EVIDENCE BASED PUBLIC HEALTH POLICY AND PRACTICE

School culture as an influencing factor on youth substance use

Sherri Bisset, Wolfgang A Markham, Paul Aveyard

J Epidemiol Community Health 2007;61:485–490. doi: 10.1136/jech.2006.048157

See end of article for
authors' affiliations

Correspondence to:
S Bisset, Groupe de
Recherche Interdisciplinaire
en Santé, Université de
Montréal, CP 6128, Succ
Centre-ville, Montréal,
Québec, H3C 3J7, Canada;
sherri.l.bisset@umontreal.ca

Accepted 30 May 2006

Objective: To determine whether value-added education is associated with lower risk of substance use among adolescents: early initiation of alcohol use (regular monthly alcohol consumption in grade 7), heavy alcohol use (>10 units per week) and regular illicit drug use.

Design: Cross-sectional self-reported survey of alcohol and drug use. Analysis used two-level logistic modelling to relate schools providing value-added education with pupils' substance use. The value-added education measure was derived from educational and parenting theories proposing that schools providing appropriate support and control enhance pupil functioning. It was operationalised by comparing observed and expected examination success and truancy rates among schools. Expected examination success and truancy rates were based on schools' sociodemographic profiles.

Participants: Data were collected across 15 West Midlands English school districts and included 25 789 pupils in grades 7, 9 and 11 from 166 UK secondary schools.

Results: Value-added education was associated with reduced risk of early alcohol initiation (OR (95% CI) 0.87 (0.78 to 0.95)) heavy alcohol consumption (OR 0.91 (0.85 to 0.96)) and illicit drug use (OR 0.90 (0.82 to 0.98)) after adjusting for gender, grade, ethnicity, housing tenure, eligibility for free school meal, drinking with parents and neighbourhood deprivation.

Conclusions: The prevalence of substance use in school is influenced by the school culture. Understanding the mechanism through which the school can add value to the educational experience of pupils may lead to effective prevention programmes.

Epidemiological data from the UK and the US show widespread early initiation to alcohol, regular binge drinking and increased illicit drug use.^{1–4} Prevention of substance use is an adolescent health priority,^{5–6} and prevention in schools is a key strategy.^{6–7} The primary means of prevention are classroom-based programmes that aim to influence the knowledge of substance use, skills or attitudes.^{8–10} Systematic reviews report that most of these prevention programmes are ineffective.^{9–10} School health frameworks advocate ecological approaches to prevention, which take into account the influences of the school, family and social and physical environments of the community.^{11–12}

Educational research has a long tradition of investigating the relationship between the school environment and pupils' achievements.¹³ Some schools are recognised as providers of added value. In this sense, a pupil's achievement is uniquely attributed to the culture or ethos of the school when inter-school variation cannot be entirely explained by the innate abilities and socioeconomic composition of the pupils.¹⁴ School culture or ethos refers to the set of values, attitudes and behaviours characteristic of a school.¹⁴ There is evidence that school culture may also influence pupils' health behaviour.^{15–18} For example, West *et al*¹⁷ found significant unexplained inter-school variation in the prevalence of drinking, smoking and drug use. Inter-school variation in most of these behaviours was diminished greatly by controlling for educational engagement and teacher–pupil relationships. Although intriguing, the limitations of the interpretative meaning gleaned from empirical findings that are not grounded in explicit theoretical frameworks have been identified in the literature of both school health¹⁹ and public health.^{20–21}

Bernstein²² proposed that schools provide two kinds of learning, termed the instructional orders and the regulatory orders. Parenting theories suggest that parents influence their children through the balance of support and control.²³ Building on these frameworks, a theoretical proposition on how the

school optimises pupil functioning has been developed,²⁴ extended to health behaviour,²⁵ and evidence supporting smoking has been found.²⁵ This framework proposes that schools optimise pupil functioning through the provision of appropriate support and control. Support, in the case of schools, facilitates the acquisition of knowledge and skills, and control refers to the processes used to ensure that pupils' behaviour is acceptable.

These two inter-related support and control processes have been operationalised in this and in a previous study²⁵ using a single measure called "value-added education". Value-added education is a contextual measure of the school, whereby, given the sociodemographic pupil composition, the school performs better than expected on academic success (related to support) and truancy rates (related to control). We hypothesise that pupils in value-added schools are more likely to internalise the values of the school, which are inimical to substance use and, thus, are less likely to use substances. Schools where academic success and truancy rates are worse than expected given the sociodemographic pupil composition provide value-denuded education. We hypothesise that pupils in value-denuded schools would be more likely to reject the values of the school and therefore seek affiliation elsewhere, such as with youth cultures that promote substance misuse. In a previous cross-sectional survey, we found evidence that attending schools providing value-added education was associated with a lower risk of regular smoking.²⁵ In this paper, we examine whether value-added education is associated with early initiation of alcohol, heavy drinking and regular illicit drug use.

METHOD

Sampling

Data were taken from the West Midlands Young People's Lifestyle Survey 1995–6.²⁶ The survey aimed to sample 2000 pupils, split equally among grades 7 (aged 11–12 years), 9 (aged 13–14 years) and 11 (aged 15–16 years) from each of the 15 West Midlands districts. Schools (n = 329) were selected

Table 1 Descriptive data for early alcohol initiation, heavy alcohol consumption and illicit drug use

	Early alcohol initiation (n = 8037)	Heavy alcohol consumption (n = 25360)	Illicit drug use (n = 24771)
Grade			
7	8037 (100)	8125 (32.0)	7786 (31.4)
9	—	9346 (36.9)	9164 (37.0)
11	—	7889 (31.1)	7821 (31.6)
Gender			
Male	3994 (49.7)	12698 (50.1)	12353 (49.9)
Female	3999 (49.8)	12523 (49.4)	12283 (49.6)
Missing	44 (0.5)	139 (0.5)	135 (0.5)
Ethnicity			
White	6689 (83.2)	21324 (84.1)	20892 (84.3)
African-Caribbean	164 (2.0)	454 (1.8)	434 (1.8)
Indian	442 (5.5)	1493 (5.9)	1441 (5.8)
Pakistani	237 (2.9)	756 (3.0)	717 (2.9)
Bangladeshi	49 (0.6)	144 (0.6)	133 (0.5)
Chinese	22 (0.3)	81 (0.3)	82 (0.3)
Mixed	232 (2.9)	632 (2.5)	616 (2.5)
Other	110 (1.4)	279 (1.1)	270 (1.1)
Housing tenure			
Owned	5174 (64.4)	18189 (71.7)	17871 (72.1)
Rented	1600 (19.9)	4903 (19.3)	4743 (19.1)
Other	85 (1.1)	238 (0.9)	234 (0.9)
Does not know	1107 (13.8)	1856 (7.3)	1759 (7.1)
Missing	71 (0.3)	174 (0.7)	164 (0.7)
Free school meal			
Yes	1443 (18.0)	3849 (15.2)	3661 (14.8)
No	6405 (79.7)	21031 (82.9)	20645 (83.3)
Does not know	133 (1.7)	340 (1.3)	328 (1.3)
Missing	56 (0.7)	140 (0.6)	137 (0.6)
Townsend score			
Most deprived	1122 (14.0)	4140 (16.3%)	4099 (16.5%)
Fairly deprived	1329 (16.5)	4289 (16.9)	4240 (17.1)
Middle	1294 (16.1)	4371 (17.2)	4311 (17.4)
Fairly affluent	1340 (16.7)	4359 (17.2)	4260 (17.2)
Most affluent	1526 (19.0)	4489 (17.7)	4310 (17.4)
Unknown	380 (4.7)	1221 (4.8)	1183 (4.8)
Missing	1046 (13.0)	2491 (9.8)	2368 (9.6)
Drinking with parents			
Never	3220 (40.1)	7332 (28.9)	—
Sometimes	3596 (44.7)	13352 (52.6)	—
Often	504 (6.3)	2600 (10.3)	—
Missing	717 (8.9)	2076 (8.2)	—

—, not applicable.
Values are n (%).

randomly with probability proportional to size, and 201 (61%) schools participated. Participating and non-participating schools had similar examination results and truancy rates.²⁵ Classes were selected randomly with probability proportional to the school size. A total of 27 257 pupils (91% of target sample) completed the survey during class time under examination conditions. In the UK, pupils in grade 7 attend middle schools or secondary schools. We excluded pupils attending middle schools (n = 1476) from the analysis because pupils in these schools do not take General Certificates of Secondary Education (GCSE) examinations, the results of which were used in our measurement of value-added education score. The final sample used in our study reported here consisted of 25 789 pupils in 166 secondary schools.

Individual-level outcome measures

Early alcohol initiation focused only on pupils in grade 7. Pupils who reported having drunk alcohol at least once a month were

defined as early initiators. Pupils who responded “I have never drunk any alcohol”, “I have only tried alcohol once or twice” or “I have an alcoholic drink only a few times a year” were categorised as non-initiators. This definition corresponds to those used by others.^{27–28} A total of 8037 pupils (96% of grade 7 sample) were included in the analysis and 347 pupils were excluded owing to missing data.

The heavy alcohol consumption measure was based on reported alcohol consumption in the previous 7 days. A major problem in adolescent drinking is binge drinking, often operationalised as ≥ 5 units of alcohol in one episode.^{29–31} The West Midlands Young People's Lifestyle Survey did not measure consumption during a single episode. We therefore defined heavy drinking as consuming ≥ 10 units of alcohol per week. Recent data show that 90% of pupils in grades 7 and 9 and 70% of pupils in grade 11 who drink alcohol at least weekly do so only once or twice per week.³² Our definition implies an average intake of 5 units per drinking episode for most pupils. Pupils reported the number of drinks in natural units (such as a half pint) of six different drinks and we converted this into units. A total of 25 360 pupils (98% of sample) were included in the analysis and 439 pupils with inconsistent or missing data were excluded.

Pupils were classified as regular illicit drug users if they reported regularly using one or more of the following: cannabis, ecstasy, amphetamines, lysergic acid diethylamide (LSD), cocaine, magic mushrooms and heroin. A total of 24 771 pupils (96% of sample) were included in the illicit drug analysis and 1018 pupils were excluded because of inconsistent or missing data.

School-level measures

School performance measures, including academic achievement and truancy, are published annually in the UK. Five-year averages of these indicators were used to improve reliability. Measurement of school support was derived from the proportion of pupils obtaining the equivalent of the academic requirements for a high school diploma (at least five GCSEs with A to C grades). Measurement of school control was derived from the proportion of half-days lost to unauthorised absences (truancy).

The value-added/denuded measure was obtained in two steps. First, two logistic regression models were created using the five GCSEs with A to C grades pass and truancy rates as outcomes, with five indicators of the demographic and socioeconomic profile of pupils as predictors (the mean Townsend score of pupils' ward of residence), the proportion of pupils who were white, female, lived in owner-occupied residences and were eligible for free school lunch (which means that their parents/guardians receive state financial assistance). Schools do not routinely publish indicators of their pupil population, so these data were aggregated for each school from our survey. The standardised residuals from these models represent the difference between the observed school achievement and what could be expected based on the school's sociodemographic profile of a pupil.

Next, the standardised residuals produced from these two models were compared. Principal components analysis identified a single factor with an Eigen value > 1 that explained two-thirds of the variance in both the academic- and truancy-standardised residuals.²⁵ This represented their value-added/denuded education score. By definition, a school with a principal component or value-added score of 0 would have expected examination and truancy rates, given performance profiles of the the pupil and the school for all schools in the survey. Schools with a score of +1 had results 1 SD above average, and those with a score of -1 had results 1 SD below average.

Schools with a value-added score of 1 SD (or more) above average were termed authoritative schools, in reference to

parenting style terminology. Thus, according to our theoretical proposition, authoritative schools provide appropriate support and control to their pupils. Schools with a value-denuded score of 1 SD (or more) below average were termed *laissez-faire*, again in accordance to parenting style terminology, indicating inappropriate provision of support and control. Schools with value-added scores between +0.99 and -0.99 were termed indeterminate.

Pupil-level predictors

Pupil-level predictors for each of the heavy alcohol, early initiation and illicit drug use categories included gender, ethnicity, family and neighbourhood socioeconomic profiles, including alcohol consumption patterns with parents (table 1). Family socioeconomic profile was based on owned/rented accommodation and entitlement to free school meals. Neighbourhood socioeconomic profiles were based on the Townsend score. Substance use behaviours among peers would probably influence the likelihood of substance use among individuals. However, the inclusion of peer group substance use in multilevel equations is inappropriate for several reasons. Substance use among peers is usually measured by some form of prevalence marker: how many of your friends drink? In seeking to understand prevalence variation between schools, controlling for a crude marker of prevalence diminishes inter-school variation, but provides no real explanation. The peers in question are almost always in the same school. As elaborated on elsewhere, peer climate is a feature of schools with high substance misuse, not a confounder.^{17 19}

Analysis

For both heavy alcohol consumption and regular illicit drug use, we built a two-level logistic regression model using the statistical package MLwiN V.2.01, adding an intercept term that was random across schools. School grades were entered initially as fixed effect coefficients, implying that the unknown variation between schools in the outcome was proportionately the same across all grades. This restriction was tested by allowing school grade to be random, and testing the significance of the extra variances and covariances. For early alcohol initiation, the procedure differed slightly in that the base model only included the random intercept as pupils in one grade were included in this analysis.

For each of the three measures of substance use, the value-added/denuded score was added to the base model (unadjusted model). Pupil-level covariates were added to examine and to control confounding by pupil-level risk factors (adjusted model). To distinguish our proposed theoretical framework, which utilises the value-added/denuded school measure (proxy for appropriate support and control) as distinct from basic academic success and truancy (proxy for social advantage), we re-ran the analysis for each measure of substance use including the raw examination and truancy terms instead of the value-added term.

For both heavy alcohol consumption and regular illicit drug use adjusted models, we tested the interaction between grade level and value-added factor score to examine whether the influence of the value-added term waned with increasing age. Finally, for all three outcomes, the proportion of the total variance explained by the value-added term and all pupil-level risk factors combined was calculated. As explained elsewhere,²⁵ this required separate models for each grade.

RESULTS

Table 1 provides descriptive data regarding family sociodemographics for heavy alcohol consumption, early initiation to alcohol use and regular illicit drug use. Substance use varied significantly among the 166 schools for early alcohol initiation

Table 2 Odds ratio of early alcohol initiation, heavy alcohol consumption and regular illicit drug use in relation to school achievement and value-added education

	School effect on early initiation to alcohol			School effect on heavy alcohol consumption			School effect on regular illicit drug use		
	OR (95% CI)	OR (95% CI)	χ^2 ; df; p	OR (95% CI)	OR (95% CI)	χ^2 ; df; p	OR (95% CI)	OR (95% CI)	χ^2 ; df; p
Achievement terms									
Unadjusted	Academic success 0.94 (0.87 to 1.01)	Truancy 0.83 (0.73 to 0.94)	8.0; 2; 0.02	Academic success 0.93 (0.89 to 0.97)	Truancy 0.94 (0.87 to 1.02)	9.0; 2; 0.01	Academic success 0.95 (0.90 to 1.01)	Truancy 1.07 (0.98 to 1.18)	13.2; 2; 0.001
Adjusted	0.94 (0.88 to 1.01)	0.96 (0.85 to 1.08)	3.2; 2; 0.20	0.93 (0.89 to 0.97)	0.99 (0.92 to 1.07)	13.8; 2; 0.001	0.97 (0.92 to 1.03)	1.06 (0.96 to 1.17)	5.0; 2; 0.08
Value-added terms									
Unadjusted	School culture 0.83 (0.74 to 0.93)		9.8; 1; 0.002	School culture 0.91 (0.85 to 0.97)		7.7; 1; 0.005	School culture 0.90 (0.83 to 0.98)		5.4; 1; 0.02
Adjusted	0.87 (0.78 to 0.95)		8.6; 1; 0.003	0.91 (0.85 to 0.96)		9.7; 1; 0.002	0.90 (0.82 to 0.98)		6.1; 1; 0.01

($\chi^2 = 31.5$, $df = 1$, $p < 0.001$), heavy alcohol consumption ($\chi^2 = 47.11$, $df = 1$, $p < 0.001$) and regular illicit drug use ($\chi^2 = 35.2$, $df = 1$, $p < 0.001$). The unexplained variation in substance use also varied in magnitude across grades for heavy alcohol consumption ($\chi^2 = 19.8$, $df = 1$, $p = 0.01$) and regular illicit drug use ($\chi^2 = 19.3$, $df = 1$, $p = 0.01$). Thus, base models for both these outcomes included the random intercept and two random effect terms for grades 9 and 11.

Early alcohol initiation

The risk of early alcohol initiation was not significantly associated with school examination results without and with adjustment for pupils' characteristics (table 2). Pupils in schools with higher truancy were at a lower risk of early alcohol initiation in the unadjusted model, but this association was attenuated and not significant on adjustment for pupils' characteristics (table 2). The value-added score showed a stronger and statistically significant association with reduced risk of early initiation, which was not attenuated by adjustment for pupil composition. The estimated prevalence of early alcohol initiation in grade 7 in schools with the median value-added score for *laissez-faire*, indeterminate and authoritative schools were, respectively, 23.2%, 20.2% and 13.7%.

Heavy alcohol consumption

For heavy alcohol consumption, there was a significant association with raw examination results but not with truancy rates in the unadjusted models (table 2). Schools with higher proportions of pupils achieving good examination results had pupils at significantly lower risk of heavy alcohol consumption and this association remained when adjusted for pupils' characteristics. There was no association between alcohol use and truancy in the adjusted model. The value-added term was significantly associated with reduced probability of heavy alcohol consumption in both unadjusted and adjusted models. The calculated rates of heavy alcohol consumption in *laissez-faire*, indeterminate and authoritative schools for each grade were, respectively, grade 7 (7.8%, 7.1% and 5.6%), grade 9 (14.6%, 13.5% and 10.8%) and grade 11 (27.7%, 25.9% and 21.4%).

Regular illicit drug use

In both the unadjusted and adjusted models, regular illicit drug use was not associated with either raw examination results or with raw truancy rates but was associated with the value-added score (table 2). Prevalence of regular illicit drug use in *laissez-faire*, indeterminate and authoritative schools in each of the grade levels were grade 7 (1.7%, 1.5% and 1.2%), grade 9 (5.1%, 4.6% and 3.6%) and grade 11 (15.0%, 13.8% and 11.0%), respectively.

Does grade modify the effect of school value-added education on heavy alcohol consumption and regular illicit drug use?

Cross-level interaction between grade level and the value-added score was statistically significant for heavy alcohol consumption but not for regular illicit drug use. The odds ratios (ORs) for these effect modification terms for heavy alcohol consumption in a typical authoritative school were 0.57 (grade 7), 0.65 (grade 9) and 0.96 (grade 11; $\chi^2 = 10.41$; $df = 2$; $p < 0.01$). Similarly, ORs for regular illicit drug use in a typical authoritative school were 0.78 (grade 7), 0.75 (grade 9) and 0.79 (grade 11; $\chi^2 = 0.069$; $df = 2$; $p > 0.05$).

How much inter-school variance was explained by the value-added score?

Some inter-school variation in early alcohol initiation was explained by the value-added score (9.4%), but most of the variation was explained by pupil-level risk factors (75.1%). For

heavy alcohol consumption, among pupils in grades 7 and 9, the value-added score explained 9.1% and 11.2% of the variation between schools, respectively, whereas the pupil-level risk factors explained 39.8% and 18.0%, respectively. The value-added score did not explain any of the differences in heavy alcohol consumption between schools for pupils in grade 11, but the pupil-level risk factors explained 45.5%. The inter-school variation in regular illicit drug use among pupils in grade 7 was not explained by either the value-added score or pupil-level risk factors. In grade 9, the value-added score explained 2.5% of the variance between schools, and pupil-level risk factors explained 9.3% of this variance. Among pupils in grade 11, 0.2% of the variance was explained by the value-added score and 10.0% was explained by pupil-level risk factors.

DISCUSSION

We predicted and confirmed that schools providing value-added education would be associated with a lower prevalence of early initiation into alcohol, heavy alcohol consumption and regular illicit drug use. In relation to *laissez-faire* schools (ie, schools providing value-denuded education), authoritative schools (ie, schools providing value-added education) had 40.9% fewer early alcohol initiators, and an across-grade overall average of 25.6% fewer heavy alcohol users and 28.5% fewer regular drug users. The association between these behaviours and the value-added term was relatively weak, but consistently statistically significant, unlike that for raw examination results and truancy rates.

Although these findings are in line with those of others,^{15-18 33} they offer a unique contribution to this literature in three respects. First, we proposed that schools providing value-added education would have lower substance use, and in so doing, our results suggest, like others, that some schools are able to engage pupils better than others and that this engagement positively influences health behaviour.^{27 34 35} Second, our proposition tested outcomes which capture deviant behaviour, as opposed to substance use experimentation.^{36 37} In so doing, our findings support and expand upon other theoretical frameworks^{38 39} suggesting that family, community and school each play an active role in fostering social affiliation to enhance competencies which protect youths from delinquent behaviour. Third, the value-added education measure captures a distinctive characteristic of the school which does not rely on the aggregation of individual-level perceptions. In this respect, it provides a measure of context which is not subject to problems of interpreting the ecological fallacy.

Our study has limitations. Although biases relating to the selective participation of schools and information reporting by pupils are possibilities for this type of research, participating and non-participating schools were similar in examination success and truancy rates.²² Additionally, the non-response rates for the three substance use outcomes we used were too small to explain the associations we found.

Residual school and individual-level confounding may have caused the associations observed. On the basis of a strong correlation between tobacco and other substance use,⁴⁰ the presence of an enforced smoking school policy may have reduced other substance use. Additionally, we did not control either for family management practices or for substance use attitudes and behaviours of families.²⁷ We and others have argued^{17 19} that controlling for peer attitudes and behaviour is inappropriate, as peers generally attend the same school and are exposed to the same school factors. Family management practices could confound results if families with relatively poorer parenting skills were more likely to send their children to *laissez-faire* schools than authoritative ones. However, the value-added term was not strongly related to socioeconomic

What this paper adds

- Evidence demonstrating school effects on student health behaviour, in addition to individual risk factors, is beginning to mount. Most of this evidence has not been developed within explicit theoretical frameworks and has used aggregate individual data to create school-level measures.
- Understanding how a school may influence the health behaviour of students may be developed most thoroughly when theoretical propositions lead empirical inquiry.
- Our results confirm that schools can influence health behaviour, specific to early initiation to alcohol, heavy alcohol use and regular illicit drug use.
- Schools providing appropriate levels of support and control were associated with lowered adjusted risk for these substance use behaviours. However, school rates of academic success and truancy were not consistently associated with substance use risk.
- Research into school effects on student health behaviour holds potential for future school-based public health action; however, the mechanisms through which school structure may impart an influence on health behaviour requires further theoretical developments within public health research.

status of pupils, nor was it related to raw examination pass rates, which, after proximity, were the primary influences affecting parental selection of schools. We could not adjust for differential pupil intake between schools as our study was cross-sectional; thus, use of these substances in primary schools could explain differences observed in secondary schools. However, regular use of alcohol and drugs at 10–11 years (final year of primary school) is extremely unusual and differences in secondary school substance use were probably not due to this.

CONCLUSION

Our results demonstrate that the mechanisms inherent in engaging pupils in their education might also protect against risk behaviours. We have proposed that schools achieve value-added education through the provision of appropriate support and control which also influence pupils' substance use. Future research should develop direct measures of these processes. In particular, research could address how this mutuality between appropriate cultural beliefs and values emanating from the school influence pupils' risk behaviour.

ACKNOWLEDGEMENTS

The study was developed in collaboration with National Health Service partners and representatives of the local education boards. The West Midlands Young People's Lifestyle survey was designed, administered and analysed by Emma Sherratt, Robert Lancashire, Christine Macarthur, Hywell Thomas, Alison Bullock and KK Cheng. SB is a recipient of Canadian Doctoral Research Scholarship (CIHR) and completed a stage in the UK on a departmental fellowship programme.

Authors' affiliations

Sherri Bisset, Groupe de Recherche Interdisciplinaire en Santé, Université de Montréal, Montréal, Québec, Canada

Wolfgang A Markham, School of Health and Social Studies, University of Warwick, Coventry, UK

Paul Aveyard, Department of Primary Care & General Practice, University of Birmingham, Birmingham, UK

Competing interests: None declared.

Policy implications

The size of effects reported here, if translated into a programme, could have an important influence on reducing rates of youth substance misuse.

REFERENCES

- 1 **Pincock S**. Binge drinking on rise in UK and elsewhere. *Lancet* 2003;**362**:1126–7.
- 2 **Sloboda Z**. Changing patterns of "drug abuse" in the United States: connecting findings from macro- and microepidemiologic studies. *Subst Use Misuse* 2002;**37**:1229–51.
- 3 **Centers for Disease Control and Prevention**. Surveillance summaries. *Morb Mortal Wkly Rep* 2004;**53**:SS–3.
- 4 **Fuller E**. *Smoking, drinking and drug use among young people in England 2004*. London, UK: Her Majesty's Stationary Office, 2004.
- 5 **Department of Health**. *Improvement, expansion and reform: the next three years' priorities and planning framework, 2003–2006*. London, UK: Her Majesty's Stationary Office, 2003.
- 6 **Centers for Disease Control and Prevention, US Department of Health and Human Services**. *Improving the health of adolescents & young adults: a guide for States and communities*. Atlanta, GA: Division of Adolescent and School Health, 2004.
- 7 **Department for Education and Skills**. *Drugs: guidance for schools*. London, UK: Her Majesty's Stationary Office, 2004.
- 8 **Centers for Disease Control and Prevention**. Registries of programs effective in reducing youth risk behaviors. <http://www.cdc.gov/healthyyouth/adolescenthealth/registries.htm> (accessed 15 December 2005).
- 9 **Foxcroft D**, Ireland D, Lowe G, *et al*. Primary prevention for alcohol misuse in young people. *Cochrane Database Syst Rev* 2005;**(3)**:1–23.
- 10 **Faggiano F**, Vigna-Taglianti F, Versino E, *et al*. School-based prevention for illicit drugs' use. *Cochrane Database Syst Rev* 2005;**(3)**:1–60. CD003020, 2005.
- 11 **Centers for Disease Control and Prevention**. *Healthy youth: an investment in our nation's future*. Atlanta, GA: CDC, 2005.
- 12 **Bruun Jensen B**, Simovska V. *Models of health promoting schools in Europe*. Copenhagen: WHO Regional Office for Europe, 2002.
- 13 **Lezotte LW**. *Revolutionary and evolutionary: the effective schools movement*, http://ali.apple.com/ali_media/Users/1000059/files/others/lezotte_article.pdf (accessed 19 Feb 2007).
- 14 **Scheerens J**. *Improving school effectiveness*. Fundamentals of Education Planning Series Number 68. Paris: UNESCO, 2000.
- 15 **Sellström E**, Bremberg S. Is there a "school effect" on pupil outcomes? A review of multilevel studies. *J Epidemiol Community Health* 2006;**60**:149–55.
- 16 **Maes L**, Lievens J. Can the school make a difference? A multilevel analysis of adolescent risk and health behaviour. *Soc Sci Med* 2003;**56**:517–29.
- 17 **West P**, Sweeting H, Leyland A. School effects on pupils' health behaviours: evidence in support of the health promoting school. *Res Pap Educ* 2004;**19**:261–91.
- 18 **Aveyard P**, Markham WA, Lancashire E, *et al*. Is inter-school variation in smoking uptake and cessation due to differences in pupil composition? A cohort study. *Health Place* 2005;**11**:55–65.
- 19 **Aveyard P**, Markham WA, Cheng KK. A methodological and substantive review of the evidence that schools cause pupils to smoke. *Soc Sci Med* 2004;**58**:2253–65.
- 20 **Diez Roux AV**. Investigating neighborhood and area effects on health [comment]. *Am J Public Health* 2001;**91**:1783–9.
- 21 **Frohlich KL**, Mykhalovskiy E, Miller F, *et al*. Advancing the population health agenda: encouraging the integration of social theory into population health research and practice. *Can J Public Health* 2004;**95**:392–5.
- 22 **Bernstein B**. *Class, codes and control. Towards a theory of educational transmission*. London: Routledge and Kegan Paul, 1977.
- 23 **Conoley J**. Schools and families: theoretical and practical bridges. *Prof Sch Psychol* 1987;**2**:191–203.
- 24 **Markham WA**, 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.
- 25 **Aveyard P**, Markham WA, Lancashire E, *et al*. The influence of school culture on smoking among pupils. *Soc Sci Med* 2004;**58**:1767–80.
- 26 **Sherratt E**, Macarthur C, Cheng K, *et al*. *West Midlands young people's lifestyle survey 1995–6 Final report*. Birmingham: University of Birmingham, 1997.
- 27 **Simons-Morton B**. Prospective association of peer influence, school engagement, drinking expectancies and parent expectations with drinking initiation among sixth graders. *Addict Behav* 2004;**29**:299–309.
- 28 **McBride N**, Farrington F, Midford R, *et al*. Early unsupervised drinking—reducing the risk: the School Health and Alcohol Harm Reduction Project. *Drug Alcohol Rev* 2003;**22**:263–76.
- 29 **Robson J**. Alcohol misuse. *Arch Dis Child* 2001;**84**:95–7.
- 30 **McLennan J**, Shaw E, Shema S, *et al*. Adolescents' insight in heavy drinking. *J Adolesc Health* 1998;**22**:409–16.
- 31 **Paschall M**, Flewelling R, Russell T. Why is work intensity associated with heavy alcohol use among adolescents? *J Adolesc Health* 2004;**34**:79–87.
- 32 **Blenkinsop S**. Drinking prevalence and consumption. In: Fuller E, eds. *Smoking, drinking, and drug use in young people in England, 2004*. London, UK: Her Majesty's Stationary Office, 2004.

- 33 Rountree P, Clayton R. A contextual model of adolescent alcohol use across the rural-urban continuum. *Subst Use Misuse* 1999;**34**:495–519.
- 34 Maddox SJ, Prinz RJ. School bonding in children and adolescents: conceptualization, assessment, and associated variables. *Clin Child Fam Psych* 2003;**6**:31–49.
- 35 Aveyard P, Markham WA, Almond J, et al. The risk of smoking in relation to engagement with a school-based smoking intervention. *Soc Sci Med* 2003;**56**:869–82.
- 36 Fromme K, D'Amico E. Measuring adolescent alcohol outcome expectancies. *Psychol Addict Behav* 2000;**14**:206–12.
- 37 Kloepp M, Hendry L, Ingebrigtsen J, et al. Young people in 'drinking' societies? Norwegian, Scottish and Swedish adolescents' perceptions of alcohol use. *Health Educ Res* 2001;**16**:279–91.
- 38 Catalano R, Hawkins J. The social development model: a theory of antisocial behavior. In: Hawkins J, ed. *Delinquency and crime: current theories*. New York: Cambridge University Press, 1996:149–97.
- 39 Oetting E, Donnermeyer J. Primary socialization theory: the etiology of drug use and deviance. *Subst Use Misuse* 1998;**33**:995–1026.
- 40 Sutherland I, Willner P. Patterns of alcohol, cigarette and illicit drug use in English adolescents. *Addiction* 1998;**93**:1199–208.

THE JECH GALLERY

Children's exposure to tobacco

Although selling tobacco to children <16 years is not allowed, tobacco vendomats are widespread in Germany. By 2007 tobacco vendomats will be equipped with a mechanism that will make it impossible for children to get cigarettes. The technical solution chosen, however, does not guarantee the latter.

Young Germans mostly begin smoking between the ages of 11 and 16 years.¹ The prevalence of smoking among children and youth has risen since the 90s and is now around 20% of their total population.²

Figure 1 Tobacco vendomat beside a candy vendomat.

Figure 2 Tobacco vendomat less than 10 m away from a kindergarten.

Tobacco vendomats represent the main source of cigarettes for children and youth.³ On taking a short walk around the

Figure 3 Tobacco vendomat hung about 50 cm above the ground.

Figure 4 Tobacco vendomat close to a public playground.

quarter where I live in Hamburg, I found at least 10 tobacco vendomats placed near a school (in a radius of 200 m). Some were located right in front of public playgrounds, and others were close to the entrance of kindergartens, or a centre for youth counselling, some beside candy vendomats and some situated very low down. None of the vendomats displayed any warning about the risks of smoking, nor mentioned that the sale of tobacco to young people is prohibited.

One of the principles of health promotion is to facilitate healthy choices.⁴ However, it should be also be to render unhealthy choices more difficult... everywhere.

Marcial Velasco-Garrido

Correspondence to: M Velasco-Garrido, Department of Health Care Management, Technische Universität Berlin, EB 2 Strasse des 17, Juni 145, Berlin 10623, Germany; marcial.velasco@tu-berlin.de

References

- 1 Bundeszentrale für gesundheitliche Aufklärung. *Die Drogenaffinität Jugendlicher in der Bundesrepublik Deutschland 2001 [Drug-Affinity of Youth in the Federal Republic of Germany 2001]*. Cologne: Bundeszentrale für gesundheitliche Aufklärung, 2001.
- 2 Schulze A, Lampert T. *Bundes-Gesundheitssurvey: Soziale Unterschiede im Rauchverhalten und in der Passivrauchbelastung in Deutschland [Federal Health Survey: Social Inequalities in Smoking and Passive Smoking Burden in Germany]*. Berlin: Robert-Koch-Institut, 2006.
- 3 Bayerisches Staatsministerium für Arbeit und Sozialordnung Familie, Frauen und Gesundheit. *Gesundheitsverhalten von Jugendlichen in Bayern: Ein Überblick über die repräsentativen Jugendgesundheitsstudien in Bayern von 1973 bis heute [Health Attitudes of Youth in Bavaria: Overview of representative Youth Health Surveys in Bavaria from 1973 up to date]*. München: Bayerisches Staatsministerium für Arbeit und Sozialordnung Familie, Frauen und Gesundheit, 1997.
- 4 World Health Organisation. *Ottawa Charter for health promotion*. Geneva: World Health Organisation, 1986.