doi:10.1111/j.1360-0443.2007.02020.x

Value-added education and smoking uptake in schools: a cohort study

Wolfgang A. Markham[1], Paul Aveyard[2], Sherri L. Bisset[3], Emma R. Lancashire[4], Christopher Bridle[5] & Sara Deakin[6]

University of Warwick, UK,[1] Department of Primary Care and General Practice, University of Birmingham, UK,[2] GRIS/Université de Montréal, Montréal (Québec), Canada, H3C 3J7,[3] Department of Public Health and Epidemiology, University of Birmingham, UK,[4] Institute of Clinical Education, Warwick Medical School, University of Warwick, Coventry, UK[5] and West Midlands Public Health Observatory, Birmingham Research Park, UK[6]

ABSTRACT

Aim To show that schools achieving higher examination pass and lower truancy rates than expected, given that their pupil populations (high value-added schools) are associated with a lower incidence of smoking among pupils (13–14 years). **Design** Value-added scores for schools were derived from standardized residuals of two regression equations predicting separately the proportion of pupils passing high school diplomas and the half-days lost to truancy from the socio-economic and ethnic profiles of pupils. The risk of regular smoking at 1- and 2-year follow-up was examined in relation to the value-added score in a cohort of 8352 UK pupils. Random-effects logistic regression was used to adjust for baseline smoking status and other adolescent smoking risk factors. **Setting** A total of 52 schools, West Midlands, UK. **Participants** Year 9 pupils aged 13–14 years ($n = 8352$) were followed-up after 1 year ($n = 7444$; 89.1% of original cohort) and 2 years ($n = 6819$; 84.6% of original cohort excluding pupils from two schools that dropped out). **Measurements** Regular smoking (at least one cigarette per week). **Findings** Schools with high value-added scores occurred throughout the socio-demographic spectrum. The odds ratio (95% confidence interval) for regular smoking for a 1 standard deviation increase in the value-added measure was 0.85 (0.73–0.99) at 1-year and 0.80 (0.71–0.91) at 2-year follow-ups. Baseline smoking status did not moderate this. **Conclusions** Schools with high value-added scores are associated with lower incidence of smoking. Some schools appear to break the strong link between deprivation and smoking. Understanding the mechanisms could be of great public health significance.

Keywords Adolescence, school culture, smoking uptake.

Correspondence to: Wolfgang A. Markham, School of Health and Social Studies, University of Warwick, Coventry CV4 7AL, UK.
E-mail: wolfgang.markham@warwick.ac.uk
Submitted 2 April 2007; initial review completed 24 May 2007; final version accepted 21 August 2007

INTRODUCTION

Over the past 30 years, studies in a number of countries have consistently reported differences in prevalence of smoking between schools, such that the prevalence in some schools was several times greater than in others [1]. A review of these studies concluded that it was unlikely that differences between schools in pupil composition explained this variation [1]. Since then, studies using multi-level models have produced more convincing evidence that variation in smoking prevalence between schools is not due to differences in pupil composition [2,3]. The strongest study followed pupils from primary to secondary school, measured smoking, alcohol consumption, illicit drug use and unhealthy diet and adjusted for prior measures of these behaviours and a very broad range of pupil-level risk factors [2]. West and colleagues found that their comprehensive range of pupil-level risk factors explained very little variation between schools in the prevalence of regular smoking, drinking and illicit drug use during early and mid-adolescence [2]. However, as expected, individual characteristics explained the variation between schools in consumption of a healthy diet [2]. Based on the consistency of the findings, we conclude that some characteristics of the way schools operate have a major role as risk factors for smoking (and probably alcohol and drug use) during adolescence. The aim of this study is to investigate further the relationships between school and school-level variation in smoking prevalence.

The causal factors in schools leading to school-level variation in smoking prevalence are not totally clear. Studies concentrating on tobacco control measures commonly show that restrictions on smoking are associated with reduced prevalence [4,5]. However, in many countries schools ban smoking in all areas, so this is unlikely to form the basis of the observed school-level variations in smoking prevalence. Other studies have found consistently that the quality of relationships between pupils, staff, and between pupils and staff, are associated with smoking prevalence or incidence [1,2,6,7].

We have developed a theory to explain interschool variation in smoking, alcohol use and substance use [8]. This is based on studies of schools' educational effectiveness underpinned by Bernstein's influential theory of cultural transmission [9–11]. Bernstein proposed that schools impart two main types of learning. These are the instructional order, which refers to the acquisition of knowledge and skills, and the regulatory order, which refers to appropriate ways of behaving. We believe it is reasonable to assume that schools which transmit the instructional and regulatory orders effectively will also prevent smoking uptake. This is because pupils who reject these kinds of learning reject the image and identity embodied by the school. Such pupils will, instead, affiliate with youth subcultures, which more typically promote smoking and other substance use than does the cultural identity promoted by the school.

We developed a value-added measure of educational effectiveness to test this idea [12]. This was derived from routinely published school performance data on examination success and truancy. Schools that are effective in transmitting the learning implied by the instructional and regulatory orders would respectively have better than expected examination pass rates and lower truancy rates. However, these rates are influenced mainly by the socioeconomic and other characteristics of pupils [13,14]. Thus, we need to adjust for these characteristics to reveal the degree to which schools are adding educational value. In a previous study, schools that had better than expected examination pass rates had lower than expected truancy rates, so we derived a principal component—an educational value-added score [12]. In this study and a similar study, pupil characteristics explained little or no variation between schools in smoking, alcohol or drug use, as is commonly the case [12,15]. However, schools with higher value-added scores had lower prevalence of all these behaviours and this term explained some variation between schools [12,15]. Here we repeat this analysis in a cohort study. Cohort studies provide stronger evidence of causality because they can adjust for the main risk factor for future smoking—prior use [16].

We have reported previously no association between the school to which a young person belonged and the likelihood that he or she would be smoking at follow-up if he or she was a regular smoker at baseline [3]. However, schools exerted a strong influence on the likelihood of becoming a regular smoker at follow-up among baseline never and occasional smokers. In this paper, we also examine whether the value-added score has a diminished influence on regular smokers.

METHODS

Sampling

We used data from a school smoking prevention and cessation trial where the intervention was ineffective and both intervention and control schools had similar smoking prevalences at follow-up [17,18]. Briefly, 89 schools from the West Midlands, UK were selected randomly with probability proportional to size; 52 (58.4%) participated. In 1997, year 9 (aged 13–14 years) pupils ($n = 8352$; 92.0% of registered year 9 pupils) completed a questionnaire on personal details and smoking habits. The questionnaires were administered by trained personnel under examination conditions. Using an identical questionnaire, we followed-up 1 year later and 2 years later. Two schools dropped out at 2-year follow-up. Thus, we followed-up 7444 pupils (89.1% of the original cohort) after 1 year and 6819 pupils (84.6% of the original cohort, excluding pupils from the two schools that dropped out) after 2 years [17,18].

Smoking status

We used the standard UK question to assess smoking status [19,20]. This question asks pupils which of six descriptions best describes their smoking behaviour, ranging from 'never tried' to 'at least one cigarette a day'. Young people who smoke regularly were defined as smoking regularly at least one cigarette per week. Young people who smoked occasionally were defined as smoking less than one cigarette per week. Following Goddard [21], 'ex-smokers' were classed as young people who smoked occasionally. Participants' responses were checked against other questions on smoking status and only participants with logically consistent responses were included in the analyses (7147 pupils at 1-year follow-up, 96.0% of those followed-up; and 6785 pupils at 2-year follow-up, 99.5% of those followed-up).

School-level measure of value-added education

Nationally available data on schools' examination results and schools' truancy rates were used to assess value-added education. Schools' ability to transmit the instructional order was derived from the proportion of year 11 pupils (aged 15–16) in each school who pass at least five General Certificate of Secondary Education (GCSE)

examinations with A–C grades (5A–C), which is the equivalent of a high school diploma. Schools' ability to transmit the regulatory order was derived from truancy rates (the number of half-days lost to truancy as a proportion of all half-days that could have been attended). Five-year averages (1995–1999) of these indicators were used to improve reliability. The median and range of 5A–Cs and truancy rates were similar in participating and non-participating schools. We chose 5A–C and truancy rates because every school in England is required by law to collect and report accurately the proportion of pupils who achieve at least five GCSEs at A–C grades and the number of half-days schooling that are lost to unauthorized absences. These data are published and available to the public. We believe that inaccurate recording of these data is unlikely, because this is standard practice and all schools are inspected regularly.

We used the same method to assess value-added education as in the previous investigation, which had two steps [12,15] described briefly here.

Step 1

Two logistic regression models were created using school-level 5A–C and truancy rates as outcomes with four indicators of the social profile of each school's pupil population as predictors. These predictors were the proportion of white pupils, proportion of females, an area-based deprivation score (the Townsend score of pupils' ward of residence; approximately 2330 households) and the proportion of mothers who smoked. Socio-economically disadvantaged women are more likely to smoke, so this variable acts as another marker of pupils' socio-economic status. Schools do not publish routinely data on pupil social profile indicators, so these data were aggregated for each school from our survey. The standardized residuals from these two logistic regression models represent the difference between the observed 5A–C and observed truancy rates and what would be expected based upon the pupil socio-demographic profile of each school.

Our sample had relatively few schools. To improve precision, we included the 166 schools used in our cross-sectional study [12] as well as the 52 schools in this cohort study in the regression equations to assess value-added education provided by the 52 schools in the cohort study. The cross-sectional study was conducted during the year prior to the cohort study in the same area (West Midlands). Questionnaires containing similar or identical health behaviour and social profile questions to the cohort study were administered similarly to a random sample of pupils from the same year (year 9). The same school performance data collected over the same years were used for both samples of schools and the ranges and the medians of the school performance data were similar for the participating schools in both samples. We recalculated value-added scores using only data on the 52 schools in this study; the results were similar and are not reported.

Step 2

Examination of the standardized residuals produced from these two logistic regression models showed that schools achieving better than expected examination results also achieved lower than expected truancy rates. We have reported the same finding previously [12]. Principal components analysis identified a single factor that explained 65% of the variance and had factor loadings of +0.81 for 5A–C and −0.81 for truancy residuals. This continuous variable was termed the 'value-added score', and reflects both examination success and truancy rates. By definition, a school with a principal component or value-added score of zero would have observed examination results and truancy rates that would not have differed from the expected examination results and truancy rates when expectations are based on the social profile of the pupil population. While +1 represents a school with performance 1 standard deviation (SD) above average, −1 represents a school with performance 1 SD below average.

The influence of the value-added score on pupil-level regular smoking at 1- and 2-year follow-up

All modelling was performed using Multilevel Modelling for Windows (MLwiN) with second-order penalized quasi-likelihood methods. A random-effects logistic regression model (unadjusted model) was created to examine the influence of the value-added term on the risk of regular smoking at 1- and 2-year follow-up. The predictors in these models were an intercept, random across schools; fixed-effect dummy terms for arm (intervention or control school) and occasional smoker status at baseline; a random-effects dummy term for regular smoking status at baseline; and a fixed-effect term for the value-added score. Making regular smoking status random allows the effects of school membership to be larger for pupils who were smoking at baseline than for those who were not smoking at baseline, or vice versa. We have shown previously in these data that this extra complexity fitted these data more effectively [3]. The significance of the value-added term was tested by calculating the odds ratio (OR) 95% confidence interval (95% CI) for a 1 SD increase in the value-added score.

The influence of pupil-level predictors on regular smoking at outcome

Confounding may arise because pupils with many risk factors for smoking congregate in particular schools. For

both 1- and 2-year follow-up models, we adjusted for gender, age, ethnicity, deprivation based on census derived characteristics of the enumeration district of each pupil's residence, maternal, paternal and other relatives' smoking habits (the adjusted models). The significance of the value-added term was again tested using the OR (95% CI) for a 1 SD increase in our value-added score.

School-level smoking prevalence at 1- and 2-year follow-up

From the unadjusted models, we calculated the probability of pupils' smoking in three illustrative schools, if all other risk factors were equal. The probability could also be viewed as the prevalence. Schools were categorized as having a value-added score +1 SD and greater (high value-added schools), −1 SD and lower (low value-added schools), and the intermediate group (medium value-added schools) The median score for each group was used to calculate probability/prevalence.

Does the influence of value-added education vary according to pupil baseline smoking status?

The adjusted models above imply that the value-added score had proportionately equal influence on the odds of smoking at outcome on all pupils, regardless of baseline smoking status. We added a baseline regular smoking × value-added score interaction term to the adjusted models and examined whether the influence of value-added school membership had a lesser influence on those already smoking at baseline. We tested the significance of the interaction term using the Wald statistic.

RESULTS

Characteristics of the pupil populations of the participating schools

The characteristics of the pupil populations of participating schools are summarized in Table 1. No significant correlation was observed between the value-added score and each socio-demographic marker (data not shown), indicating that schools with high value-added scores occurred throughout the ranges of each socio-demographic characteristic.

The influence of value-added education on pupil-level regular smoking at 1- and 2-year follow-up

At 1-year follow-up, the OR (95% CI) for regular smoking for a 1 SD increase in value-added score was 0.90 (0.78–1.05) (unadjusted), and 0.85 (0.73–0.99) when adjusted for pupil-level smoking risk factors. At 2 years, the ORs (95% CI) were 0.85 (0.74–0.96) (unadjusted) and 0.80 (0.71–0.91) (adjusted).

Table 1 Characteristics of the pupil populations of the participating schools.

	Mean	*Standard deviation*
Proportion of white pupils*	86%	19%
Townsend score†	1.25	2.9
Proportion of mothers who smoke	29%	9%
5A–C GCSE average	44%	16%
Truancy average	0.9%	0.8%
Value-added score	0.30	0.78

*Distribution skewed median = 94% interquartile range = 12%. †By definition, Townsend score has a mean of zero with positive values indicating greater socio-economic deprivation. The standard deviation is not standardized.

School-level smoking prevalence at 1- and 2-year follow-up

The modelled prevalence of regular smoking at 1- and 2-year follow-ups for young people who at baseline had never smoked, smoked occasionally and smoked regularly in high, medium and low value-added schools are shown in Table 2. These figures mean that relative to low value-added schools, high value-added schools had 14.3% fewer students who smoked regularly at 1-year follow-up and 27.6% fewer students who regularly smoked at 2-year follow-up.

Does the influence of value-added education vary according to pupil baseline smoking status?

The regular smoking × value-added score interaction term was not significant at either 1-year ($\chi^2 = 0.002$; $P = 0.96$) or 2-year follow-up ($\chi^2 = 0.36$; $P = 0.55$). The OR for a 1 SD increase in the value-added score at 1-year follow-up for occasional/never smoking was 0.85 and for regular smoking was 0.85. The OR for a 1 SD increase in the value-added score at 2-year follow-up for occasional/never smoking was 0.79 and for regular smoking was 0.87.

DISCUSSION

Schools with better than expected school-level examination results and truancy rates, given the socio-demographic characteristics of their pupil populations (high value-added schools), were associated with a lower incidence of regular smoking. These observations were made after adjustment for both baseline smoking status and several other pupil-level smoking risk factors. The association between high value-added education and future smoking was similar for students who at baseline had never, occasionally and regularly smoked.

This study highlights the importance of school as a social institution on academic attainment, behaviour and

Table 2 The modelled follow-up percentage prevalence of students who smoke regularly according to baseline smoking status and type of school attended.

	Type of school		
	Low value-added schools percentage	*Medium value-added schools percentage*	*High value-added schools percentage*
1-year follow-up			
Baseline never smoke	5.4	4.8	4.0
Baseline occasionally smoke	26.2	23.8	20.4
Baseline regularly smoke	79.9	77.7	74.1
Total prevalence of students who smoke regularly	19.6	18.3	16.8
2-year follow-up			
Baseline never smoke	9.4	7.7	5.6
Baseline occasionally smoke	34.7	30.2	23.6
Baseline regularly smoke	79.2	75.6	68.8
Total prevalence of students who smoke regularly	24.6	21.8	17.8

health-related behaviours. Our findings are consistent with other quantitative studies that have highlighted the relationships between smoking prevalence at school- and pupil-level and disengagement from school at school- and pupil-level [2,22,23]. The relationships between orientation towards schooling/education and teenage smoking have also been highlighted in qualitative studies [24,25]. Belonging to a school with higher engagement/identification levels appears to result in a given pupil being more likely to be engaged with the school and this pupil is, consequently, less likely to smoke. Engagement with school may arise as a consequence of closer supervision or oppressive school regimes [12]. Alternatively, engagement may be related to school connectedness which focuses upon improved quality of relationships between pupils and between pupils and staff [6,7,12]. Our findings also build upon those of other studies [3], as they indicate that even when a given pupil has disengaged from school and chosen to smoke regularly, the school still has the potential to influence pupils' smoking decisions. Pupils who smoke regularly are most likely to give up smoking in schools providing high value-added education.

Implications for policy

Schools providing high value-added education and low value-added education occurred throughout the socio-demographic spectrum and ranges of 5A–C results and truancy rates. Many of the schools that provided high value-added education and were thus associated with a lower risk of smoking, in this and our previous investigation [12], served very disadvantaged communities. These schools had examination pass and truancy rates that would be regarded widely as very poor and were among the very worst in our samples. However, these examination pass and truancy rates are predominantly a function of the social disadvantage of the pupils who attend the schools [13,14]. If our findings are causal, this implies that some schools are breaking the strong link between social disadvantage and smoking during adolescence [26]. If we could gain greater understanding of the mechanisms by which high value-added schools influence pupils, this would be of enormous public health significance. This information could inform the development of future initiatives that focus upon school connectedness/engagement and aim to promote academic attainment, reduce substance use and possibly reduce antisocial behaviour [23,27].

The measure of value-added education

We are confident that our measure of value-added education is based on accurately recorded data. The examination and truancy data we used were an average over a 5-year period. Misreporting or manipulating these data systematically over 5 years is improbable. Our measure could have been improved had we used more indicators of successful transmission of both the instructional order (5A–C) and the regulatory order (truancy rates). However, no other indicators of these constructs are, by law, collected routinely by every school in the United Kingdom.

Strengths and weaknesses of the study

Ideally, all invited schools would have participated in the study. We observed an association between value-added score and smoking incidence. If, overall, the true situation was that there was no association, then the reverse association must pertain in the non-included schools. That is, if we observe a relationship between value-added

status and smoking in the 60% of schools observed, to have no overall association in the whole population, we need to assume that the association in the 40% of schools not observed is in the opposite direction. Furthermore, it must be 60/40 = 1.5 times as strong to produce no association overall. It is more plausible that the association also holds in non-included schools. The schools that did/did not participate did not differ on available data (5A–Cs and truancy rates) in meaningful ways, suggesting little selection bias.

The major threat to the validity of observational epidemiology is confounding. We adjusted for eight pupil-level smoking risk factors including the strongest risk factor, baseline smoking status [16]. Adjusting for baseline smoking status enabled us to control for some unknown confounders that cause experimentation with smoking. Nevertheless, we would, ideally, have adjusted for additional pupil-level smoking risk factors, especially aspects of parenting, were such data available. Particularly effective parents might encourage their children to attend high value-added schools, thus spuriously creating the association between value-added education and smoking. However, in England, most children attend their nearest school and where parental choice is exercised it is based primarily upon examination performance. School achievement measures (raw observed 5A–C results and truancy rates) were unrelated to pupils' smoking in this study (data available on request), as in our cross-sectional study [12]. Many high value-added schools had very poor examination results, and value-added data were not available to parents. Hence, it seems unlikely that parents would have chosen many of the high value-added schools.

There were other pupil-level risk factors that were not adjusted for that could have explained these results. We have argued [1], as have others [2], that adjusting for peer attitudes and behaviour is inappropriate, as peers generally attend the same school and are exposed to the same school factors. Adjusting for eight pupil-level risk factors only strengthened the relationship between value-added education and the odds of smoking. It therefore seems unlikely that further adjustment for unmeasured pupil-level confounders would attenuate this association completely. It is, however, possible that our measure of value-added education is associated with other school-level factors that are the true explanation of our observed association.

CONCLUSION

Future research should develop direct measures of school culture to identify how school's policies and practices influence pupils' perceptions of their schooling and then influence their acceptance or rejection of the school's values and, we propose, valued school identities. Such research has the potential to have broad influences for good on social, educational and psychological outcomes that could have important effects on public health.

Acknowledgements

The Health Authorities of West Midlands funded the trial but the subsequent analysis of the resulting data received no special funding. The funders had no input into the study design; in the collection, analysis and interpretation of data; in writing the report; or in the decision to submit the paper. The views expressed in this article are independent of the views of the funders. All authors declare that there are no conflicts of interest in that there are no financial or personal relationships with other people or organizations that inappositely bias their work on this paper.

References

1. Aveyard P., Markham W. A., Cheng K. K. A methodological and substantive review of the evidence that schools cause pupils to smoke. *Soc Sci Med* 2004; **58**: 2253–65.
2. West P., Sweeting H., Leyland A. School effects on pupils' health behaviours: evidence in support of the health promoting school. *Res Pap Educ* 2005; **19**: 261–91.
3. Aveyard P., Markham W. A., Lancashire E., Almond J., Griffiths R., Cheng K. K. Is inter-school variation in smoking uptake and cessation due to differences in pupil composition? A cohort study. *Health Place* 2005; **11**: 45–54.
4. Charlton A., While D. Smoking prevalence among 16–19 year-olds related to smoking policies in sixth forms and further education. *Health Educ J* 1994; **53**: 28–39.
5. Moore L., Roberts C., Tudor-Smith C. School smoking policies and smoking prevalence among adolescents: multilevel analysis of cross-sectional data from Wales. *Tob Control* 2001; **10**: 117–23.
6. Resnick M. D., Bearman P. S., Blum R. W., Bauman K. E., Harris K. M., Jones J. *et al.* Protecting adolescents from harm: findings from the National Longitudinal Study on Adolescent Health. *JAMA* 1997; **278**: 823–32.
7. Bond L., Patton G., Glover S., Carlin J. B., Butler H., Thomas L. *et al.* The Gatehouse Project: can a multilevel school intervention affect emotional wellbeing and health risk behaviours? *J Epidemiol Commun Health* 2007; **58**: 997–1003.
8. Markham W. A., Aveyard P. A new theory of health promoting schools based on human functioning, school organisation and pedagogic practice. *Soc Sci Med* 2003; **56**: 1209–20.
9. Bernstein B. *Class, Codes and Control*. Vol. 3. Towards a Theory of Educational Transmission. London: Routledge and Kegan Paul; 1977.
10. Bernstein B. *Pedagogy, Symbolic Control and Identity*. London: Taylor & Francis; 1996.
11. Daniels H., Holst J., Lunt I., Ulsoe-Johansen L. A comparative study of the relation between different models of pedagogic practice and constructs of deviance. *Oxford Rev Educ* 1996; **22**: 63–77.
12. Aveyard P., Markham W. A., Sherratt E., Bullock A., Macarthur C., Cheng K. K. The influence of school culture

on smoking amongst pupils. *Soc Sci Med* 2004; **58**: 1767–80.
13. Gripps C., Murphy P. *A Fair Test? Assessment, Achievement and Equity.* Buckingham: Oxford University Press; 1994.
14. Gaine C., George R. *Gender, Race and Class in Schooling. A New Introduction.* London: Falmer Press; 1999.
15. Bisset S., Markham W. A., Aveyard P. School culture as an influencing factor on youth substance use. *J Epidemiol Community Health* 2007; **60**: 485–90.
16. McNeill A. D., Jarvis M. J., Stapleton J. A., Russell M. A., Eiser J. R., Gammage P. *et al.* Prospective study of factors predicting uptake of smoking in adolescents. *J Epidemiol Commun Health* 1989; **43**: 72–8.
17. Aveyard P., Cheng K. K., Almond J., Sherratt E., Lancashire R., Lawrence T. *et al.* A cluster-randomised controlled trial of an expert system based on the transtheoretical ('stages of change') model for smoking prevention and cessation in schools. *BMJ* 1999; **319**: 948–53.
18. Aveyard P., Sherratt E., Almond J., Lawrence T., Lancashire R., Griffin C. *et al.* The change-in-stage and updated smoking status results from a cluster-randomized trial of smoking prevention and cessation using the transtheoretical model among British adolescents. *Prev Med* 2001; **33**: 313–24.
19. Bewley B. R., Day I., Ide L. *Smoking by Children in Great Britain—A Review of the Literature*. London: Social Science Research Council; 1973.
20. Leventhal H., Cleary P. The smoking problem: a review of the research and theory in behavioral risk modification. *Psychol Bull* 1980; **88**: 370–405.
21. Goddard E. *Why Children Start Smoking. An Enquiry Carried Out by Social Survey Division of OPCS on Behalf of the Department of Health*. London: HMSO; 1990.
22. Aveyard P., Markham W. A., Almond J., Sherratt E., Griffiths R., Cheng K. K. The risk of smoking in relation to engagement with a school-based smoking intervention. *Soc Sci Med* 2003; **56**: 869–82.
23. Hawkins J. D., Kosterman R., Catalano R. F., Hill K. G., Abbot R. D. Promoting positive adult functioning through social development intervention in childhood: long-term effects from the Seattle Social Development Project. *Arch Pediatr Adolesc Med* 2005; **159**: 25–31.
24. MacDonald M., Wright N. E. Cigarette smoking and the disenfranchisement of adolescent girls: a discourse of resistance? *Health Care Women Int* 2002; **23**: 281–305.
25. Michel L. Loud sad mad or bad: young people's perceptions of peer group and smoking. *Health Educ Res* 1997; **12**: 1–14.
26. Sweeting H., West P. Social class and smoking at age 15: the effect of different definitions of smoking. *Addiction* 2001; **96**: 1357–9.
27. Charlton A. Why are school-based, youth-centred smoking interventions not as effective as we hoped? Some ideas for research. *Int J Health Promot Educ* 2000; **38**: 124–8.