

## The social determinants of adolescent smoking in Russia in 2004

Olga Kislitsyna · Andrew Stickley · Anna Gilmore ·  
Martin McKee

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### Abstract

**Objectives** To determine the prevalence of adolescent smoking in the Russian Federation and examine what factors are associated with it.

**Methods** Data were drawn from Round 13 of the Russia Longitudinal Monitoring Survey (RLMS) carried out in 2004. The sample consists of 815 adolescents (430 boys, 385 girls) aged 14–17 years who answered questions about their health behaviours.

**Results** Smoking was more prevalent among boys than girls (26.1 vs. 5.7%). Maternal smoking and adolescent alcohol use were associated with smoking among both sexes. The self-assessment of one's socioeconomic position as unfavourable was associated with girls' smoking, while

living in a disrupted family, physical inactivity and having a low level of self-esteem were predictive of boys' smoking. **Conclusions** The family environment appears to be an important determinant of adolescent smoking in Russia. In particular, boys and girls may be modelling the negative health behaviour lifestyles of their parents, with unhealthy behaviours clustering. Efforts to reduce adolescent smoking in Russia must address the negative effects emanating from the parental home whilst also addressing associated behaviours such as alcohol use.

**Keywords** Russia · Smoking · Adolescent · Alcohol · Family environment

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O. Kislitsyna (✉)

Institute for Social and Economic Studies of Population,  
Russian Academy of Sciences, 32 Nakhimovskii Prospect,  
Moscow 117218, Russia  
e-mail: olga.kislitsyna@gmail.com

A. Stickley

Stockholm Center on Health of Societies in Transition  
(SCOHST), Södertörn University, 141-89 Huddinge, Sweden

A. Stickley

Department of Global Health Policy, Graduate  
School of Medicine, University of Tokyo,  
7-3-1 Hongo, Bunkyo-ku,  
Tokyo 113-0033, Japan

A. Gilmore

School for Health, University of Bath, Claverton Down,  
Bath BA2 5AX, UK

M. McKee

European Centre on Health of Societies in Transition  
(ECOHST), London School of Hygiene and Tropical  
Medicine, Keppel Street, London WC1E 7HT, UK

### Introduction

Although adolescent smoking is widespread in every part of the world (Global Youth Tobacco Survey Collaborative Group 2002), the prevalence of current smoking is especially high in the World Health Organization's European Region (Warren et al. 2006). In particular, rates of smoking (among males) are extremely high in the countries of the former Soviet Union such as Russia (Global Youth Tobacco Survey Collaborative Group 2002). The percentage of males aged 13–15 who currently smoked (used cigarettes or other tobacco products on  $\geq 1$  of the preceding 30 days) was fourth highest in the Russian Federation from among 121 sites around the world in the period 1999–2002 (Global Youth Tobacco Survey Collaborating Group 2003). Although adolescent male smoking rates were already high in the period before the collapse of the Soviet Union in 1991 (Hearn et al. 1991), some evidence suggests that small increases nevertheless occurred in the late 1980s and through the 1990s (Tkachenko and Prokhorov 1997). The prevalence of

smoking is currently much lower amongst Russian girls than boys, but evidence suggests that it has risen more sharply in the post-Soviet period (Rogacheva et al. 2008)—mirroring the marked rise recorded among Russian women (Perlman et al. 2007). Such increases would also be consistent with the decrease in the age of smoking initiation observed in younger female birth cohorts (Perlman et al. 2007). Moreover, one recent study has even indicated that there may now be little difference between the prevalence of boys' and girls' smoking in Russia (Baška et al. 2009).

It seems likely that the persistence of high rates of smoking among Russian boys and increasing rates among Russian girls are, at least in part, a consequence of policies pursued by transnational tobacco corporations. Since entering the Russian market in the early 1990s they have focussed their efforts on those segments of the population with the greatest potential for market growth: young people and women (Gilmore and McKee 2004). However, regardless of the precise reasons, the current situation in Russia is deeply worrying from a public health perspective. Western research has linked smoking in adolescence to both smoking in adulthood (Chassin et al. 1996) and, unsurprisingly, adverse health outcomes (Strand et al. 2004), with evidence suggesting that starting before the age of 15 years doubles the risk of lung cancer compared with those starting five or more years later (Peto et al. 2000). If an increasing number of young people are now smoking, many of them heavily, it will further exacerbate the terrible impact that smoking already has on public health in Russia. It has been estimated that between 1980 and 2000 nearly six million people died as a result of smoking in the Russian Federation and currently over 300,000 deaths are attributed to smoking annually (Peto et al. 2006).

Against this background the aim of the current study is twofold. First, to determine the prevalence of smoking among 14- to 17-year-olds. Second, to examine which factors are associated with smoking among Russian adolescents. Determining which elements underpin smoking among young people is an important first step in any attempts to stop the spread of this practice particularly given the importance of young people to the tobacco industry. The key advantage of this paper over existing studies is that it focusses on the determinants of adolescent smoking using a sample drawn from across the Russian Federation, rather than from single sites/regions as has previously been the case (King et al. 1996; Rogacheva et al. 2008).

## Methods

### Data

The data in this study come from phase II of the Russia Longitudinal Monitoring Survey (RLMS). This is a

nationally representative survey designed to determine how the social and economic changes that have occurred in post-Soviet Russia have affected the population across time. This survey is coordinated by the Carolina Population Center at the University of North Carolina. The present study makes use of data from Round 13 of the RLMS undertaken between September and December 2004.

A multi-stage (random) probability sample was used to obtain respondents from 38 population points called primary sampling units (PSUs) across Russia (containing 95.6% of the population after remote and/or inaccessible areas, e.g. Chechnya, were removed). Moscow city, Moscow Oblast and St. Petersburg city were selected as automatic sampling areas while individual districts from the remaining 35 PSUs were selected using the 'probability proportional to size' (PPS) method, i.e. the probability that a district would be selected was proportional to its population size.

Within each PSU the population was stratified into its urban and rural components called second-stage units (SSUs) with the target sample size being allocated proportionally. In rural areas a list of all villages was created to serve as the SSUs, while in urban areas the 1989 census enumeration districts were used for the same purpose. Within these SSUs, housing lists compiled by the researchers were used as a basis for the random sampling of addresses.

The survey collects data on both households and individuals. The information collected from individuals relates to such things as their employment status, demographic characteristics, anthropometry, health and health behaviours. Individual questionnaires were administered to every person living in the household (except for the very young and old). Those aged 14 and above self-completed the questionnaire after their parents provided informed consent for their participation. Household (and within them, individual) response rates have been very high at the beginning of phase II of the survey. A fuller description of the sampling methodology is available on the RLMS website (Russia Longitudinal Monitoring Survey 2010). In the present study, data from 815 adolescent respondents (430 boys and 385 girls) aged between 14 and 17 is utilised.

### Measures

To obtain information about adolescents' smoking the respondents were asked, "In the last 7 days have you smoked anything?" with subsequent questions clarifying that this referred to tobacco. Those who responded 'yes' are classified as weekly smokers in the present study.

Information was also collected on a number of other variables that have been examined previously in relation to adolescent smoking. Data were gathered on family structure

with families being subsequently divided into three types: two-parent families consisting of both biological parents; two-parent families with step-parents; and disrupted families/families consisting of other relatives. To assess the socio-economic situation that the adolescents (and by extension their families) found themselves in, the following question was used: "Tell me, please: how satisfied are you with your economic conditions at the present time?" Respondents who answered either "fully satisfied" or "rather satisfied" were classified as being materially satisfied. Information on maternal smoking was obtained directly from the adolescents' mothers. The mothers were subsequently classified as being current (defined as weekly smoking), former or never smokers. We did not examine paternal smoking because of the high frequency of absent fathers.

To ascertain whether the adolescents drank alcohol they were asked, "In the last 30 days have you consumed alcoholic beverages?" Those who answered "yes" are classified as users of alcohol in this study. Information was also obtained about the degree of physical exercise the

adolescents engaged in each week. Those who undertook any regular activity during out-of-school hours [ranging from light (i.e. less than three times per week) through to intensive (at least 30 min a day) physical activity] are classified as being physically active. Data on the level of self-esteem among the respondents was obtained by asking them if they agreed or disagreed with the statement, "I think I don't have many things to be proud of". Those who agreed are classified as exhibiting low self-esteem. The adolescents were also classified in terms of their place of residence i.e. as coming from either urban or rural areas. Urban residence was further sub-divided into those who came from the largest metropolitan centres—Moscow and St. Petersburg—and those who came from 'other' urban regions.

#### Statistical analysis

Details of the respondents' baseline characteristics and the prevalence of smoking are presented in Table 1. Chi-square tests were used to determine if there were significant

**Table 1** Adolescent respondents' baseline characteristics and the prevalence (%) of smoking, 2004, Russia (data from Round 13 of the Russia Longitudinal Monitoring Survey)

Variable	Boys ( <i>n</i> = 385)	Girls ( <i>n</i> = 430)	All	$\chi^2$	<i>P</i> value
Age				2.590	0.459
Mean (s.d.)	15.53 (1.12)	15.49 (1.12)	15.51 (1.12)		
Place of residence (%)				1.370	0.503
Moscow/St. Petersburg	14.5	13.0	13.8		
Other urban	48.9	52.9	50.8		
Rural	36.7	34.1	35.4		
Socioeconomic position (%)				0.148	0.701
Satisfactory	56.3	55.0	55.7		
Unsatisfactory	43.7	45.0	44.3		
Adolescent alcohol use (%)				0.820	0.365
Yes	25.6	22.9	24.3		
No	74.4	77.1	75.7		
Adolescent physical activity (%)				0.039	0.840
Yes	31.1	31.7	31.4		
No	68.9	68.3	68.6		
Adolescent self-esteem (%)				0.059	0.807
Low	73.9	73.1	73.5		
High	26.1	26.9	26.5		
Maternal smoking (%)				4.044	0.132
Never smoker	73.5	69.1	71.4		
Former smoker	6.8	10.9	8.7		
Current smoker	19.7	20.1	19.9		
Family structure (%)				0.022	0.989
Two-parent family	59.0	59.1	59.1		
Two-parent family (step-parents)	11.1	10.8	10.9		
Disrupted family/other relatives	29.9	30.1	30.0		
Smoking status (%)				62.06	0.000
Yes	26.1	5.7	16.4		
No	73.9	94.3	83.6		

s.d. Standard deviation

differences between male and female sample characteristics and the prevalence of weekly smoking. Logistic regression analysis was used to examine if any of the independent variables described above were associated with adolescent smoking, with males and females being examined separately. Two separate models are presented for each gender. In Model 1, bivariate analyses (controlling only for age) were carried out, while in Model 2, multivariate analyses were undertaken i.e. controlling for all the other variables in the model. As households rather than individuals were sampled, a Huber–White sandwich estimator was subsequently used to examine the potential effects of data clustering on outcome estimates. The initial results remained unaffected and are thus presented.

## Results

### Sample size and characteristics

The mean age of the adolescent respondents was 15.5 years (see Table 1). Most adolescents lived with their biological parents in two-parent families, although approximately a third had no father living with them. Just over half of the respondents were satisfied with their economic circumstances (55.7%), while the vast majority of the adolescents' mothers had never smoked. Nearly one-quarter of all respondents had consumed alcohol in the previous month, and a slightly higher percentage (31.4%), regularly engaged in physical activity. Nearly three-quarters of both boys and girls exhibited a low level of self-esteem. Finally, a majority of respondents lived in urban locations. There were no statistically significant differences observed between the sexes for any of these variables.

### Prevalence of smoking

Across the whole of Russia 16.4% of adolescents were current weekly smokers in 2004. The prevalence of smoking was almost five times greater among boys compared to girls (26.1 vs. 5.7%,  $P < 0.000$ ).

### Factors associated with adolescent smoking

The factors associated with adolescent smoking are presented in Table 2. From the age of 14 with each passing year the odds of smoking doubled for boys and trebled for girls. The influence of residential location differed by sex. In the age-adjusted model, living in urban areas had a significant protective effect against smoking for boys (OR = 0.51; CI: 0.31–0.81, while living in Moscow and St. Petersburg increased the odds of smoking for girls (OR = 4.07; CI: 1.20–13.78). In the fully adjusted model,

however, these odds ratios were attenuated somewhat and were no longer significant. Although socioeconomic position was not significant in Model 1, when all the other variables were adjusted for in Model 2, being dissatisfied with their economic circumstances increased the odds of smoking amongst girls by over four times (OR = 4.08; CI: 1.13–14.69). This suggests a strong interaction effect with other variables acting to amplify the effects of socioeconomic dissatisfaction. No significant effect of socioeconomic dissatisfaction was found among boys.

For both sexes the use of alcohol was strongly associated with an increased risk of smoking (boys OR = 3.91; CI: 2.13–7.15; girls OR = 7.05; CI: 2.06–24.07). In contrast, other factors predicted smoking among boys but not among girls: physical exercise during out-of-school hours had an important protective effect against smoking (OR = 2.14; CI: 1.16–3.92 for those who were not physically active), while low self-esteem increased the odds of smoking by a factor of 2.66 (CI: 1.41–5.00). The probability of smoking was greater for adolescents whose mothers were current smokers, especially among girls (boys OR = 2.43; CI: 1.21–4.89; girls OR = 9.51; CI: 2.42–37.37). Finally, living in a disrupted family or with other relatives increased the odds of smoking for both sexes in Model 1 but in the fully adjusted model (Model 2) the result remained significant only for boys (OR = 2.70; CI: 1.40–5.21).

## Discussion

This study examined the prevalence of smoking and the factors associated with it among adolescents aged 14–17 in the Russian Federation in 2004. Our finding that 26% of boys are weekly smokers accords with the result from a study undertaken across a number of regions of Russia in 2006 where 27% of 15-year-old boys were found to be weekly smokers. However, the prevalence of weekly smoking we recorded among girls was much lower than in this aforementioned study where 21% of 15-year-old females were weekly smokers (Currie et al. 2008). This highlights one of the possible limitations of the current study—that data were collected within households rather than schools, which may have resulted in some girls concealing their true smoking status as it is still less culturally acceptable for females to smoke in Russia (Kempainen et al. 2006).

The finding that smoking increases with age mirrors that from earlier studies in Russia (Pärna et al. 2003), as does the much greater prevalence of smoking recorded among boys compared with girls (McDermott et al. 1998). When girls' and boys' data were entered into the same age-adjusted model it showed that boys were nearly 6.5 times

**Table 2** Factors associated with adolescent smoking in Russia in 2004 (data from Round 13 of the Russia Longitudinal Monitoring Survey)

	Model 1		Model 2	
	Boys ( <i>n</i> = 430)	Girls ( <i>n</i> = 385)	Boys ( <i>n</i> = 430)	Girls ( <i>n</i> = 385)
Age <sup>a</sup>	2.07 (1.65–2.59)	1.99 (1.25–3.16)	2.11 (1.58–2.82)	3.02 (1.43–6.39)
Place of residence				
Rural	1	1	1	1
Moscow/St. Petersburg	0.67 (0.33–1.34)	4.07 (1.20–13.78)	0.56 (0.22–1.41)	2.45 (0.50–11.95)
Other urban	0.51 (0.35–0.81)	1.30 (0.43–3.95)	0.55 (0.29–1.04)	0.72 (0.18–2.87)
Socioeconomic position				
Satisfactory	1	1	1	1
Unsatisfactory	1.55 (0.97–2.45)	1.68 (0.67–4.21)	1.31 (0.73–2.35)	4.08 (1.13–14.69)
Adolescent alcohol use				
No	1	1	1	1
Yes	5.19 (3.13–8.60)	2.65 (1.14–6.88)	3.91 (2.13–7.15)	7.05 (2.06–24.07)
Adolescent physical activity				
Yes	1	1	1	1
No	2.69 (1.66–4.37)	1.36 (0.55–3.34)	2.14 (1.16–3.92)	0.72 (0.23–2.28)
Adolescent self-esteem				
High	1	1	1	1
Low	3.43 (2.06–5.71)	0.96 (0.36–2.55)	2.66 (1.41–5.00)	1.68 (0.47–5.97)
Maternal smoking				
Never smoker	1	1	1	1
Former smoker	2.25 (0.88–5.71)	1.13 (0.13–9.85)	2.71 (0.93–7.96)	0.94 (0.09–9.54)
Current smoker	2.68 (1.45–4.95)	7.02 (2.43–20.32)	2.43 (1.21–4.89)	9.51 (2.42–37.37)
Family structure				
Two-parent family	1	1	1	1
Two-parent family (step parents)	1.73 (0.83–3.64)	3.31 (0.90–12.16)	1.75 (0.74–4.16)	2.21 (0.45–10.83)
Disrupted family/other relatives	2.40 (1.45–3.97)	3.28 (1.22–8.80)	2.70 (1.40–5.21)	3.17 (0.84–11.92)

Results are presented in the form of odds ratios with 95% confidence intervals in parentheses

<sup>a</sup> Entered as a continuous variable

more likely to be smokers (OR = 6.41; CI: 3.19–10.51) (data not shown). This gender difference in adolescent smoking has also been observed in other Eastern European countries (King et al. 1996) and reflects the marked gender differences seen in adult smoking. It has been suggested that it may result from cultural beliefs about the acceptability of smoking in Russia (Kempainen et al. 2002). Alternatively, it may stem from the success of marketing in reinforcing the view, in part based on role models, that smoking is normal for adolescents males (McDermott et al. 1998) in much the same way as it is for men in Russia (Perlman et al. 2003). This notion concerning the potential modelling and normalisation of smoking gains support from the very high rates of adult male smoking to which boys are exposed (around 60% of adult males in Russia smoke) (Perlman et al. 2007) and the numerous social situations in which smoking occurs in Russia. Moreover, a recent study has shown that children are comparatively more exposed to regular indoor tobacco smoke and

paternal smoking in Russia than in some other countries (Hugg et al. 2008).

Greater smoking among boys may also be related to its social image (McDermott et al. 1998). We found a significantly greater frequency of smoking among adolescent boys with low self-esteem. Previous research has shown that Russian adolescents rate themselves much lower on this measure when compared with children from other countries (Slobodskaya 1999). It has been suggested that Russian children (especially boys) may develop low self-esteem as they are subjected to frequent criticism, teachers fail to praise pupils for their efforts, and mothers appreciate their children's social skills, abilities and performance of various activities less than in other countries (Slobodskaya 1999). In such circumstances, it is possible that some boys may initiate smoking in an attempt to boost their social image, especially as among many school children in Russia smoking is associated with being a 'real' man (Prokhorov and Alexandrov 1992) looking 'cool' and being more

'grown up' (Rogacheva et al. 2008). In addition, some previous research suggests that those with low self-esteem may also be unable to resist the social pressure from peers to start smoking (Carvajal et al. 2000). In Russia, adolescents have a significant amount of freedom as regards their peer relations and leisure activities (Holloway et al. 2008) and a best friend's smoking is also a strong predictor of adolescent smoking (Kempainen et al. 2006).

Maternal smoking was associated with boys' and especially, girls' smoking. This association has been observed in an earlier study of adolescent smoking in Russia (Kempainen et al. 2006). Several ways have been proposed in which parents might influence children's smoking. For example, social learning theory (Bandura 1977) has emphasized the role of modelling in behaviour acquisition and it has subsequently been argued that this may be important in the initiation of smoking by children. Moreover, as mothers not only have a greater role in children's socialization but also spend significantly more time with children, seeing their mother smoke may act to both normalise and legitimise smoking by adolescent girls. There is also the possibility of confounding by, for example, unmeasured dimensions of deprivation but as this would affect both sexes equally, the marked difference in the strength of the relationship between boys and girls suggests that modelling is likely to be much more important.

Smoking was also more common among those adolescent girls who reported that their economic position was less than satisfactory. Earlier research in Russia has linked material deprivation to smoking among adults (McKee et al. 1998), which suggests that adolescents from poor families may be more likely to encounter negative parental role models. The fact that the effects of material dissatisfaction significantly increased when maternal smoking was added to the model (data not shown) suggest this may be the case. Other factors may also lead adolescents in a less than satisfactory economic position to experiment with cigarettes, such as the stresses and strains that can result from poor material circumstances (Wills et al. 2002).

The effects emanating from an unfavourable socioeconomic position might also be related to another factor. Our results revealed that there is an association between adolescent smoking and family structure where a two-parent family with both biological parents being present was a protective factor against smoking. This is an important finding as almost one-third of the adolescents in this study lived in disrupted families—with many of them likely to be single parent families headed by mothers, whose numbers have grown sharply in recent years in Russia (Lokshin et al. 2000). Households with such families are among the poorest in contemporary Russia (Lokshin et al. 2000). There are several ways in which economic disadvantage may interact with family structure to predict smoking.

Poverty can impact negatively for example, on the quality of parenting which in turn, can be detrimental for the child's developmental well-being and behaviour (McLanahan 1999). Moreover, parental separation can weaken family ties, lead to a lower level of subsequent parental monitoring, as well as strengthen adolescents' attachment to their peers and potential for participation in activities such as smoking (Griesbach et al. 2003; Miller 1997).

Both adolescent alcohol use and a lack of physical activity (among boys only) were closely associated with an increased risk of smoking. Lifestyles tend to cluster, so that individuals who adopt a healthy lifestyle with regard to one aspect of their lives also tend to do so in others (Tyas and Pederson 1998). Being physically active during out-of-school hours may also mean that there are fewer opportunities for engaging in risky behaviours such as smoking, drinking alcohol or excessive sedentary behaviour such as spending many hours in front of a television (Collingwood et al. 1991). This may be an especially important factor in Russia, where socioeconomic transition following the collapse of communism has been accompanied by a considerable reduction in the number of establishments for out-of-school activities for children and adolescents (such as sports clubs) that had been previously provided by the state. The substantial reduction of adolescent participation in organised activities since the Soviet period (Holloway et al. 2008) has meant that many Russian adolescents spend their free time 'doing nothing', 'sitting at home' and 'walking' (Boitsova 2003). The street environment often serves as a meeting place away from parental supervision (especially for boys), where experimentation with tobacco, alcohol and other unsanctioned activities occur (Boitsova 2003).

The place of residence was a strong predictor of adolescent smoking in Model 1, when adjusting for age, with a different rural/urban gradient in the prevalence of smoking being seen among adolescent boys and girls, i.e. boys in rural areas were generally more likely to smoke, while smoking among girls was significantly more common in Moscow and St. Petersburg. A similar result has been obtained for the Russian adult population (Perlman et al. 2007) and most, if not all, post-Soviet surveys show that in countries where the tobacco industry has been privatised urban residence is a major determinant of female smoking. This has been specifically linked to the privatised tobacco companies targeting young women and directing their initial marketing and distribution efforts at major cities (Perlman et al. 2007). Entering the variables into the multivariate model in several stages revealed that among girls the effect of Moscow/St. Petersburg residence on cigarette smoking is mediated by maternal smoking, which as noted, previous research suggests will in turn be determined by place of residence.

Before concluding, it is necessary to highlight several potential limitations of this study. As mentioned above, data were collected from adolescents in the parental home and there were no biochemical checks (e.g. cotinine) undertaken to verify reported smoking status. This may have resulted in the under-reporting of smoking status, especially among girls (Kempainen et al. 2006). Second, the cross-sectional nature of this study makes it impossible to determine cause and effect. For example, adolescent smoking may be a cause as well as a consequence of low self-esteem, as the stigmatisation of smokers may feed through to lower levels of self-esteem (Baumeister et al. 2003). Third, we also had no information on some potentially important variables such as familial/parent-child relations, parenting style and peer smoking which have previously been shown to be important predictors of adolescent smoking. Finally, another key issue is the small sample size which accounts for the wide confidence intervals. However, unlike many surveys of adolescent behaviour, we were able to link each individual's reported smoking status to their family environment, showing that it is an important influence, albeit one of many.

This study has shown that the prevalence of smoking varies widely between boys and girls. However, several factors are strongly predictive of smoking for both sexes across Russia. In particular, adolescent modelling of parental smoking (and other negative health behaviours) may be especially important. As previous research has highlighted that smoking amongst youth in Russia is associated with negative health outcomes even in adolescence (Prokhorov and Alexandrov 1992) addressing the issue of adolescent smoking is an urgent task from a public health perspective. Our results, in conjunction with the findings from earlier studies (Kempainen et al. 2006) suggest that the parental home may be an especially important site when it comes to both understanding adolescent smoking in Russia, and that any attempts to prevent youth smoking must be combined with efforts to reduce adult (and thus parental) smoking.

Moreover, as negative health behaviours seem to cluster, this suggests that approaches to deal with youth smoking should be linked to those used to reduce alcohol use and physical inactivity. Specifically, as evidence indicates that these behaviours begin to cluster among children early in life, this highlights the need for comprehensive interventions in the form of school-based health education programmes that are designed to counter a range of potentially harmful behaviours simultaneously, which should be implemented at an early age to encourage the emergence of a 'positive health profile' (Lytle et al. 1995).

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**Conflict of interest** The authors declare that they have no competing interests.

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