSSB (RC/suburbs) = 1; ORCSSB (RC/inner) = 1; CBE (state/suburbs) = 1.

International Postgraduate Diary

Royal Free Hospital School of Medicine, London

8–12 February 1999, 7–11 June 1999: MRCP Part II course

Details: DG James, Department of Medicine, Royal Free Hospital, Pond Street, London NW3 2QG, UK. Tel + 44 171 830 2108

Queen Charlotte's & Chelsea Hospital, London

5 November 1998: Infant nutrition perspectives

Details: Course Registration Service, PO Box 3219, Barnes, London SW13 9XR, UK. Tel + 44 181 741 1311; fax + 44 181 741 0611; e-mail: CourseRegs@aol.com

Royal College of Physicians of Edinburgh, Edinburgh

2–6 November 1998: MRCP Part II course
Details: Royal College of Physicians of Edinburgh, 9 Queen Street, Edinburgh EH2 1JQ, Scotland, UK. Tel + 44 131 225 7324; fax + 44 131 220 4393

Institute of Psychiatry, The Maudsley Hospital, London

19 November 1998: Career development day for women psychiatrists (meeting)

1 December 1998: The Gudjonsson suggestibility scales (workshop)

7 January 1999: Anxiety disorders: the essentials of behavioural psychotherapy (meeting)

Details: Lee Wilding, Short courses office, Institute of Psychiatry, De Crespigny Park, London SE5 8AF, UK. Tel + 44 171 919 3170; fax + 44 171 740 5172; e-mail L.wilding@iop.bpmf.ac.uk

University of Warwick short courses

14–17 December 1998: Techniques and applications of molecular biology: a course for medical practitioners

Details: Dr Charlotte West, Department of Biological Sciences, University of Warwick, Coventry CV4 7AL, UK. Tel + 44 1203 523540; fax + 44 1203 523701

18th Joint meeting of British Endocrine Societies

12–15 April 1999: Bournemouth, UK
Details: Society for Endocrinology, 17/18 The Courtyard, Woodlands, Almondsbury, Bristol BS12 4NQ, UK. Tel + 44 1454 619036; fax + 44 1454 616071; e-mail: info@endocrinology.org

4th European forum on quality improvement in healthcare and 4th Swedish QUL conference

25–27 May 1999: Stockholm, Sweden
Details: Marchella Mitchell, BMA Conference Unit, BMA House, Tavistock Square, London WC1 9JP, UK. Tel + 44 171 383 6478; fax + 44 171 383 6869; e-mail MMitchell@bma.org.uk

2nd International Symposium on Angiotensin II Antagonism

15–18 February 1999: Queen Elizabeth II Conference Centre, London, UK

Details: The Secretariat, Hampton Medical Conferences Ltd, 127 High Street, Teddington, Middlesex TW11 8HH, UK. Tel + 44 181 977 0011; fax + 44 181 977 0055; e-mail: hmc@btinternet.com

24th International Congress of Internal Medicine

4–9 November 1998: Lima, Peru
Details: Congress Secretariat, Avenue Jose Pardo 138 of 701, Miraflores, Lima, Peru. Tel +51 1444 5158; fax +51 1447 5396

International Institute for Continuing Medical Education

2–5 November 1998: Breast imaging today and tomorrow (Naples, FL)

Details: Ryals & Associates, Inc. PO Box 1925, Roswell, GA 30077-1925, USA. Tel +1 770 641 9773; fax +1 770 552 9859

University of California, San Francisco

5–7 November 1998: Otolaryngology, neurology, and skull base surgery update

9–8 November 1998: 44th Annual group therapy symposium

4/5 December 1998: 10th Annual California trauma conference. Trauma care: then and now

4–6 December 1998: Stabilization and management of the critically ill child

Details: University of California, Office of Continuing Medical Education 1855 Folsom St, MCB Room 630, San Francisco, CA 94143-0742, USA. Tel +1 415 476 4521; fax +1 415 476 0318

University of California, San Diego

30 October–1 November 1998: Breast imaging & interventions update

Details: Ryals & Associates, Inc. PO Box 1925, Roswell, GA 30077-1925, USA. Tel +1 770 641 9773; fax +1 770 552 9859

XIVth Annual Conference of the Indian Rheumatism Association

10–12 December 1998: Hyderabad, India

Details: Dr G Narsimulu, Organising Secretary IRACON-98, Nizam's Institute of Medical Sciences, Punjagutta, Hyderabad 500 082, Andhra Pradesh, South India. Tel + 91 40 332 0332, ext 132; fax +91 40 331 0076

Correction

Statement of Authorship

Crisp AH, Stravraki C, Halek C, Williams E, Sedgewick P, Kiossis I. Smoking and pursuit of thinness in schoolgirls in London and Ottawa. *Postgrad Med J* 1998;74:473–9.

The senior author of the above article, Professor AH Crisp, now feels that the sequence of authors should read: Crisp AH, Halek C, Sedgewick P, Stravraki C, Williams E, Kiossis I, to reflect more accurately the considerable contribution made to the study by Philip Sedgewick.