



The effects of the school environment on student health: A systematic review of multi-level studies



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ARTICLE INFO

Article history:

Received 21 September 2012

Received in revised form

7 December 2012

Accepted 10 December 2012

Available online 19 December 2012

Keywords:

Schools [MeSH]

Multilevel analysis [MeSH]

Adolescent [MeSH]

Risk taking [MeSH]

Review [MeSH publication type]

ABSTRACT

Health outcomes vary between schools and it is theorised that this may be partly attributable to variation in the school environment. Existing systematic reviews have not drawn authoritative conclusions because of methodological limitations in the review or studies available. We identified 42 multi-level studies, ten of which were judged of sufficient quality to narratively synthesize. There was consistent evidence that schools with higher attainment and attendance than would be expected from student intake had lower rates of substance use. Findings on the influence of smoking/alcohol policies were mixed. Three studies examined the health effects variously associated with school campus area and observability, year structure, school size and pupil-to-teacher ratio with mixed findings. The studies reviewed support the potential influence of the school environment on student health.

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1. Introduction

Disparities in health are often shaped early in life during childhood and adolescence and sustained across the life course. Investing in early years therefore is vital to reducing health inequalities (Marmot, 2010). Health education delivered through the school curriculum and aiming to improve knowledge, develop skills and modify norms is now well-established in schools, addressing substance use, sexual behaviour, physical activity and diet. However, such interventions often have disappointing results (DiCenso et al., 2002; Faggiano et al., 2005; Foxcroft et al., 2002; Harden et al., 2001; Oliver et al., 2008; Thomas and Perera, 2006; Wells et al., 2003). A complementary approach is to modify the school environment to promote health, informed by the notion of 'school effects'.

Originating with the work of Rutter et al. (1979), educational researchers have found that a school's ethos, in terms of values, attitudes and organisation can explain differences in attainment and behaviour between schools (Arnot et al., 1998; Gaine and George, 1999; Gripps and Murphy, 1994; MacBeath and Mortimore, 2001; Scheerens, 2000). According to Macintyre et al. (2002), the effects of place on health can occur due to both 'compositional' (which people are found in a place) and 'contextual' factors (the characteristics of a place). Rutter's seminal

work on 'school effects' prompted further research to examine if certain institutional-level characteristics also influenced students' health-related behaviours (West, 2006).

In their theory of human functioning and school organisation, Markham and Aveyard (2003) suggested that to enable young people to choose health-promoting behaviours, schools should develop students' 'practical reasoning' (ability to understand one's own and others' perspectives and emotions) and sense of 'affiliation' (ability to form relationships). A school is theorised to enable students to fulfil these capacities through its 'instructional' and 'regulatory' orders, which, respectively, promote learning and behavioural norms. Students committed to these orders are more likely to choose healthy behaviours, whereas students disconnected from one or both orders are more likely to seek affiliation in anti-school peer groups and risk behaviours such as smoking. Schools' abilities to build commitment is theorised as depending on how flexibly they define 'boundaries', for example between staff and students, and how student-centred is the organisation and delivery ('framing') of schooling.

Existing syntheses have not been able to examine Markham and Aveyard's theory. An early review of the effects of anti-smoking policies on student smoking was hampered by its non-systematic design and inclusion of ecological studies alongside multi-level studies (Evans-Whipp et al., 2004). Multi-level studies, unlike ecological studies, enable proper examination of how features of the school as an institution as opposed to the compositional features of the student body affect student health

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outcomes. A review of school effects on smoking by Aveyard et al. (2004a) acknowledged the importance of multi-level evidence, but found few studies. It concluded that although smoking prevalence differed markedly between schools, it was not yet possible to determine whether this reflected compositional or institutional factors. This was because studies did not adequately adjust for the potentially confounding effects of families and neighbourhoods, or over-adjusted for factors which might actually mediate school-level effects on smoking, such as student attitudes to school and peer behaviours, so that it is impossible to determine for example whether null effects reflect an absence of school effects or that these are present but are mediated by factors for which adjustment is made. Another review of multi-level studies of school effects on a range of student outcomes did not involve systematic methods (Sellström and Bremberg, 2006). Reviews of school effects on drug use (Fletcher et al., 2008) and students' emotional health outcomes (Kidger et al., 2012) have included longitudinal studies examining individual-level measures of schooling alongside multi-level studies and do not fully examine whether the latter took an appropriate approach to confounding. Previous reviews have also included studies that rely on the same sources for data on school-level determinants and health outcomes; for example studies using school-level measures derived from aggregates of self-reports from the same individuals (usually students) providing outcome data. This can introduce 'same-source' bias whereby any associations found might merely reflect unmeasured characteristics of those providing the data (Duncan and Raudenbush, 1999). For example, students who are more likely to report negative relationships in school might also be more likely to report engagement in health risks.

Considering these limitations, we conclude a systematic review of multi-level studies of school health effects focused on studies which appropriately adjust for covariates and are not subject to same-source bias is now timely. Our review was done as part of a larger project mapping and synthesising evidence on how the school environment influences health (Bonell et al., 2011). In stage 1 of the project, we identified and descriptively mapped a broad array of literature on how the school environment may influence staff and student health. This map was then presented to academic, policy and youth stakeholders with whom we consulted to help define priorities for the second stage of the review.

In stage 2, we focused on student health and defined school environment more narrowly in terms of school organisation/management, teaching, pastoral care, discipline and/or physical environment. We chose not to focus on catering or physical exercise lessons because these areas are already well synthesised (Dobbins et al., 2009; Shepherd et al., 2001). Stage 2 involved several in-depth reviews, of which the review of multi-level studies reported here was undertaken to address the question: what are the effects of school-level measures of the environment (defined as above) on health and health inequalities among school students aged 4–18 years examined via multi-level quantitative designs?

2. Methods

Following a protocol (Bonell et al., 2011), in stage 1 we mapped references of articles judged as theorising or empirically examining: the influence on staff or student (aged 4–18) health of the school social and/or physical environment; interventions to address this (not including the provision of health education or health-related goods or services); and/or the processes underlying these. Sixteen bibliographic databases were searched between 30

July and 23 September 2010, with no limits on language or date: Australian Educational Index; British Educational Index; CAB Health (part of CAB Abstracts, now known as Global Health); The Campbell (C2) Library; CINAHL (the Cumulative Index to Nursing and Allied Health Literature); Cochrane Controlled Trials Database; Embase; ERIC (Education Resources Information Center); HMIC (Health Management Information Consortium); IBSS (International Bibliography of the Social Sciences); Medline; PsycInfo; Social Policy and Practice (includes Child Data & Social Care Online); Social Science Citation Index (Web of Knowledge); Sociological Abstracts; and Dissertation Abstracts/Index to Theses.

We conducted 'core' searches plus 'non-core' searches which we planned to screen more rapidly, although in practice we screened these equally carefully. Our first 'core' searches involved terms for setting (school), population (children), intervention/effect (intervention/school-level effects), outcomes (broad range of health outcomes). We conducted other 'core' searches with various phrases related to 'health promoting schools'. Our 'non-core' searches involved the same terms for school, child and health outcomes but other, broader terms related to intervention/school-level effect (available on request).

All references were uploaded into Eppi-Reviewer 4 software (Thomas et al., 2010) and duplicates removed. Stage-1 exclusion criteria (available on request) were used to screen references on title and abstract to produce the descriptive map for academic, policy and youth stakeholders. Pilot screening was conducted by two reviewers on a sample of 200 abstracts. The remaining references were divided between six reviewers and screened independently. After each reviewer screened 2000 references, a random sample of 200 was double screened by another reviewer to check consistency, with an acceptable threshold of less than one percent disagreement. We included 285 multi-level and ecological references in the final evidence map.

In stage 2, the aim was to review in-depth multi-level studies examining the effects on student (age 4–18) health or wellbeing of school-level measures of schools organisation/management, teaching, pastoral care, discipline and physical environment. We excluded ecological studies because these are vulnerable to unmeasured confounding and cross-level bias (Aveyard et al., 2004a). We included only those studies which drew on different sources for data on the school environment and health outcomes.

Drawing on full papers, two reviewers (CB, HW) double-screened all 285 references that were mapped in stage 1 as being multi-level and ecological studies of school health effects independently using the following exclusion criteria: (1) no school-level measures; (2) school-level measures from same source as health outcomes; (3) not a multi-level model analysis; (4) no relevant health outcomes; (5) other reason (i.e., full paper did not meet stage 1 inclusion criteria); and (6) not in English.

We extracted data from included studies on: research questions/hypotheses; study site and population; dataset; sampling; type of schools; data collection methods; analysis methods; results; school-level measures; levels included; and covariates. Data extraction tools (available on request) were piloted on a random sample of two reports by two reviewers (CB, HW). Subsequently, HW extracted data on context and methods of data collection while WP extracted data on methods of analysis and results, both checked by CB with any differences being settled by discussion. We also checked reference lists of included studies and contacted authors at this stage to identify other relevant studies.

We aimed to synthesise findings from only those studies that were judged of high quality, defined as adjusting for key potential confounders (gender plus individual or family socioeconomic status, ethnicity, family structure, or area deprivation or health)

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