
Capturing complexity: integrating health and education research to inform health-promoting schools policy and practice

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Abstract

Despite the intersectoral nature of health promotion practice many programs limit their evidence base to health sector research and do not draw on evidence from other sectors' research in program design. To help ensure programs are relevant and acceptable to intersectoral partners and intended outcomes are of value to all sectors involved, utilising evidence from more than one discipline is essential. This article identifies the narrow interpretation of existing evidence for health promoting schools and discusses the challenges faced by practitioners and policy makers when reviewing evidence. These issues include the various perspectives on what is 'quality' evidence and how to ensure multidisciplinary evidence is used to inform practice, particularly with the education sector that has a strong research base of its own. A data extraction tool was developed to help address these issues and assist the design of a health promoting schools program. A description of the tool's elements and two case studies provide examples of how research from two different disciplines can be integrated to inform planning and strengthen partnerships. The tool expands the evidence base for policy

and practice decision-making for health promoting schools, acknowledging the practical realities of both sectors.

Introduction

Evidence-based health promotion involves the application of evidence from high-quality research when making decisions [1]. What constitutes high-quality research has mostly been based on the 'hierarchy of evidence', which identifies the randomized controlled trial (RCT) as the best form of evidence [2]. Health promotion policy makers and practitioners who are making decisions regarding the allocation of limited resources and the design of interventions often turn to systematic reviews for guidance. Using evidence from these reviews as a basis for health promotion planning may be legitimate for activities within the health sector. However, when developing health-promoting schools programmes, collaboration with the education sector is critical, and this collaboration includes consideration of the educational evidence base. This article argues for accessing evidence from both sectors and describes a data extraction tool as an example of a strategy for comprehensively encapsulating the evidence base. The development of this tool was seen to be essential to advance practice by accommodating the breadth, complexity and often contradictory perspectives on what constitutes evidence in the education and health sectors and in consequent definitions of evidence-based practice. These contradictory perspectives are described and framed by explication of a settings approach to health promotion; critiques of the appropriateness

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of health sector systematic reviews for health-promoting schools and education sector concepts of evidence. The data extraction tool developed provided a useful framework for health promotion planners to appraise evidence for health-promoting schools initiatives.

Health-promoting schools: a settings approach to health promotion

Health-promoting schools as a ‘settings approach’ to health promotion reflect a conceptual shift from disease prevention focused on individual lifestyle factors to health promotion that addresses the broader social and environmental determinants of health. A settings approach to health promotion acknowledges the complex interaction of factors that impact on health in a system or organization [3]. Within a settings approach, as well as concern for developing personal competencies, there is ‘a desire to act in various ways on policies, re-shape environments, build partnerships, bring about sustainable change through participation and develop empowerment and ownership of change through the setting’ [4]. The complex interaction of factors that impact on health in settings presents particular challenges in terms of evidence-based practice.

Health-promoting schools involve activity to address particular health issues in a comprehensive way—such as creating policy to support curriculum or changing the physical environment. However, it is the process of the planning and implementation of this activity that is critical to its success and sustainability. Health-promoting schools involve providing the conditions for the empowerment of the school community to take ownership of the health of its community, thereby being proactive for health issues the community has identified, rather than being reactive to the agendas of outside bodies [5].

If this is the conceptual framework of health-promoting schools, what evidence base should be used and how is practice judged for its effectiveness?

Issues in reviewing the evidence base for health promotion practice

There are numerous sources of electronically retrievable systematic reviews of evidence (e.g. Cochrane Health promotion and public health www.vichealth.vic.gov.au/cochrane, Campbell www.campbell.gse.upenn.edu, Evidence for Policy and Practice Information and Co-ordinating Centre epi.ioe.ac.uk). Systematic reviews are intended to ensure systematic searching takes place to protect against reviewer bias and that conclusions are based on robust studies [6]. They also provide the opportunity to identify areas for further research and identify effective and ineffective interventions [6, 7]. In most cases, experimental studies form the basis for the inclusion criteria in systematic reviews [6, 8, 9].

Critiques of the evidence from a systematic review process in both the education [viz. 10, 11] and health sectors [viz. 7, 12, 13] have highlighted the limitations of applying the findings of systematic reviews and of their usefulness in influencing practice. Researchers [8] argue that because studies included in systematic reviews are based on research design and not on the quality of the intervention, anomalous results are produced. Limiting the searching and critical appraisal to experimental studies reduces the likelihood that results from research using other methodological approaches will be taken into account when drawing conclusions [6]. One researcher [7] has suggested that reviews of a limited number of studies are not helpful for practitioners and policy makers who ‘find their conclusions confusing and frustrating’.

Problems exist in the application of the hierarchy of evidence to settings-based health promotion interventions. The hierarchy of evidence applied to judge the status of evidence was developed specifically to raise the quality of clinical interventions and to provide guidelines for practice [14]. It is based on a hierarchy of research methods that holds the RCT as the research design that provides the best interventional evidence. It has been argued that this hierarchy of evidence most suits medical

clinical investigations rather than those answering social or educational questions [9]. Yet it is the framework that some people have used to evaluate the effectiveness of health-promoting schools programmes.

The limitations of relying heavily on systematic reviews based on controlled studies for decision making are being recognized. A review of adolescent health promotion [15] developed categories for rating the quality of evidence, giving controlled studies a high rating. But the report put qualifiers on this process. These qualifiers were as follows:

- (i) such reviews complement rather than replace the practical experience and critical judgement of planners and practitioners;
- (ii) recommendations need to be carefully considered against the context for implementation and
- (iii) as available evidence is limited, we need to use intermediate indicators of organizational capacity.

These qualifiers indicate that researchers have already recognized the importance of context, incorporate the experience and judgement of planners and practitioners and look for additional indicators to health outcomes.

A report from a comprehensive review of health-promoting schools [13] attempted to delineate a different way to judge research. The authors stated that reports should include the theoretical framework/literature review, aims and objectives, description of context, sample, data collection method/s, attempts to establish reliability and validity and citing of data collected. The value of including data from a range of study methods in systematic reviews has been acknowledged [16]. These authors have suggested a process for integrating qualitative research with trials in systematic reviews so that perspectives from people's lives were included in addition to quantitative data. This they suggest will 'identify ways to improve interventions and their implementation' [16]. This information will be useful for practitioners and policy makers.

The RCT design does not lend itself to outcomes that involve organizational or structural change [13]. First, because the theoretical understandings

of the process of educational change and readiness for change are ignored in the process of randomization where concerns about sampling override the educational research findings about optimal implementation conditions. And second, the statistical assumptions that underpin RCT are invalid when it comes to organizational or structural change, and the conclusions that are likely to be drawn are limited [13]. That is, RCTs assume that in practice, a health promotion strategy has the potential to work equally well in one school as another. It is the absence of the health promotion strategy in the control group that is used to explain difference, not the implementation context. But educational research on school effectiveness identifies that schools are differentially effective [17]. Strategies for school development need to 'fit' the 'growth' state of a particular school [18].

In policy making and planning for health-promoting schools, perspectives and findings of educational research are essential elements. One researcher has noted that there is a pre-occupation in the health sector with evidence-based medicine sometimes ignoring the practice-based evidence derived from clinical experience and development of clinical instincts that clinicians employ in the use of evidence-based knowledge [19]. This prompts Peile to question why the world of education is much more cautious about defining and promulgating its evidence base, positing that the disciplines of medicine and education are either fundamentally different 'or is it the culture and context that has led the one to embrace the concept [of practice-based evidence] which is still regarded with much suspicion in the other?' The place of culture and context in educational research is a key to understanding the privileging of one form of evidence over another. This is encapsulated in the importance elaborated for 'situated generalization', 'the process of transforming context-bound data into transferable evidence for other contexts' [20] in some educational research.

That is, within education sector research, two forms of evidence are utilized by researchers, evidence-based practice and practice-based evidence. The latter term denotes that professionals,

teachers and medical clinicians both generate and use evidence [21]. Some educational researchers [20, 22] prefer the term evidence-informed practice to more clearly denote the process that occurs in teachers' work where school and classroom decisions are situational and based on 'explicit knowledge derived from reflective scrutiny of evidence from research or from teacher's own pupils' [22]. That is, in the education sector, there is a broader concept of what can constitute evidence.

In the context of practice-based evidence in schools, one group of researchers [20] argue that 'situated generalization' reminds us of three factors that operate in the realm of evidence:

- (i) teachers need to interpret and reinterpret what evidence means for them in their classroom teaching,
- (ii) presentation of evidence needs to remain closely connected to the situation in which it arose, not be abstracted from it and
- (iii) the collective interpretation and analysis of data by peers seem to act as a validity filter [20].

Teachers' perceptions of the benefits and relevance of evidence are a crucial consideration in the development of health-promoting schools.

The need for a broader perspective on 'evidence'

Public health researchers have traditionally been concerned with acquiring data to provide proof of the health impact of a standard intervention. But this has problems because it is 'based on the assumption that delivering a standardised intervention ... is possible and desirable' [6]. Health promotion is not a standardized intervention, a project with a linear trajectory with a beginning and an end. While health promotion practice has altered in the last decade or two, there has not been an equivalent development in research design and evaluation methods to match this shift, a shift that acknowledges the multiplicity of factors that influence health and therefore the multistrategic action needed to address it [23].

The creation of health-promoting schools is caught in these shifting paradigms of research and practice and debates about evidence. Existing evaluation and research designs that view schools as sites, where health promotion interventions are implemented, where different discrete components (such as policy and curriculum) are compared and where measurement occurs across schools for particular individual health behaviour outcomes, are fraught with problems. In these research designs, various components are trialled under controlled conditions to identify the efficacy of the individual components. Researchers fail to recognize and monitor the synergy created by integrating components, give it minor status in reporting or omit 'process' completely. This ignores an essential quality in a settings approach—the interaction of components in a specific context. Ignoring the culture and context fails to acknowledge how schools as organizations operate, improve and change and how teachers judge and change their practice. The lack of recognition of the dynamic nature of schools results in inappropriately applied research designs which fail to acknowledge the constraints imposed by internal structures of schools that make the randomization of children into intervention and control groups, and the establishment of 'controlled school environments' impractical [6, 24]. The result is that illuminating evidence from large-scale research designs on health-promoting schools can be overlooked by narrowly conceptualized definitions of evidence. Health promotion involves creating the conditions for achieving optimal health for individuals and communities. It is a dynamic and on-going process and mechanisms are needed that assess the quality of the practice as well as the final outcomes.

The process of developing as a health-promoting school is often lost in research reports (if data has in fact been collected) [25]. That is, from the health sector's perspective, individual health behaviours and health outcomes are used as evidence of success, often from a short-term (up to 1 year) intervention. This can result in missing essential contributing factors. Measures of individual health outcomes may not provide essential insights into

organizational changes [26]. A health promotion outcomes framework has been developed [27]. It elaborates how a combination of health promotion actions results in health promotion outcomes and intermediate health outcomes including healthy environments and individual health outcomes. Many existing research designs are not sensitive enough to detect these combinations and connections in school settings.

Being able to assess the fidelity of implementation based on quality health promotion practice is an essential aspect of the research design. In school settings, educational researchers have identified that fidelity of implementation of an innovation is an essential factor to monitor and document because it helps explain the outcomes [28]. Involvement of young people is seen as a key part of health promotion practice, but only 7% of the studies reviewed by Harden *et al.* [25] provided a role in the intervention development for young people. They concluded that this represents a conflict with principles of empowerment and partnerships. Researchers can fail to account for and value evidence that illustrates quality practice outcomes.

New types of evidence to demonstrate the efficacy and effectiveness of public health interventions have been called for [2]. They are articulated as delineating conditions for adequacy and plausibility evaluations to develop evidence-based practice. Evaluations of health-promoting schools action meet the criteria for plausibility evaluations which ‘aim to document impact and rule out alternative explanations by including a comparison group—historical, geographic or internal and by addressing compounding variables’ [2].

Contextualized health promotion action and outcomes as evidence

Quality health promotion practice includes acknowledging the context, the participatory process, the multistrategic action and the dynamic cyclical process [29]. As well as partnerships and the involvement of young people already noted, a number of criteria of health promotion action for

creating health-promoting schools have been developed [30, 31]. Denman integrated information from a number of studies identifying the common elements of quality health-promoting school interventions. These include: an initial school-based review; a designated coordinator; a policy, plan and budget; management support; involvement of staff, parents and pupils; a contract with outside agencies to provide support; teacher awareness of the benefits; training and support; alliances and partnerships to sustain action [24].

Many of the factors are whole school practice and policy factors, whose particular combination and quality create school culture and can be unique to a school. These culture and context issues create distinct school effects. That is, local factors, such as staff mobility, that are beyond the control of central policy makers, impact on local school action [32]. Schools also vary in their ability to engage in innovation [33]. The differing capacity of schools to engage in change and development means that varying supportive strategies at different stages will be needed from the health sector [18]. The National Healthy Schools Standards document [30] acknowledges the different levels schools will be at in their involvement in the change process to create health-promoting schools and has developed different criteria to measure their achievements.

The importance of considering contextual issues when designing, implementing and evaluating community-based health promotion interventions is widely accepted [34]. This emphasis on context supports the need to examine evidence from other disciplines [35]. As well as considering what counts as evidence in educational research as briefly described earlier, any intervention being considered for implementation in the school community setting should take into account evidence for school organizational change and school effectiveness. School change research provides insights into the conditions necessary to facilitate change in the school environment to make it more ‘health promoting’. Examining school effectiveness research can assist in programme design by highlighting what the education sector considers as effective practice in schools [17]. Other educational research

in areas such as teacher efficacy [36] and effective pedagogy [37] could also be integrated with health promotion research to inform health promotion action and outcomes.

Health promotion practitioners and policy makers have to decide where to invest their limited resources in the context of the complexities associated with measuring outcomes for school-based health promotion interventions. It is acknowledged that there are many factors that should be considered in the decision making process about health promotion interventions, such as local epidemiological data, available resources, acceptability and organizational support [27]. However, appraising the available evidence is a necessary element to inform decisions. Given the discussion so far, how could practitioners and policy makers be assisted to critically appraise the breadth of evidence for school-based health promotion interventions?

A data extraction tool to inform health-promoting schools policy and practice

To inform the development of a health-promoting schools programme at a local health service level in Australia, a narrative synthesis was undertaken [38, 39]. The method involves a narrative interpretive approach to the process of synthesis. Narrative approaches deal with findings and interpretations in their own terms without transforming them in a common quantitative grouping. It was chosen to summarize findings due to the heterogeneity in the studies. It is an appropriate approach when the following conditions exist: 'where participants are very different, when delivery of interventions differ, when different outcome measures are employed or when differences in study quality exist' [40]. Researchers [39, 41] have identified a number of stages in the process, summarized as

- (i) defining the underlying purpose or aim of the review,
- (ii) specifying the review question/s,
- (iii) scoping the review and mapping the evidence,

- (iv) deciding on criteria and selecting the studies,
- (v) data extraction and study quality appraisal,
- (vi) the synthesis and
- (vii) reporting the results of the overview and dissemination.

This paper focuses on Stages 1–5 of this process.

Studies were included if they were published between 1990 and 2003; primary studies, systematic reviews, evidence reviews or guidelines and published in English. To be consistent with local, state and national health priorities for children, the review focused on evidence relating physical activity, nutrition and mental health interventions in schools. Studies or reviews were excluded if they only focused on one area of the health-promoting schools framework or if the abstract revealed no information on delivery of the programme, evaluation, theory, literature or conceptual base or did not focus on the health and well-being of children and/or young people. A data extraction tool was developed to provide a framework for the analysis (Table I). This framework provided a structure for summarizing and explaining the findings from the studies and reviews included in the narrative synthesis. The tool was developed to ensure that data information relevant to educational research was integrated into the analysis of the evidence. While separate data extraction tools for both educational research and health-promoting schools research have been developed [9, 13], none of these has captured the complex interaction of education and health research and quality health promotion action that informs the development of health-promoting schools.

The tool developed mapped a range of data including methods, programme components and the implementation of the intervention, enabling the reviewers to determine the level of outcomes achieved and to categorize the evidence. It contained seven elements. Brief descriptive information was provided about the document source and the study, in the 'source' and 'description' elements. The 'methods' described the type/s of measures applied to assess the degree to which the intervention achieved its outcome/s and how the results

Table I. Data extraction tool to assist planning for health-promoting schools

Information generated	Description
Source	Country, authors and journal/report
Description	Brief outline of programme/project and study type
Method	Measures, analyses and length of implementation
Programme components	Curriculum, professional development, health services, family, physical/social environment, resources and structures
Intervention	Collaboration with education authorities; coordination within the school; health, school personnel and parents part of team; involvement of young people and use of incentives
Outcomes	Based on hierarchy of health promotion outcomes health promotion action, health promotion outcomes, intermediate health, social and educational outcomes and health and educational outcomes [27]
Evidence	Categories: limited, promising, implementation, outcome and dissemination (based on Department of Human Services [15])

were analysed. This enabled reviewers to determine the appropriateness for the school context of measures and methods of analyses applied. The methods section also describes the length of time the programme was implemented in the schools. This information allowed reviewers to assess whether or not the implementation period was adequate enough for the programme to be ‘institutionalized’ in schools. It takes at least 18 months for an innovation to become part of usual practice [42]. Therefore, the implementation period for interventions in the school setting needed to provide enough time for the programme to take effect.

Technical information is provided about components of the programme, the intervention, the outcomes and categories of evidence criteria. The ‘programme components’ report elements of the context and the foci of the process that identify the quality of the interventions [24]. It enabled reviewers to determine the comprehensiveness of

the intervention. These elements of quality interventions include curriculum, professional development, health services, family involvement, attention to the physical and social environment and structural change.

The ‘intervention’ element recorded information on the nature and process of the intervention as reported in the documentation of the study being reviewed. However, researchers tend to omit descriptive, contextual details [25, 29]. In quality health promotion practice, the intervention process integrates and operationalizes the programme components. It provides evidence to identify Type III errors. This aspect of the data extraction tool also allowed reviewers to consider educational evidence relating to school change and culture and school effectiveness. Generating a positive school culture is an essential quality of an effective school [17]. The characteristics of a positive school culture include involvement of teachers in decision making; school ownership of improvement; giving students control over their learning environment; emphasizing students’ rights and responsibilities and involvement in activities; monitoring progress at all levels; practical, quality staff development integral to school activities; and parental involvement [43]. Where reported, information relating to characteristics of school effectiveness and school culture and change was included to ensure that educational evidence was integrated into the analysis.

The ‘outcomes’ elements record the different types of outcomes achieved by the intervention based on the hierarchy of health promotion outcomes and included in the International Union for Health Promotion and Education review of health promotion effectiveness [12].

The hierarchy in Table II identifies how various health promotion actions and health promotion outcomes are related. In this hierarchy, social outcomes such as quality of life, functional independence and equity and health outcomes such as physical and mental health status are at the highest level. The next tier in the hierarchy is intermediate health outcomes. The determinants of social and health outcomes are included at this level, and

Table II. *An outcome model for health promotion [27]*

Health and social outcomes	Social outcomes: measures include quality of life, functional independence and equity		
	Health outcomes: measures include reduced morbidity, disability and avoidable mortality		
Intermediate health outcomes (modifiable determinants of health)	Healthy lifestyles: measures include tobacco use, food choices, physical activity, alcohol and illicit drug use	Effective health services: measures include provision of preventive services, access to and appropriateness of health services	Healthy environments: measures include safe physical environment, supportive economic and social conditions, good food supply and restricted access to tobacco, alcohol
Health promotion outcomes (intervention impact measures)	Health literacy: measures include health-related knowledge, attitudes, motivation, behavioural intentions, personal skills and self-efficacy	Social action and influence: measures include community participation, community empowerment, social norms and public opinion	Healthy public policy and organizational practice: measures include policy statements, legislation, regulation, resource allocation and organizational practices
Health promotion actions	Education: examples include patient education, school education, broadcast media and print media communication	Social mobilization: examples include community development, group facilitation and technical advice	Advocacy: examples include lobbying, political organization and activism, overcoming bureaucratic inertia

represent determinants such as individual health behaviours, healthy environments and effective health services. The third tier of the hierarchy is health promotion outcomes. These outcomes are usually those more proximal to the health promotion intervention. Health promotion outcomes include health literacy, social influence and action, healthy public policy and organizational practice. The fourth tier on the hierarchy is health promotion actions and includes education, facilitation and advocacy.

Use of this hierarchy accommodates elements of quality health promotion practice, as necessary to assess programme effectiveness. Health behaviour change (an intermediate health outcome) is difficult to achieve by school-based interventions alone, therefore documentation of conditions that contribute to its attainment is essential to judge effectiveness. Mapping outcomes achieved against this hierarchy allowed reviewers to consider the various levels and types of outcomes that have been achieved in school-based health promotion interventions. This provides policy makers and practi-

tioners with a broader base of evidence upon which to make base decisions.

Authors of a report on adolescent health promotion [15] developed evidence categories that the ‘evidence’ element is based on. These categories are as follows:

- (i) Limited—no effectiveness demonstrated, no theoretical grounds for implementation,
- (ii) Promising—theoretically sound or promising,
- (iii) Implementation—evidence for implementation feasibility,
- (iv) Outcomes—controlled studies for outcome effectiveness and
- (v) Dissemination—intervention feasible outside controlled trial setting.

This categorization acknowledges the importance of the role of theory, evidence that supports programme development, quality implementation and dissemination. However, outcomes are still narrowly categorized as coming from controlled studies.

The decision to include both outcomes and evidence column in the data extraction tool was to attempt to achieve some balance between 'levels of evidence' that dominates reviews of evidence in health promotion with the broad range of outcomes that can be achieved through health promotion actions. 'Evaluation concerns assessment of the extent to which action achieves a "valued" outcome' [27]. Including elements of educational research in the data extraction tool provides evidence of outcomes that are valued by the education sector.

Examples of the application of the data extraction tools are provided in Tables III and IV. The programme components and intervention columns ensured that educational evidence was integrated into the synthesis of information. The studies in Table III [44, 45] indicate that there was consistency with educational evidence. The intervention design was based on input from staff and parents, it provided teacher professional development, ensured school ownership of the programme by enabling schools to develop action plans based on their perceived needs, included curricular and extra-curricular components and involved the local education authority. However, the implementation period for this programme was one academic year, which would equate to ~10 months. Based on educational evidence, it could not be concluded that the school-level changes reported in this article could be sustained.

Table IV illustrates the outcomes of a programme implemented in Greek primary schools over a 3-year period [46]. The data extraction tool indicates that this programme provided teacher professional development, engaged parents to reinforce what was taught in the curriculum and gained approval for the programme from the Ministry of Education, indicating some involvement of educational experts in the review of the programme design. All of these strategies are supported by educational evidence. The 3-year implementation period was significant and it could be concluded that this programme has the potential to become institutionalized in the school's usual practice and appropriate for wider dissemination.

The examples in Tables III and IV also demonstrate the usefulness of the data extraction tool in providing valuable information upon which policy makers and practitioners can base decisions regarding investment of resources in school health promotion, including

- (i) study method and analysis of results,
- (ii) the context of intervention implementation,
- (iii) the implementation period of the intervention,
- (iv) resource support provided to schools, including staff time and funding,
- (v) programme components and how these were operationalized,
- (vi) the broad range of outcomes that can be achieved through school health promotion initiatives and
- (vii) processes and outcomes valued by both the education and health sectors that will support successful programme implementation.

For many health promotion interventions, the achievement of individual health outcomes may not be attainable through one setting alone or within a comparatively short time frame. This tool allows policy makers and practitioners to identify intermediate health outcomes that have the potential to influence individual health behaviour and to determine the components of the interventions that have achieved these outcomes that would be relevant to their context.

To inform practice in school health promotion at the local health service level, we applied the following criteria to determine common elements of 'effective' programmes.

- (i) 'Consistency with educational evidence'. This contributes to effectiveness in school health promotion as it acknowledges the evidence base relevant to schools and provides guidance about the strategies required to influence schools capacity to implement and sustain change. It also acknowledges the multidisciplinary nature of health-promoting school practice.
- (ii) 'Level of outcome achieved and category of evidence'. It was important to determine the

Table III. Example of data extraction tool application (UK study)

Source	Description	Method	Programme components	Intervention	Outcomes	Evidence
United Kingdom Evaluation of implementation and effect of primary school based intervention to reduce risk factors for obesity [44, 45]. This article reports individual health outcomes of the same study. Two positive outcomes (vegetable intake and global self-worth) and two negative outcomes (lower fruit intake and higher intake of food and drink high in sugar) were reported.	APPLES—Active Programme Promoting Lifestyle in Schools. Multicomponent, multidisciplinary programme based on the health promoting school concept aimed at reducing risk factors for obesity in primary school children.	Randomized controlled crossover trial, with 10 schools involved—five interventions and five controls. The five control schools received the intervention in the following year. Implemented over one academic year. Main outcomes measures were response rates to questionnaires, teachers' evaluation of training and input, success of school action plans, content of school meals and children's knowledge of healthy living and self reported behaviour. To evaluate the implementation and effect of the programme, descriptive data were pooled from the 10 schools involved.	APPLES involved a range of strategies, including teacher training, modification of school meals, school action plans targeting curriculum, physical education, tuck shop and playground activity. Project manager made regular contact with schools and offered a range of ways to support schools to implement their action plan.	Questionnaires were administered to school staff and parents to inform the design and development of the programme. Encouraged school to develop their own action plans based on their perceived needs. Local education authority involved in modification of school meals. Parent involvement encouraged through both involvement in questionnaire and through completion of a 3-day diet and activity diary.	Intermediate health outcomes—healthy environment. Positive changes to quality of school meals. Implementation of school action plans included improved playground facilities, healthy tuck shops and healthy packed lunches. Health promotion outcomes—health literacy. Increased awareness among teachers of healthy eating and physical activity among students. Greater understanding among students of health benefits of diet and physical activity. Health promotion outcomes—healthy public policy. Policy changes regarding breacktime snacks. Health promotion actions—school education. Nutrition education incorporated into curriculum; Fit is fun incorporated into physical education lessons.	Outcome

Table IV. Example of data extraction tool application (Greek study)

Source	Description	Method	Programme components	Intervention	Outcomes	Evidence
Greece The effects of a health education intervention initiated at first grade over a 3-year period: physical activity and fitness indices [46] Health education research, theory and practice	Reports on outcomes at Year 3 of a 6-year study. The outcomes are reported on targeted variables such as children's and parent's health knowledge and children's physical fitness and physical activity out of school.	Longitudinal RCT. A random sample of 538 children from 24 schools comprised the intervention group; with 424 from 16 schools comprising the control group. Questionnaires were used to collect data relating to pupils' health knowledge, and parents reported their child's level of activity in terms of duration and intensity. The EUROFIT tests protocol was used to assess physical fitness. Questionnaires were also used to investigate parental knowledge of, attitudes to and beliefs on health matters. Sample at baseline consisted of 509 boys and 453 girls.	Curriculum materials, utilizing social cognitive theory as the framework, were developed to assist teachers. Class teachers taught the health aspects of the intervention; physical education experts taught the two PE sessions per week. Teacher orientation sessions were conducted annually. Parents were provided with their child's results from the screening—at meetings parents were given presentations on topics relevant to diet and exercise. Two meetings were held annually at each school. Parents of students in control groups received results with comments in an envelope—however no educational sessions were held for these parents.	Ensured that the intervention was delivered by teachers and provided teachers with training on an annual basis. No evidence of teacher or education involvement in the development of materials. Does mention that the Greek Ministry of Education approved the programme. Has a long-term commitment. Parental involvement reinforces what is being taught in the classroom and encourages parents to be role models for their children.	Health promotion outcomes. Improvements in both parental ($P < 0.05$) and children's ($P < 0.0001$) health knowledge. Intermediate health outcomes. Improvements in moderate to vigorous physical activity outside of school hours ($P < 0.005$) and in physical fitness (all P values were <0.05 , actual values varies between component of fitness tested).	Implementation

level of outcome and category of evidence that interventions should achieve in order to inform practice in a publicly funded organization, where careful consideration of where to invest limited resources is required. In this case, interventions that achieved intermediate health outcomes (including healthy behaviours, healthy environments and effective health services) and were categorized as 'promising' informed the design of the local health-promoting schools programme.

The process of analysing available evidence using the data extraction tool described above provided useful information that contributed to decision making at the local health service level in terms of design and evaluation of the health-promoting schools programme. Integrating evidence from educational research enriched the analysis and also assisted in engaging the education sector in the programme. Drawing on school organizational change and culture, school effectiveness and practice-based evidence has ensured that the local area health service programme has relevance to schools and the approach being taken is relevant to the education sector.

While it is not within the scope of this article to describe in detail the results of the synthesis undertaken, based on the criteria described above, common elements of effective programmes included

- (i) professional development of school staff,
- (ii) active involvement of school staff in the planning and implementation of the intervention,
- (iii) provision of resources to support schools to implement interventions,
- (iv) an implementation period of at least 18 months,
- (v) a sound theoretical base and attention to changing social norms and influences,
- (vi) a focus on at least two areas of the health-promoting school framework,
- (vii) curriculum programmes delivered by trained teachers in the usual school context and
- (viii) engaging parents in the intervention.

These elements demonstrate how health and educational evidence can be integrated to provide guidance to programme and policy makers.

Conclusion

Collaborative health promotion agendas are 'dependent on the participants' abilities to negotiate mutual beneficial outcomes, feasible implementation strategies and compatible monitoring and evaluation methods' [47]. The data extraction tool developed is firmly based in research and practice of both sectors. It expands the evidence base for policy and practice decision making, acknowledging the practical realities of both sectors.

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Conflict of interest statement

None declared.

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