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Review Paper

The value of using schools as community assets for health



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ABSTRACT

In planning, designing, procuring and ensuring delivery of improved services ('commissioning') for the school age population, the outcomes should be students who are healthy to learn and who learn to be healthy. Intuitively, linking education and health development together within the wider learning environment seems a good start to planning school health. However there has been a shortage of either theoretical models that can span different settings or experimental research that demonstrates improved community health. Is there evidence that the wider learning environment provided in a school is valuable in improving health?

An initial scoping exercise identified domains of health where there was a promise of health gain. International literature on school health outcomes using the framework of Asset-Based Community Development (ABCD) has been reviewed. It was found that research on a variety of interventions was relevant to schools as an asset for public health. Effective areas for health gain were identified for local planning and evaluation using this community model. However, none of the studies reviewed was originally designed to test schools as assets and most of the research lacked methodological rigour, especially regarding children in low income countries. The ABCD model could help national governments develop resources for both education and health, but there is a global need to generate better quality evidence. Then people who commission for their local communities can make more effective use of these multifaceted assets to improve health and education outcomes for children.

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Introduction

The United Nations survey 'My world' revealed the two most important aspects of life for people and their families, across 194 countries. Rated first was good education and second was better health care.¹ This raises the question 'is there an interaction of education in school and better health for children, looking at the whole school as an asset?' That asset could include the teachers, children and families, the facilities for sanitation, sports, creativity and catering, in an environment designed both for structured learning and for personal and social development. Regular school attendance and educational attainment are known to predict later health in adulthood.^{2,3} From the beginnings of Asset-Based Community Development (ABCD) it became apparent that improving the connections between a local community and its schools could add mutual benefit.⁴ Save the Children summarise the potential benefits of this connection in their motto 'supporting school-age children to be healthy to learn and to learn to be healthy'.⁵ Their School Health and Nutrition programme exemplified this, reaching almost six million children between 2005 and 2010. One of the quick wins identified for the UN's Millennium Project is 'providing free school meals for all children using locally produced foods with take-home rations'.⁶ Very long term benefits arise from the interaction of education and health. In child development, the effective use of schools offers lifelong benefits, for example better educational attainment when young predicts better biological ageing decades later (using telomere lengths).⁷ Effects can span generations: in encouraging local action for Health Promoting Schools, the World Health Organization emphasised 'the single most important factor predicting a child's health is the mother's level of education'.⁸ Worldwide, as girls are spending longer in the school environment, levels of mortality in the next generation are already falling.⁹

The 'whole school' environment

As well as a setting for health promotion, each school is a distinct society. Local factors like children's success in examinations or their pattern of attendance shape that environment.¹⁰ For Americans aged around 15 years, the social dimension of their health is correlated with 'school connectedness' in that learning environment.¹¹ However, it is important not to extrapolate measures from affluent countries to low income nations where only elementary education may be accessible, and to societies where school may promote values like reverence (whereas Americans may 'encourage student self-management').¹¹ For example in Bhutan¹² only 7% of adults had any secondary education but cultural preservation and nature conservation are esteemed.¹³

Within a 'school age' population spanning 5–18 years, biological growth underpins development of mental, physical and social health.^{14,15} Worldwide, huge inequities in child development are apparent.¹⁶ UNESCO and partner agencies have stimulated work around the developing child through Focusing Resources on Effective School Health (FRESH). FRESH is based on the consensus that a child's ability to attain her or his full potential is directly related to the synergistic effect of

good health, good nutrition and appropriate education.¹⁷ Not all school-based interventions produce the positive effects intended, for example an unforeseen problem with the US school breakfast programme was 'stigma associated with participation in a program intended for youth from low-income families'.¹⁸

Background for this project

Three of the authors have been commissioners of health care and four led initiatives to improve professional practice. Box 1 gives the current English definition of 'commissioning'.²⁰ Improved commissioning of services with better outcomes for the school age population is recognised by paediatricians as an imperative.¹⁹ The rationale for this review was to find the best available evidence (and to locate the major gaps in knowledge) for health planners in any country, working with that population.

Box 1

Principles of commissioning

Commissioning for health is a 'continual process of analysing the needs of a community, designing pathways of care, then specifying and procuring services that will deliver and improve agreed health and social outcomes, within the resources available'.²⁰ While this includes traditional elements of health care planning or purchasing, commissioning is outcome-driven and aims for a sustainable improvement in the health of a specified population.

The origins of this review began with attempts to plan the UK school health workforce within a wider public health strategy, after evidence presented to Parliament in 2000.²¹ An inter-professional School Health Research Group found very few controlled trials then: most publications related to small case studies in a single school.²² A contemporary, uni-professional review of school nursing did not include a single RCT done in the UK.²³ In the US the *Journal of School Health* completed a review in 2003 of the discouraging quality and scope of published research, up to 2000.²⁴ Against a background of concern about the poor emotional and physical condition of many young people²⁵ and the inadequate engagement of young people by general medical practice,²⁶ UK planning for school health continued. The strategy *Getting it right for children, young people and families* was published by the Department of Health in 2012.²⁷

This review focused on the time period 2000–2012 corresponding to the development of UK policy. The experimental research available from the UK was limited, so the authors searched for international evidence using published or unpublished research available from any country. They looked at material in many languages and formats (including PhD theses and conference presentations) – in the end all the languages used were European (predominantly English),

although schools on six continents were described. From 2014, clinical commissioning groups are to become ‘accountable care organisations’²⁸ so the UK faces an urgent need for evidence-based commissioning. When planning this review a variety of overseas colleagues were contacted who expressed unanimously the need to overview the interaction in school of education and health. There could be lessons about synergistic health and education policy for many countries.

A number of reviews prior to 2000 looked at the WHO’s model of Health Promoting Schools.^{29,30} There was an attempt to implement a fragmented version of the WHO model in England called Healthy Schools (or NHSP). In spite of many enthusiastic local champions at the time, this was not implemented consistently or sustainably and a *Lancet* policy summary in 2011 concluded: ‘it is not known if the NHSP results in improved health outcomes for children’.³¹ While planning this evidence review it had been noted that a Cochrane Review of the WHO model had recently begun.³² After this review submission, that Cochrane Collaboration recently reported that the effects were ‘generally small’ but that Health Promoting Schools have the ‘potential’ to produce health benefits.³³ The review takes a different, community perspective on the added value of linking education and health development.

What is Asset-Based Community Development?

Kretzmann and McKnight in Chicago developed an approach to community development ‘from the inside out’ that they called asset-based.³⁴ Thirty years ago they used the metaphor of finding and combining local ‘building blocks’ that would become self-organizing structures: today children who have seen *The Lego Movie* (Warner Brothers, 2014) have an image of animated Lego structures that are not just passive blocks but are purposeful and collaborate in an ‘awesome’ community. Michelle Obama described working in Chicago for Asset-Based Community Development (ABCD) thus: ‘*That has been the theme of my work in community for my entire life - that there are assets and gifts out there in communities and that our job as good servants and leaders is not only just being humble, but it's having the ability to recognise those gifts in others, and help them put those gifts into action. Communities are filled with assets that we need to better recognise and mobilize...*’.³⁵

In England public health leadership shifted in 2012 from a Health Service to a Local Authority responsibility. With foresight, in 2010 the Annual Public Health Forum had debated a radical, local government report *A glass half-full: how an asset approach can improve community health and well-being*.³⁶ For the new Local Authority planner this report offered a fresh direction: ‘One of the key challenges for places and organisations that are using an asset approach is to develop a basis for commissioning that supports community development and community building – not just how activities are commissioned but what activities are commissioned’. For this review, it also offered a new lens through which the authors appraised research: ‘Assessing and building the strengths of individuals and the assets of a community opens the door to new ways of thinking about and improving health and of responding to ill-health’.³⁶

Recent research on ABCD from Canada³⁷ showed overall health in children correlates with the number of ‘assets’ nearby. In relation to improving health across communities, Knight³⁸ stressed the need to combine the local assets like ‘building blocks’. For example, to guide planners, local groups in England are now authorised to compile lists of Assets of Community Value.³⁹ In developing application of ABCD, Kretzmann claims such professional/community mapping of ‘building blocks’ unleashes ‘health-producing power’.⁴⁰ If school health really does benefit from ABCD then it is necessary to look for sustained changes permeating the ‘distinct society’ of participating schools (see above).

In England the Health and Social Care Act 2012 required new structures called Health and Wellbeing Boards to span local government and health services. The NHS Confederation now urges these Boards to develop ‘a clear plan to maximise the use of public assets (children’s centres, schools, youth services, health centres, etc) to improve health outcomes for children’.⁴¹ However, managers who are implementing local ABCD complain the ‘evidence base is uncertain’ and lacks ‘quantifiable outcomes’ for commissioning.⁴² Simultaneously, public health trainers say they need an updated curriculum for ‘mobilising the assets of a community’.⁴³

Methods

Work between 2000²² and 2012²⁷ gave prior knowledge of the diversity of the evidence base. Because commissioning is outcome-driven the authors carried out preliminary work scoping potential outcomes, before undertaking a systematic appraisal of the evidence. Datasets searched included the Cochrane Library, ZETOC, the C4EO data (funded by the UK Department for Education), ETHOS theses and WHO reports including *Health Behaviour in School-aged Children*: these were valuable for interpreting potential interventions in schools and outcomes in subsequent, systematic searching. No previous reviews had looked specifically at schools as assets, but promising areas for commissioning were identified e.g. two (out of five) relevant Cochrane Reviews suggested potential health benefits around young persons’ use of alcohol^{44,45} and tobacco.^{46,47} There were differences between the topics of reviews from higher and lower income nations e.g. evidence on teenage pregnancy⁴⁸ and obesity⁴⁹ focused on more developed countries. An area raised in multiple documents was ‘social and emotional learning’ in schools⁵⁰ including building emotional resilience and educational attainment in socially excluded subgroups of children.^{51,52} In the Netherlands a review of reviews⁵³ looking at school-based approaches to sexual behaviour, substance abuse and nutrition found effective interventions had these five elements: use of theory, with specific reference to social cognitive theory; addressing social influences, especially social norms; addressing cognitive-behavioural skills; training of facilitators; and includes multiple components. In other words, using the whole learning environment of a school as an asset, including local social and community links and developing new skills among its teaching staff, did appear a promising approach.

Initial ‘scoping’ of the field found not only was there a need to synthesise different papers reporting quantitative or qualitative outcomes, but an individual paper might combine diverse data. The evidence available could be collected and appraised systematically, but the outcome was not going to be an overall, quantitative ‘effect’ as produced (typically using meta-analysis) in systematic reviews. An alternative, rigorous method was needed to combine diverse data from heterogeneous reports. The Social Care Institute for Excellence (SCIE)⁵⁴ offered an advice on meta-synthesis, an innovative US NIH methodology to review evidence that used diverse research designs, within a narrative structure. The detailed background to SCIE’s advice can be found in the 2008 *Cochrane Handbook for Systematic Reviews of Intervention*.⁵⁵ Author WC published the first British review using a meta-synthesis.⁵⁶ Meta-synthesis generates a structured, narrative review of the ‘commonalities’ shared across relevant research findings.

Sources of evidence

Two parallel approaches were planned. One involved searching online databases of published research. Another aimed to locate ‘grey literature’ by approaching individual experts known to be involved in school health research (for example people who had previously presented evidence to the Department of Health²⁷ or the School Health Research Group²²) and also professional networks which relayed requests to their membership (for example the National Forum of School Health Educators or contacts in a European Two Seas project on youth). During 2012 new contacts arose, e.g. from international collaboration on European Child Health Services and Systems.⁵⁷

The authors experimented with many search terms and sources of literature for either health or education. One term was much more efficient at finding relevant papers in both fields than any alternatives tried: ‘school health’. A checklist of seven inclusion criteria was then applied to all papers or reports:

Relevant to schools as an asset for health, age range 5–18 (could include a wider range 4 or 19 years as well), setting explicit, sample explicit, intervention/interventions described clearly, child health outcomes or wider impact reported clearly, method rigorous, e.g. controlled trial.

Where risks or harms to children were reported these were noted, but few studies considered any negative outcomes.

Vaccination research was excluded on the grounds that similar immune responses were likely to arise using settings other than schools e.g. clinic, summer camp or home programmes. Many published studies included an element of health screening, but unless this was combined with an intervention and outcome in response to the screening results, they were excluded.

Previously very few published RCTs had been described, so the experimental studies with less rigorous comparison groups were included, for example a trial comparing an intervention for schoolchildren in one school district with control schools in a nearby geographical area. The time frame of interest was 2000–2012, however for reasons discussed below finding some earlier material was necessary to understand the interventions used in schools and some updates of initial research came early in 2013. It has been aimed to follow the PRISMA system as described for school research by the Institute of Education⁵⁸ but the ability to appraise each article independently was frequently subverted by the behaviour of authors in this field who ‘salami sliced’ their research as separate publications across different journals at different times. Sometimes it was necessary to find earlier work (including project reports or PhD theses from a decade before) by the same author(s) just to identify the intervention or evaluation methods they had employed for later (incomplete) publications reporting their ‘results’. Many search engines and two large library collections were needed to check the quality of such ‘salami’. Where the authors reference such serial articles in this review, they cite only the two or three papers judged essential to describe the methods and results of those studies.

The databases used in Table 1 were SCOPUS (which includes Medline), the British Education Index (BEI) and the Australian Education Index (AEI). All the full reports received via individual experts or wider networks were appraised, but some indirect contacts from networks sent non-specific material (such as student reading lists) that were not used. French, Spanish, Portuguese and German language papers were appraised (SCOPUS also had articles in other languages, but their abstracts did not pass the initial screening for relevance). None of these non-English papers met the quality criteria, mainly because of limited information on any methods used. All the initial evidence that reported any explicit outcome for children was appraised independently by two authors (JC and WC). Health outcomes included were related both to mental and physical disorders and to positive well-being. Standard checklists for critical appraisal (e.g.

Table 1 – Sources of evidence.

From databases	From individuals and networks	Total
466 (SCOPUS) +18 (BEI) +6 (AEI)	67 (these included six also found in SCOPUS, but none of those six were selected after appraisal)	557
337 abstracts relevant to the review		
93 papers appraised (and some earlier, linked reports)	67 appraised	160
12 selected	13 selected	25 Papers
(representing six studies)	(representing 11 studies)	(17 studies)
Note salami slicing occurred e.g. both BEI and AEI contained additional thin ‘slices’ of more detailed reports found in SCOPUS, which are not included in the 25 papers selected above.		

CASP) were of little use with some of the evidence found, so bespoke inclusion criteria were discussed with a public health observatory. Only papers where both these authors agreed that all seven inclusion criteria were met (see above) are reported in Table 2. One ‘expert’ had sent such relevant material that she was invited to join the authors of this review (M-AH) but she did not take part in the appraisal of research quality. The main data collection began in October 2012 from electronic sources, and the final collation (including heterogeneous evidence sent by both individual experts and wider professional networks) was done in April 2013. The synthesis required a narrative around common themes in the evidence.

Results

From 557 items 25 papers from eight countries have been selected. Table 2 summarises this evidence selected by theme (with effect sizes where available). A simple meta-synthesis⁵⁴ by relevance to asset-based development was attempted for these findings. All the quantitative differences tabulated were claimed to be statistically significant ($p < 0.05$) although occasionally the calculations employed were not clear. Overall a meta-analysis was not appropriate, as outcome measures across the studies were not consistent, e.g. many researchers used idiosyncratic measures developed locally, and few papers used a genuine intention-to-treat analysis, e.g. a posthoc analysis by selected subgroups of children was common. The 25 papers came from 17 studies. Not one study replicated the ‘intervention’ used in the other studies: their common feature was their use of educational assets for health outcomes.

Limitations

It is likely that with a wider search, more evidence might have been found. With hindsight, a search using a social care database, e.g. 59 may have revealed more evidence on assets for the social dimension of health as such papers were not captured in either the education or health databases. Only two of the experimental studies in Table 2 came from developing countries: controlled trials in schools were much more common in high income nations. The initial 557 reports included a substantial body of research from other countries (including multicentre studies such as observations on 430,000 Egyptian schoolchildren⁸⁶ or 15,207 Chinese schoolchildren⁸⁷) but their interventions, like most others, had no control group. The BMJ summarised this issue in a feature on medicine in developing countries: ‘the deworming literature is large but of variable quality’.⁸⁸ During appraisal some of the available evidence in Portuguese or Spanish appeared highly relevant, but lacked key aspects of research ‘quality’.

Areas of health benefit

There was evidence of schools becoming an asset in addressing all the health areas suggested by the initial scoping (see Methods), especially social and emotional learning, where mental health benefits could overlap with educational benefits and sexual health. The potential health areas did include obesity, use of alcohol and tobacco or the care of pregnant

schoolgirls. Additional health areas included the management of both parasitic infections and malnutrition. The education literature generally has different outcomes to health papers, but the Campbell Collaboration⁸⁹ has identified ‘health care’ as the key factor for improving enrolment of children into the school system in developing countries. The biggest effect size for enrolment was seen for asthma treatment (0.74), and in this review a school-based community partnership (in Cincinnati) addressed the long-term management of childhood asthma. This project illustrates the problems of using the current evidence: it was published at different times in different places and with limited experimental details in any place.

Common themes in the results

To answer the initial question, is there an interaction of education in school and better health for children, looking at the whole school as an asset?

Yes: a good example is the Czech obesity reduction trial⁷¹ where that asset included the teachers, children and families, the facilities for sports and recreation, structured learning and the promotion of individuals’ choices for development. Health professionals played a part but such sustained changes for health would have been impossible without mobilising the local community and community leadership. The collaborative Seattle Social Development Project⁶⁰ draws on an even wider range of elements. Uncontrolled experiments such as the initiative across Zhejiang province⁸⁷ have also connected child, school and community elements, but without any control groups or standard outcome measures, the effects from such initiatives are hard to apply for commissioning services in different countries.³⁶ The most common challenge to a meta-synthesis of diverse types of evidence is the ‘heterogeneity inherent in the primary studies’.⁹⁰ The 17 studies that were relevant to schools as assets were designed to test different questions. They used a variety of methods (some with uncertain rigor) and had outcome measures that defied meta-analysis. Nonetheless, across studies there was there a general pattern.⁹⁰ For 16 of the 17 studies the wider resources and environment were used to improve health, for example even in the paper of uncertain quality by Kierle and Thomas⁶⁷ the school governor, head teacher, a trained health education co-ordinator, all the teachers and outside community agencies collaborated over time: having made substance use their common priority they did observe much less alcohol use locally compared to the ‘control’ children. In one of the 17 studies,⁸¹ there was the introduction of a DVD to standard health education classes, that could probably have been done in isolation from the rest of the school or its local community. However its sexual health message was embedded ‘in an environment designed both for structured learning and for personal and social development’ (see Introduction).

Gaps in evidence

Evidence of any harm to young people was rarely reported, but the clearest examples (e.g. dizziness) came from interventions around physical activity.^{75,84} The years 5–18 are critical for the

Table 2 – details the main themes found across the papers selected.

Area of possible health gain	Country	Numbers of schoolchildren, type of school	Main outcome(s)	Design & analysis
<i>Mental health and psycho-social wellbeing</i>				
Hawkins et al. (2008) ⁶⁰	USA	808 Primary	Mental Health (DSM criteria) score 4.23 in the intervention group vs 6.48 in the control group at 15 year follow up. Initial benefits seen for substance use and crime were not maintained.	Clearly described multiple component intervention and controls, intention-to-treat analysis.
Maisey et al. (2012) ⁶¹	UK	449 teenage mothers Secondary	Low self-esteem 15% in the intervention group vs 25% in the control group at one year postintervention; facilitators, teachers and participants described qualitative improvement in 'interpersonal skills'.	Rigorous RCT of multiple component intervention, intention-to-treat analysis.
Snyder et al. (2012) ⁶²	USA	1880 Primary	Locally developed School Quality Survey: the largest effect sizes were observed for the quality of student support 1.91, coordinated teamwork 1.84, and involvement 1.75 at one year postintervention.	Matched pairs of schools were randomised to a multiple component intervention or controls but outcomes were only expressed at one time point, using a non-standard measure that varied greatly across school years.
Schonert-Reichl et al. (2012) ⁶³	USA	585 Primary	In the intervention group peer-reported prosocial behaviours improved across all six items scored, and teacher ratings of two aggressive behaviours from the <i>Child Behaviour Scale</i> improved with effect sizes of –0.53 and –0.36 after one school year.	Quasi-experimental design matching classrooms from two sites; outcomes only reported at one time point.
<i>Alcohol use and harm</i>				
McBride et al. (2004), ⁶⁴	Australia		Mean number of standard drinks in the last 12 months	Initial plan for RCT altered over

McBride et al. (2003) ⁶⁵ and McBride et al. (2000) ⁶⁶		1778 Secondary	273.8 (CI 217–330) for the intervention group vs 362.7 (CI 283–443) for the control group, after 32 months. Mean harm score associated with students' own use of alcohol 9.8 (CI 8.3–11.3) for the intervention group vs 12.5 (CI 10.5–14.4) for the control group, after 32 months. Subgroup analysis of harm: students who were 'unsupervised drinkers' or non-drinkers at baseline were more likely to respond to the intervention than supervised drinkers.	time during the study.
Keirle & Thomas (2000) ⁶⁷	UK	367 Primary and secondary	Locally developed questionnaire: 1.6% drank alcohol daily in the intervention group vs 16.7% in the control group.	Non-random control group, outcomes measured at only one time point.
<i>Smoking</i> Hatzis et al. (2010) ⁶⁸ and Manios et al. (1999) ⁶⁹	Greece	634 Primary	7% were smokers in the intervention group vs 13% in the control group, after 10 years.	Non-random control group with multiple, repeated outcome measures.
Wang et al. (2012) ⁷⁰	USA	572 Primary	Intervention reduced offers of tobacco: adjusted hazard ratio 0.76 (CI 0.62–0.94). No effect on uptake of smoking if tobacco was offered to students.	RCT of classroom interventions, but different follow up measurements for different students over 1–7 years.
<i>Obesity and related health behaviours</i> Sigmund et al. (2012) ⁷¹	Czech Republic	176 Primary	OR of obese or overweight in the intervention group vs control group 0.09 (CI 0.04–0.27). Baseline obesity in the intervention group 7% girls and 11% boys, after two years 0% girls and 0% boys. In the control group obesity rose from 7% girls and 6% boys to 22% and 23%. After two years physical mean activity in the intervention	Non-random controlled trial with repeated measures analysed by intention-to-treat.

(continued on next page)

Table 2 – (continued)

Area of possible health gain	Country	Numbers of schoolchildren, type of school	Main outcome(s)	Design & analysis
Ohinmaa et al. (2011) ⁷² and Veugelers and Fitzgerald (2005) ⁷³	Canada	5200 (obesity comparisons) 15195 (costs) Primary	group was 10399 steps/school day (girls) and 10832 (boys) vs 7794 steps/school day (girls) and 8693 (boys) in the control group. OR of obesity in one intervention group 0.28 (CI 0.14–0.57) vs control group. Cost of intervention Canadian \$8.37 per student.	Quasi-experimental design with three types of school.
Hatzis et al. (2010) ⁶⁸ and Manios et al. (1999) ⁶⁹	Greece	634 Primary	Mean BMI 22.9 in the intervention group vs 23.1 in the control group after 10 years.	Non-random control group with multiple, repeated outcome measures.
DeBar et al. (2011) ⁷⁴ and Foster et al. (2010) ⁷⁵ and Willi et al. (2012) ⁷⁶	USA	4603 Middle	Non-participants in the intervention schools were no different from controls. Among active ‘participants’ BMI >95th percentile 21.4% in the intervention schools vs 26.6% in control schools. Of students with BMI >85th percentile at baseline, 44.5% ‘participants’ finished >95th percentile vs 53.2% controls. OR in this selected group 0.79 (CI 0.63–0.98). ‘Prehypertension’ blood pressure between 90th–94th percentile reduced only in male, non-hispanic black (6.4% vs 11.00% controls) and non-hispanic white students (2.0% vs 6.5% controls). No dose response effect found for ‘participation’.	Designed as an RCT over three school years, but analysed posthoc by selected subgroups of students. Adverse effects (e.g. dizziness) were reported for 2.4% students in both intervention and control schools.
Wilson et al. (2012) ⁷⁷	USA	1119 Middle	Followed up one year after the intervention daily fruit and vegetable intake was 3.02 servings vs 2.69 serving in the control group.	RCT with repeated measures. Posthoc subgroup analysis found intake improved

Morgan et al. (2012) ⁷⁸	Australia	100 Secondary	Training self-efficacy improved in +0.44 (CI 0.27–0.61) in the intervention group vs –0.03 (CI –0.19 to +0.12) in the control group, after six months. BMI changed in the intervention group –0.7 (CI –1.0 to –0.4) vs 0.0 in the controls (CI –0.3 to +0.3) and percentage body fat in the intervention group changed –6.7% (CI –7.9 to –5.6) vs –4.9% (CI –6.0 to –3.8) in the controls. Locally developed	only among white students. Small n RCT with locally developed scales.
Keirle and Thomas (2000) ⁶⁷	UK	367 Primary and secondary	questionnaire about knowledge of health behaviours e.g. 1% intervention group thought eating sweets was ‘good for the body’ vs 9% controls.	Non-random control group, outcomes measured at only one time point
<i>Asthma</i> Rose et al. (2005) ⁷⁹ and Mansour et al. (2008) ⁸⁰	USA	234 in intervention group (the number of controls unclear) Primary and middle	Emergency department visits fell by 0.7 per quarter in the intervention group but rose by 1.8 visits per quarter in the comparison group. Children without activity restriction due to asthma rose from 24% to 60% in the intervention group.	Initial project with 42,000 students began measures including Emergency department visits. Non-random comparison group was a ‘similar population’ to the intervention group: limited experimental methods described in these papers.
<i>Sexual health</i> Hawkins et al. (2008) ⁵³	USA	808 Primary	Any STD diagnosis 0.23 in the intervention group vs 0.84 in the controls, after 15 years.	Clearly described multiple component intervention and controls, intention-to-treat analysis.

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Table 2 – (continued)

Area of possible health gain	Country	Numbers of schoolchildren, type of school	Main outcome(s)	Design & analysis
Merzouk et al. (2011) ⁸¹	USA	626 Secondary	<i>Human Papillomavirus</i> Questionnaire: knowledge of HPV virus improved 7% in the intervention group vs 1% in the controls.	RCT with students' preclass and postclass test scores matched.
<i>Parasites and malnutrition</i> Nga et al. (2011) ⁸²	Vietnam	510 Primary	Fortified biscuits + albendazole reduced parasitic infection with <i>Ascaris</i> (RR 0.30, CI 0.15–0.59) and <i>Trichuris</i> (RR 0.36, CI 0.18–0.73), after four months. Effect size on mid upper arm circumference 0.082 (CI 0.02–0.15). Cognitive function using Raven's score improved only for children anaemic at baseline: effect size 1.86 (CI 0.46–3.3).	RCT with four groups. Posthoc subgroup analysis undertaken for some children.
Monse et al. (2013) ⁸³	Philippines	412 Primary	Soil-transmitted helminths found in 10.7% of the intervention group vs 17.3% of controls after 1 year. Mean BMI in the intervention group 14.88 vs 14.65 in the controls.	Non-random control group (intervention was part of a longer, longitudinal study).
<i>Education and adult employment</i> Hawkins et al. (2008) ⁶⁰	USA	808 Primary	Mean measure of SES socio-economic status index 0.93 in the intervention group vs 0.84 in the controls, after 15 years.	Clearly described multiple component intervention and controls, intention-to-treat analysis.
Two other reports expressed concern about possible adverse effects from interventions on emotionally vulnerable subgroups: one on obesity ⁸⁴ and one on depression ⁸⁵ but the details of possible harm were limited. Note: The types of school are described (as in the papers) rather than the age of children, because of variation in policy, e.g. the total number of years of schooling attained could be more relevant than age.				

social dimension of health and two projects were selected in primary schools^{60,63} that included social development, using the search terms. However, in the studies the authors appraised, there was a gap concerning the social dimension of health in older pupils (see [Sources of Evidence](#), above). They missed research on development of social relationships such as the Gatehouse Project in Australia which used English classes ‘to support the social milieu’ among 13–14 year olds.⁹¹ Although the perspectives of young people were occasionally included within research evidence^{61,63} there was no indication that schoolchildren themselves had influenced the focus of research [compare with [Box 2](#)].

In general, there is an urgent need to develop capacity for randomised trials in low income countries: the only good example was an international collaboration.⁸² While there were observations on vital areas like sanitation (e.g. teachers enthused by community health professionals to design, dig and maintain a latrine system for their pupils) none of these reports passed appraisal for their research. Nonetheless, a more recent report from Uganda⁹² on using village project workers in schools to improve hand hygiene demonstrates it is possible to complete a controlled trial of sanitation, given international help (in this case from the USA). Obesity was a very common topic in high income countries, but an under-researched area was the connection between school and home life, given the role of family in nourishing children. One review of youth sport found that not only were multiple components (health education, physical education and the wider environment for play) needed as assets for schools, but for children aged over 12 years involving their families⁹³ was important for an effective intervention.

In future, research on the wider health systems around schools will be needed. The WHO report *Changing Mindsets*⁹⁴ provides a salient study about Lebanon's Healthy School programme. There, analysis of oral health in schools led to community changes in water fluoridation and national changes in legislation.

Conclusion

Asset-Based Community Development proved a useful ‘lens’ to view research in schools on the interaction of education and health improvement. Having confirmed that there are promising areas for health gain from using schools as ‘assets’,²⁸ there is now a need for good experimental research that tests enhancing such assets within public health, specifically. In the UK this needs to inform the commissioning for child and family health emerging within local authorities. As well as improving universal school health services²⁷ local government commissioners need to address health inequalities⁹⁵ in populations like children in care, homeless young people or children with disabilities. Such commissioning for disadvantaged subgroups of children needs a much better evidence base.⁹⁶

At a global level, it can appear daunting to address inequities in child development and opportunities to flourish: where to begin at a classroom level?

As well as familiar issues like malnutrition and food in schools it may be worth considering social and emotional

learning. For example *The Lancet* has spoken out about the need to engage adolescent boys ‘to lead more gender equitable lives’.⁹⁷ Canada has led the way in school-based research on violence towards women and girls, e.g. after relationship education when aged 14, boys were less likely to use physical violence towards girls 2.5 years later (intervention group 2.7% vs control group 7.1%, OR 2.77 (CI 1.39–5.29)).⁹⁸

Whatever priorities emerge in each country, a key resource may be the insight and imagination of young pupils themselves⁹⁹ (see [Box 2](#)).

Box 2

The United Nations convention on the rights of the child Article 12:

1. States Parties shall assure to the child who is capable of forming his or her own views the right to express those views freely in all matters affecting the child, the views of the child being given due weight in accordance with the age and maturity of the child.

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Conflicts of interest

None.

Contributors

Author WC conducted the preliminary searches and wrote the first draft. MR helped frame the project plan and provided key background material. WN contacted many experts and checked the project plan in relation to its policy relevance. JC conducted an appraisal of the papers in parallel to WC and advised on gaps and weaknesses in the evidence. M-AH helped co-ordinate the project team and summarised their

findings. JC, GC, M-AH and MR edited subsequent drafts and all authors approved the manuscript.

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