

## **Systematic review of reviews of school-level effects on sexual health, violence and substance use**

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### **Abstract**

For three decades there have been reports that the quality of secondary schools affects student health. The literature is diverse and reviews have addressed different aspects of how the school environment may affect health. This paper is the first to synthesise this evidence using a review of reviews focusing on substance-use, violence and sexual-health. Twelve databases were searched. Eleven included reviews were quality-assessed and synthesised narratively. There is strong evidence that schools' success in engaging students is associated with reduced substance use. There is little evidence that tobacco-control policies and school sexual-health clinics on their own are associated with better outcomes.

### **Introduction**

Health behaviours are shaped early in life during childhood and adolescence and persist across the life course (Sawyer et al., 2010) making these years critical for health improvement (Viner et al., 2012). Substance misuse, violence and sexual risk-behaviours commonly begin in adolescence (WHO, 2013, Patton et al., 2012). They are associated with social and economic costs for the individual, even after adjusting for prior disadvantage, and for society (Bloom et al., 2011). Schools are a key setting for improving adolescent health because of the amount of time young people spend there (Rutter et al., 1979), which is increasing in both high- and low-income countries (United Nations, 2012, Institute for Health Metrics and Evaluation, 2015).

Our understanding of the effects of secondary schools on health and social adjustment has grown over the past three decades (Hale et al., 2014, Rutter et al., 1979). Over that time, studies have examined a broad range of school characteristics as determinants of health risks, behaviour and academic achievement. However, there has been no adequate synthesis drawing together evidence on a diversity of school-level factors that influence students' health. Most existing systematic reviews in this area have a narrow scope, for example focusing on school-based health services (Paul and Fabio, 2014), rules and policies (Coppo et al., 2014) or engagement and support (Aveyard et al., 2004). This paper reports a systematic review of reviews (RoR) to examine school-level effects on substance use, violence and sexual-health. This was conducted as part of a broader RoR undertaken as part of the Lancet Commission on Adolescent Health and Wellbeing (<http://thelancetyouth.com>) which also synthesised reviews of the effects of interventions on these outcomes. This is different from recent reviews of school health in Lancet Psychiatry which focused on interventions specifically related to mental health (Fazel et al., 2014b, Fazel et al., 2014a). RoRs assess the quality and summarise the findings of existing systematic reviews using pre-defined research questions and methods of searching, quality assessment and synthesis. They are helpful in synthesising broad evidence on diverse interventions to inform policy and identify gaps where research and reviews are required (Caird et al., 2014).

## **Methods**

Reviews reported in this paper were included if they: reported their review questions, methods of searching, quality assessing and synthesising evidence; were published after 1980; synthesised results focusing on student physical violence, substance use (smoking, drinking and drug use) and sexual and reproductive health; reported results predominantly focused on individuals aged 11-18 years; examined school level exposures related to the physical and social environment, management/ organisation, teaching, pastoral care, discipline, school health services, whole-school

health promotion activities and policies and extra-curricular activities; and synthesised ecological or multi-level studies separately from studies conducted solely at the individual level. Studies were not excluded on the basis of language or publication status. Reviews were only included if they reported (in specific tables, narrative text or statistical meta-analysis) results separately for studies within our remit.

The following database sources were searched in the final week of January 2015 without date or language restrictions: Cumulative Index to Nursing and Allied Health Literature; Database of Abstracts of Reviews of Effects; Education Research Index Citations; Medline; Embase; PsycInfo; Social Policy & Practice; Australian Education Index; Social Science Citation Index; British Education Index; the Campbell library; and the Cochrane Database of Systematic Reviews. We also checked citation lists of included studies for other relevant reviews.

All records identified by the database searching were uploaded onto EPPI- Reviewer 4 software and duplicate records were removed. Records were initially screened based on title and abstract. Screening was hierarchical such that answering 'yes' to the first criterion led the reviewer to consider the second and so on. Two reviewers double-screened a random selection of 100 records and any discrepancies were resolved by discussion. Agreement before reconciliation was 96%. Two reviewers then single- screened the remaining records. The full texts of references not thus excluded were retrieved and double-screened by four reviewers (NS, CB, KH, KD) working in pairs. Disagreements were resolved by discussion.

One reviewer extracted data from and assessed the quality of included reviews (NS), with a second (CB) checking this. Disagreements were resolved through discussion. Where available, data were extracted on: review questions; inclusion criteria; search methods (databases, terms and other methods); quality assessment criteria; synthesis methods; designs of included studies; population;

school-level exposures of interest; relevant outcomes reported; narrative or statistical synthesis of evidence fitting our remit; and details of pertinent included primary studies.

We adapted the AMSTAR checklist (Shea et al., 2007) to assess the quality of included reviews and used this to qualitatively weight findings in our narrative synthesis (Caird et al., 2014). To aid presentation of results we defined reviews as either high, medium or low quality. High-quality reviews were required to have: provided a priori published designs (for example published protocols or ethics committee approval); searched at least two bibliographic databases plus conducted another mode of searching; searched for reports regardless of publication type; listed and described included studies; used at least two people for data extraction; documented the size and quality of included studies and used this to inform their syntheses; synthesised study findings narratively or statistically; assessed the likelihood of publication bias; and included a conflict of interest statement. Medium-quality reviews were required to have: searched at least one database; listed and described included studies; documented the quality of the included studies; and synthesised study findings narratively or statistically. Low-quality reviews did not meet at least one of these criteria. We did not seek to obtain and separately assess the quality of primary studies included in each review.

Synthesis began by summarising review results and conclusions in note form. Reviews were then grouped based on health outcomes and intervention categories. The notes of reviews in these groupings were then combined. First, we identified an index review within each sub-group based on criteria of review quality as well as recentness or the number of relevant included studies if reviews were of similar quality. We elaborated our notes on the index review into a narrative summary by referencing back to the full text of the review. We then compared and contrasted this with the next-most-useful review. The resulting narrative was then contrasted with the findings of a third review and so on. Finally, drawing on information from primary studies in the reviews, we assessed whether the conclusions of review-level evidence appeared reasonable, for example considering effect sizes

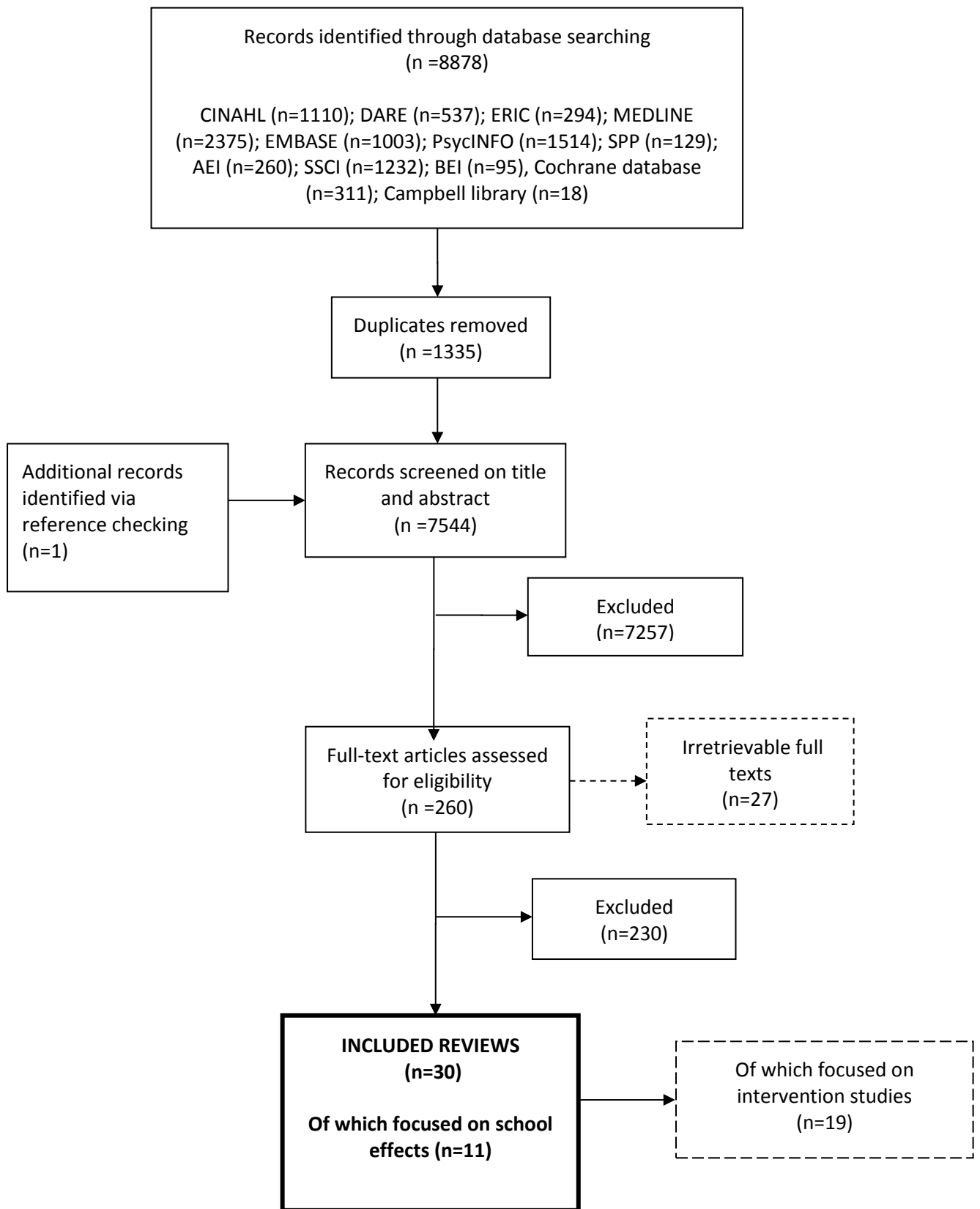
and designs. In our narrative synthesis we minimised 'vote-counting' (quantifying the number of studies reporting positive and negative findings regardless of their size and quality) by weighing findings according to the size and quality of reviews and size and design of primary studies, as well as by identifying where the same primary studies were included in different reviews (Caird et al., 2014).

## **Results**

### ***Included reviews***

The search strategy identified 7,544 unique references. Screening on title and abstract excluded 7,257. Of the remainder, we were able to retrieve 260 records of which 29 met the inclusion criteria for the overall RoR (figure 1). We included one additional review found from reference checking included reviews. Of the 30 reviews, 11 examined observational studies of school-level effects on student health (table 1) and are reported below. There were several reviews (Strunk, 2008, Shek, 2010, Bonell et al., 2013a, Feldman and Matjasko, 2005, Steffgen et al., 2013) that narrowly missed out on inclusion, mainly because of a lack of separate synthesis for school level analyses and individual level analyses. One review was excluded because it reported the same information, by the same authors, as another included review (Bonell et al., 2013a).

Figure 1. Flow of literature



**Table 1. Characteristics of included reviews**

<b>Review authors</b>	<b>School-level factors</b>	<b>Included designs</b>	<b>Population</b>	<b>Outcomes</b>	<b>Synthesis</b>	<b>% in other reviews</b>
Aveyard et al. 2004	School policies and other characteristics	Ecological and multi-level.	School-age children from age 11-22 (mostly age 11-17). Studies cover period from 1969-2001. Most studies from UK and Europe.	Smoking prevalence	Narrative	29%
Black et al. 2012	Programmes and policies addressing inclusion of LGBT students	Any	Youth in educational settings, The majority of studies included youth less than 18 years in schools, 4 studies included undergraduate and graduate samples. 15 of the samples included lesbian, gay, or bisexual participants, and 4 studies included transgender participants. Relevant studies cover period from 2001-2011.	Harassment, victimization, safer social climate, and suicidality	Narrative	0%
Bonell et al. 2013	Teaching and learning, pastoral and discipline, physical environment, school management and organisation.	Multi-level	School students age 4-18. The majority of studies focused on middle/high schools aged students in the US (18 studies), Canada (6 studies) and the UK (6 studies). Three were from Norway, two each were from Australia, Israel and the Netherlands and one each were from Belgium, Germany, Spain and Thailand, with one reporting on data from the USA and Australia. Studies cover period from 1999-2011.	Any health outcomes	Narrative	20%
Coppo et al. 2014	School tobacco policies	RCTs, CBAs and interrupted time-series analyses. Cross-sectional studies excluded from synthesis of outcome evaluations but reviewed to inform hypothesis development.	Students in primary and secondary schools age 4-18 years.	Smoking prevalence.	Narrative.	85%

Fletcher et al. 2008	School ethos; student involvement and engagement; teacher-pupil relations; pupil reports on school environment	RCTs, CBAs, ecological studies.	Students aged between 11-16. Studies published between 1985-2006. Mostly focused on the united states, one study in the UK and one in Sweden.	Drug use, alcohol, tobacco.	Narrative	0%
Galanti et al. 2013	School tobacco policies	Ecological	School students age 10-21, with the majority between the ages of 13-16. The majority of the studies were based in North America (11 in Canada and 7 in the USA), followed by European countries (n=7) and Australia and New Zealand (n=3). Two studies were based in Asian countries, while one included a comparison between US and Australian data. Studies cover a period from 1989-2011.	Smoking	Narrative	52%
Johnson 2009	School social/physical environment, organizational characteristics	Ecological	School-age children. 4 studies elementary school children, 21 studies middle/high school students. Studies cover a period from 1994-2007.	Violence	Narrative	4%
Mason-Jones et al. 2012	School-based health centres	Evaluations	Adolescents in secondary schools/high schools. 24 studies in the USA, 2 in Canada, 1 in the UK. Studies cover a period from 1991-2011.	Sexual and reproductive health	Narrative	67%
Paul & Fabio 2014	HPV vaccination	Quantitative	Girls age 9-13 years. Seventeen countries from Africa, Asia, Australia, Europe, Latin America, and North America are represented by the nine included studies. Studies were published between 2008-2012.	HPV vaccination	Narrative	0%



Sellström & Bremberg 2006	School climate, health policy or antismoking smoking, average socioeconomic status, location.	Multi-level	Children under 18 years of age in high income countries. Studies were published between 1995-2003.	Health and education	Narrative	33%
Speizer et al. 2003	Adolescent Reproductive Health Interventions	Level 1 – RCTs and CBAs Level 2 – before/after and cross-sectional	Young people age 10-24 in developing countries.	Sexual health knowledge and behaviour	Narrative	0%

Included reviews of interventions were all written in English. They were published between 2003 and 2014, covering primary studies published from 1987 to 2012. Primary studies included in the reviews; Australia and New Zealand; the Middle East; South America; Asia; and Africa. One review specifically focused on developing countries (Speizer et al., 2003). The reviews included children and young people aged between 4-24, with the majority focusing on adolescents aged 10-18 years.

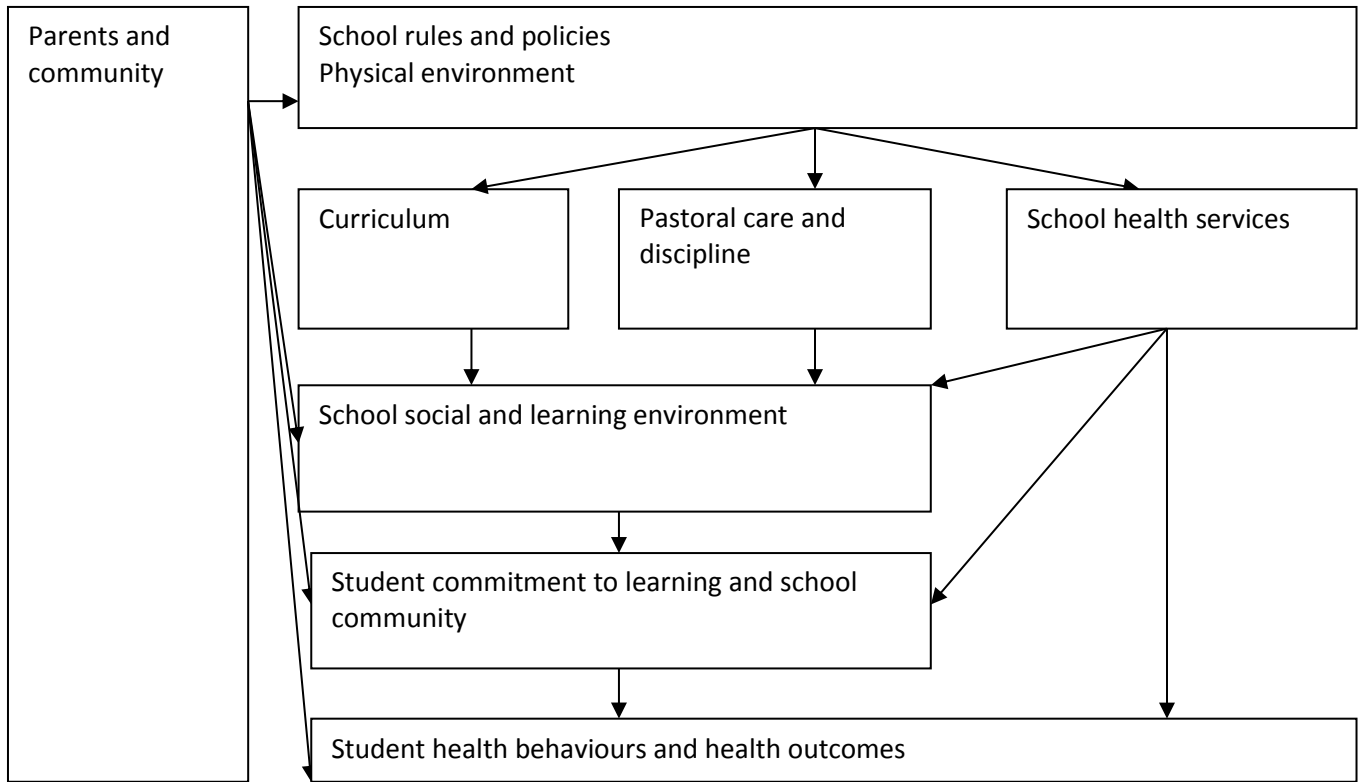
Five reviews considered school policies (Galanti et al., 2014, Black et al., 2012, Aveyard et al., 2004, Coppo et al., 2014, Sellström and Bremberg, 2006) with four considering the role of school tobacco policies (Galanti et al., 2014, Aveyard et al., 2004, Coppo et al., 2014, Sellström and Bremberg, 2006). Three reviews considered the school physical environment (Johnson, 2009, Bonell et al., 2013b, Fletcher et al., 2008) and four reviews considered the social environment (Sellström and Bremberg, 2006, Johnson, 2009, Fletcher et al., 2008, Bonell et al., 2013b). The model in Figure 2 provides an illustration of how schools impact on student health. This is informed by a published synthesis of theories of schools and health (Bonell et al., 2013c), but is elaborated here to set out the different features of school level effects. Table 2 provides an overview of the coverage of features of the school environment in relation to health outcomes assessed in the reviews included in this study; and reports the relevant studies and their quality. The table indicates that the following school features of school environments are not covered in our reviews: parents and the community; curriculum; and pastoral care provision.

Two reviews reported pertinent syntheses for sexual health outcomes (Speizer et al., 2003, Paul and Fabio, 2014) including contraceptive use and sexual activity (Speizer et al., 2003), uptake of the HPV vaccination (Paul and Fabio, 2014) and improvements in knowledge/attitudes (Speizer et al., 2003). Three reviews reported syntheses of violence related outcomes (Sellström and Bremberg, 2006, Johnson, 2009, Black et al., 2012) including victimisation (Johnson, 2009, Sellström and Bremberg, 2006, Black et al., 2012), perpetration of violence (Sellström and Bremberg, 2006, Johnson, 2009),

perceived safety (Johnson, 2009, Black et al., 2012) and carrying weapons (Sellström and Bremberg, 2006). Six reviews reported syntheses of substance use outcomes (Sellström and Bremberg, 2006, Galanti et al., 2014, Bonell et al., 2013b, Aveyard et al., 2004, Coppo et al., 2014, Fletcher et al., 2008). All six reviews reported on smoking; three reviews reported on alcohol use (Sellström and Bremberg, 2006, Bonell et al., 2013b, Fletcher et al., 2008) and two on illicit drug use (Fletcher et al., 2008, Bonell et al., 2013b). One review provided pertinent syntheses for both violence and substance use outcomes (Sellström and Bremberg, 2006).

The objectives of many of the included reviews overlapped. Two reviews focused explicitly on school tobacco policies (Galanti et al., 2014, Coppo et al., 2014) and a further review which considered the evidence that schools cause pupils to smoke included within this a consideration of the evidence for school tobacco policies (Aveyard et al., 2004). Three reviews also considered school effects on multiple student health outcomes, considering a range of school level predictors and health outcomes (Sellström and Bremberg, 2006, Bonell et al., 2013b, Fletcher et al., 2008). The reviews that most closely resembled each other in scope were more likely to include the same primary studies, the percentage of overlap ranging from 0 to 85%. Table 3 summarises review quality and table 4 summarises how the reviews contributed towards our synthesis.

**Figure 2: Logic model: how schools affect student health**



**Table 2: coverage of school level determinants and outcomes in reviews**

	<b>Sexual health</b>	<b>Violence</b>	<b>Smoking</b>	<b>Alcohol</b>	<b>Drug use</b>
Studies and quality	(++) None (+) Mason-Jones et al. 2012 (-) Speizer et al. 2003; Paul & Fabio 2014	(++) None (+) Sellström & Bremberg 2006; Bonell et al. 2013 (-) Johnson et al. 2009; Black et al. 2012	(++) Coppo et al. 2014 (+) Aveyard et al. 2014; Bonell et al. 2013; Fletcher et al. 2008; Galanti et al. 2013; Sellström et al. 2006 (-) None	(++) None (+) Bonell et al. 2013; Fletcher et al. 2008; Sellström et al. 2006 (-) None	(++) None (+) Bonell et al. 2013; Fletcher et al. 2008 (-) None
<b>Coverage of the features of the school environment reported in reviews in relation to which outcomes</b>					
School rules and policies	N	Y	Y	Y	Y
Physical environment	N	Y	Y	Y	Y
Curriculum	N	N	N	N	N
Pastoral care provision	N	N	N	N	N
School health services	Y	N	N	N	N
School social & learning environment	N	Y	Y	Y	Y
Student commitment to learning and school community	N	Y	Y	Y	Y
Parents and wider community	N	N	N	N	N

**Table 3. Quality Assessment of reviews of observational studies**

	Provide an 'a priori' design	duplicate data extraction	search ≥2 databases plus another mode of searching	Searched for reports regardless of their publication type	Include a list of included studies.	report characteristics of each of the individual studies	Assess and document the scientific quality of the included studies.	Use the scientific quality of the studies appropriately	Use appropriate methods to combine the findings of studies.	Assess the likelihood of publication bias	Include conflict of interest statement.	Overall Rating
Coppo et al. 2014	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	High
Aveyard et al. 2004	X	Y	Y	Y	Y	Y	X	Y	Y	X	X	Medium
Bonell et al. 2013	Y	Y	Y	Y	Y	Y	Y	Y	Y	X	Y	Medium
Fletcher et al. 2008	X	Y	Y	Y	Y	Y	Y	Y	Y	X	Y	Medium
Galanti et al. 2013	X	Y	Y	Y	Y	Y	Y	Y	Y	X	Y	Medium
Mason-Jones et al. 2012	X	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Medium
Sellström & Bremberg 2006	X	X	Y	X	Y	Y	Y	X	Y	X	Y	Medium
Black et al. 2012	X	X	Y	Y	Y	Y	X	X	Y	X	X	Low
Johnson 2009	X	X	Y	Y	Y	Y	X	X	Y	X	X	Low
Paul & Fabio 2014	X	X	X	X	Y	Y	X	X	Y	X	X	Low
Speizer et al. 2003	X	X	Y	X	Y	Y	X	X	Y	X	X	Low

**Table 4: Summary of school effects on health from systematic review of reviews of observational studies**

		Outcomes				
		<i>Sexual health</i>	<i>Violence</i>	<i>Tobacco</i>	<i>Alcohol</i>	<i>Drugs</i>
	<i>Student connection to school / teachers</i>	0	√	√√	√√	√√
	<i>School rules / policies</i>	0	√	0	0	0
	<i>Physical environment</i>	0	√	0	√	√
	<i>School based clinics</i>	X	0	0	0	0
	<i>School-based HPV vaccination</i>	√	-	-	-	-

√√ = rigorous evidence of benefits

√ = limited evidence of benefits

0 = no or inconsistent evidence

XX = rigorous evidence of ineffectiveness or harms

X = limited evidence of ineffectiveness or harms

## ***Evidence on sexual health***

### *School-based health services*

School-based healthcare generally refers to primary health services, targeted to young people, provided within the setting of the school. However it is delivered differently across settings and reviews do not always clearly define the interventions involved, making comparisons difficult. Overall the reviews provide little consistent evidence that school-based health services improve students' sexual health, but does find that school-based human papilloma virus (HPV) vaccination programmes may be an effective means of achieving good coverage.

A medium quality review (Mason-Jones et al., 2012) included one observational study which found that girls at schools which provided school-based health centres had an increased odds of reporting having used hormonal contraceptives at last sex and were more likely to have been screened for sexually transmitted diseases. Also, female students at schools with SBHC were more likely to have used emergency contraception at last sex. However access to SBHC did not influence receipt of reproductive healthcare for boys. A low quality review (Speizer et al., 2003) focused on adolescent reproductive health in developing countries. This synthesised observational evidence but details of included studies are not clearly provided. Overall, the authors conclude that reproductive health interventions delivered in a range of settings, including schools, tend to have positive impacts on sexual reproductive health related knowledge and attitudes, but not health related behaviours.

A low quality review (Paul and Fabio, 2014) of studies from low, medium and high income countries highlights the potential of school-based HPV vaccination programmes. School-based programs achieved high HPV vaccination coverage rates across the different studies and geographic locations,



with some evidence suggesting school-based vaccination achieves a higher coverage than healthcare-based programmes.

Overall, most of the evidence on adolescent sexual and reproductive health is derived from low quality studies and is therefore unreliable for us to make conclusions. There is some indication from these reviews that school-based health care may be utilized by young people for the purposes of sexual and reproductive health and that HPV vaccination delivered in schools may achieve better coverage than healthcare-based programmes, but importantly there is no evidence of effects on young people's sexual or reproductive behaviour.

### ***Evidence on violence***

Only one low quality review focused exclusively on student violence (Johnson, 2009) and violence was one of a number of outcomes examined in one medium quality review (Bonell et al., 2013b) and another low quality review (Black et al., 2012). The range of influences examined in these reviews are thin with limited available evidence on the school physical environment including for example, the use of metal detectors, CCTV cameras, patrolling of 'hot spots' in schools which are common in some schools in high-income countries (Taylor, 2013). There was also limited evidence on the school social or learning environment including for example, the influence of training school staff or students on prevention strategies.

### **Engaging school ethos**

There is evidence from a well-conducted longitudinal study in urban US settings included in a medium quality review (Bonell et al., 2013b) suggesting that schools where attainment and attendance were higher than would be expected given the social profile of students (termed 'value

added' education) have lower rates of group fighting. The study authors suggest that value added education is a proxy for a school's ethos which aims to engage students in learning and the school community by providing a balance of support and control for students. In other words, this suggests that what matters in terms of student health is the *value that schools as institutions provide*, rather than gross rates of attainment and attendance which merely reflect the profile of students at intake.

A low quality review (Johnson, 2009) of 25 mostly cross sectional studies, concluded that lower rates of student violence were associated with: positive relationships with teachers; students who feel a sense of ownership in their school; and classrooms/school environments focused on learning. Together, these factors illustrate the importance of the school social and learning environments. However, results should be interpreted with caution as the nature and strength of these relationships are not well reported in the review.

#### School rules and policies

A low quality review (Johnson, 2009) included cross sectional evidence suggesting that lower rates of student violence were associated with a student population that is aware of school rules and thinks they are fair. Another low quality review (Black et al., 2012) focused specifically on outcomes for lesbian, gay, bisexual and transgender (LGBT) young people in schools. The studies reported in this review suggest that schools with a more supportive policy environment (anti-bullying; anti-discrimination policies; harassment policies or LGBT support groups) were associated with better student outcomes, including reduced harassment and victimization. However, this evidence should be interpreted with caution as the strength and significance of these relationships is not clearly reported and it is not possible to judge the quality or size of primary studies in this review. Overall, there is little indication of how schools can develop and implement rules and policies so that they are considered supportive and fair by students.

### Physical environment

A low quality review (Johnson, 2009) included evidence suggesting that lower rates of student violence were associated with physical environments that were not disorderly.

### ***Evidence on substance use***

Of the health topics covered in this RoR, we found the most evidence for student substance use including, tobacco, illicit drugs and alcohol. Reviews on substance use also tended to be of relatively higher quality. Studies have examined various school level influences on substance use including, school rules and policies, school ethos (social environment) and the physical environment.

### School rules and policies

Generally, these policies govern whether and where students and adults can smoke tobacco and often involve penalties for not observing the policy. However, characteristics of school tobacco policies (e.g. rules, bans) and how they are implemented or enforced (e.g. sanctions, assistance) are extremely varied across primary studies making comparisons difficult. Evidence from one high quality (Coppo et al., 2014) and three medium quality (Aveyard et al., 2004, Galanti et al., 2014, Sellström and Bremberg, 2006, Bonell et al., 2013b) reviews suggests the effects of such policies for reducing adolescent smoking is weak and inconclusive.

The high quality review (Coppo et al., 2014) includes 24 observational studies examining the effects of tobacco policies on smoking prevalence. Nine studies found no evidence that such policies affect behaviour. The review also examined the effects of five aspects of policies: the extent of a smoking ban, the inclusion of teachers' smoking, sanctions, assistance for smoking cessation, and a ban combined with prevention and education activities. However, only a few primary studies reported

findings relating to these policy features, most of these suggesting these features are not associated with reduced smoking.

A medium quality review (Galanti et al., 2014) drawing on cross-sectional evidence also found that evidence for the effectiveness of tobacco policies was mixed and inconclusive. However, it found some evidence in support of some components of school policies that were associated with decreases in smoking: universal bans or restrictions; clear rules; and consistent enforcement towards students and adults. However, another study found that the strictness of bans was related to increases rather than decreases in smoking.

The conclusions of these two reviews are supported by two other medium quality reviews. The first of these (Aveyard et al., 2004) found little evidence that tobacco control policies reduced smoking. The second (Bonell et al., 2013b) concluded that the evidence on school policies was weak, with some evidence that effects were greater in German schools with a previously liberal approach to student smoking.

Further evidence that the effects of tobacco control policies in schools may be determined by context comes from an earlier medium quality review (Sellström and Bremberg, 2006). This synthesises evidence from a number of older studies published between 2001 and 2003 of the effects of smoking policies finding evidence that these are associated with reductions in smoking. It may be that such policies were sufficient to achieve reductions in smoking in a context where there is less general disapproval of smoking but that in most current societies in high income countries this is no longer the case. This may also suggest that the strength of the policy enforcement, for example the extent to which sanctions are applied, might also be important.

### Engaging school ethos

A medium quality review (Aveyard et al., 2004) suggests that considerable inter-school variation in smoking prevalence is not due to pupil composition. Although the reviewers pointed to limitations with the current evidence (over-control of potential mediators and under-control for important confounders), they found evidence that schools with strong student participation and sense of community had decreased levels of smoking.

A later medium quality review (Bonell et al., 2013b) drawing on several cross sectional and longitudinal studies of secondary schools in the UK and one longitudinal study of US middle schools found evidence that schools where attainment and attendance were higher than would be expected based on student socio-demographics ('value added' education) had lower rates of smoking, alcohol consumption and drug use. The authors of these studies suggested that value added education might be a proxy for schools engaging students in learning and the school community.

Another medium quality review (Fletcher et al., 2008) similarly found some evidence that an engaging school ethos might be protective against substance use. It reviewed a Scottish study which found significant associations between school-level rates of drug use, alcohol and smoking and the number of students in a school reporting disengagement and poor teacher-student relationships. Furthermore, an analysis of researcher-derived measures found that larger schools with poorer ethos (which was intended to reflect researchers' perceptions of the school organisation and pupil behaviour) were associated with high rates of student drug use at age 13, but not at age 15.

Overall, there is strong evidence of school ethos effects on substance use and reviews consistently report the importance of social relationships and student engagement on substance use prevention.

We consider this evidence to be reliable as it is consistently supported by high quality primary observational studies.

### Physical environment

One medium quality review (Bonell et al., 2013b) reported evidence from the USA that the number of unobserved/ unsupervised spaces in a school's site was associated with some measures of alcohol and marijuana use in school in the previous 12 months, but not with overall use of these substances. The review authors suggest that this might indicate that changes to schools' physical environment may influence substance use within but not outside of schools.

### **Discussion**

There is strong evidence from observational reviews of school effects on young people's health. Key influences include school ethos, including positive student-teacher relationships, student connection to school and the rules; and an orderly physical environment.

Results are summarised in table 4. There is good evidence that a positive school ethos is associated with a range of health outcomes. In schools where attainment and attendance are better than would be predicted based on student socio-demographic factors, rates of smoking, drinking alcohol, drug use and, in one study, violence were reduced. The authors of the studies reviewed suggest that value added education is a proxy for the extent to which schools balance control of and support for students. There is some evidence that student connection to school and to teachers is associated with reduced drug use, alcohol and smoking. There is also some evidence for lower rates of violence in schools with: positive student-teacher relationships; students who are aware of rules and accept

these are fair; and orderly physical environments. A review focused specifically on outcomes for LGBT students suggests that schools with more supportive policies have lower rates of victimization. However, there is little evidence for the effectiveness of tobacco control policies in the absence of a broader approach to improving school ethos according to evidence from multiple reviews. There is also little evidence for the effectiveness of school based sexual health clinics but some evidence that HPV vaccination delivered in schools achieves better coverage than when delivered through health services.

### ***Strengths and limitations***

A strength of this RoR is that it brings together and synthesises a large body of evidence on a diverse array of school-level effects on student health. We did not exclude reviews based on their quality in order to maximise its geographical scope and report on evidence from diverse regions albeit dominated by US evidence. We also checked review-level findings against the information reviews presented on included studies. A limitation of RoRs is that these are only as good as the reviews included and the primary studies that are included within them. Many of the reviews were rigorous; they assessed the quality of primary studies and used the quality of this evidence to weight their synthesis. However, there were limitations regarding the observational reviews in terms of: the heterogeneity between and within reviews related to exposure definition, outcome definition and measurement tools, making comparisons difficult; the simple measures of school level factors; and the lack of consideration of the processes that underlie apparent effects. Our narrative synthesis aimed to avoid 'vote-counting' by referring in our synthesis to magnitudes of effect, study designs and sample sizes. However we cannot rule out the possibility that our synthesis reflects methodological or conceptual biases in the reviews from which it drew or took too much account of studies included in multiple reviews. A further limitation of RoRs including our own is that these may not represent the most up-to-date research in the field and may omit studies of interventions that

are starting to be evaluated but are not yet the subject of reviews (Thomson et al., 2010). It should be noted that the methods of conducting RoR's are still being developed and there isn't currently agreement on best practice.

### ***Implications for policy and research***

Our syntheses suggest that there is good evidence that engaging students in learning and the school community might decrease rates of smoking, alcohol consumption, drug use and violence. However, another review of reviews of school environment intervention studies, examining the same health outcomes found no studies examining the health effects of interventions to increase student engagement. There is increasing interest in evaluating interventions to enhance educational attainment particularly among disadvantaged students (Education Endowment Foundation, 2013). Such studies might usefully examine health alongside education impacts. There is also some evidence that school rules and policies can reduce violence and that schools' physical environments might influence rates of violence, and alcohol and drug use in schools. Future trials should examine the effects of interventions addressing these environmental factors.

In terms of future observational research, most of the high quality studies were conducted in Europe or North America and there is a need to increase the range of settings, particularly to developing countries, to explore how school effects vary with local context. Overall, most research on school effects is concerned with substance use, and future research should broaden the health outcomes examined. There is particular need for research on school effects on violence and sexual health related outcomes which there is currently limited robust evidence. Reviews concerned with sexual and reproductive health outcomes overwhelmingly focus on school based health services, which the evidence, though weak, suggests are not promising for improving young people's health behaviours. Further primary research is warranted in this area examining other school level exposures on



student sexual health outcomes. There is a vast amount of research on student tobacco smoking, focusing mainly on school tobacco policies – which do not look promising. Future research might consider the effects of tobacco policies combined with changes to the wider school social environment. Finally observational studies should look not only at school level effects but should also assess the effects of class-level and year group-level determinants.

### **Acknowledgements**

We would like to thank the other members of the Lancet Commission on Adolescent Health and Wellbeing for their contribution to the work. This project was funded from a grant by the Bill and Melinda Gates Foundation. The views and opinions expressed therein are those of the authors and do not necessarily reflect those of the funder or of the other commission members. The funder played no role in study design, or data collection, analysis or interpretation.

### **Funding**

This project is funded from a grant by the Bill and Melinda Gates Foundation (OPP1117498). The funder had no involvement in: study design; the collection, analysis, and interpretation of data; the writing of the report; or the decision to submit the manuscript for publication.

### **Conflict of Interest**

There are no conflicts of interests, including any financial, personal or other relationships with other people or organizations, which could inappropriately influence or be perceived to influence this work. The funder had no involvement in: study design; the collection, analysis, and interpretation of data; the writing of the report; or the decision to submit the manuscript for publication.

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