
Report for the East Midlands Joint Regional Improvement & Efficiency Plan

What works in combating childhood obesity: an anthology of the literature on effective whole-system approaches



Centre for Excellence and Outcomes in Children and Young People's Services

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What works in combating childhood obesity: an anthology of the literature on effective whole-system approaches

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Executive summary

This anthology aims to support the East Midlands Joint Regional Improvement and Efficiency Plan (JRIEP) by providing an overview of current best available evidence of effective multi-agency and partnership approaches to preventing and managing childhood obesity.

The anthology focuses on research published from 2003-2010 including approaches and programmes aimed at both prevention (i.e. targeted at **all** children to prevent childhood obesity or overweight) and treatment interventions (i.e. targeted at overweight or obese children) for childhood overweight and obesity. Research sources were selected on the basis of highlighting approaches and programmes with some demonstrable effectiveness (even if only short-term or early stage) rather than providing simple programme descriptions. Approaches and programmes focusing on children ranging from two to 16 years of age were eligible for inclusion, and sources from outside the UK were included as relevant.

The study was carried out by the National Children's Bureau (NCB) Research Centre on behalf of the JRIEP and C4EO.

The evidence base

Prevalence of childhood and adolescent obesity in the UK is high and has a number of adverse effects. Many public health interventions to prevent obesity are underway, but few are being evaluated. Indeed, the most recent and rigorous systematic reviews of the evidence for preventing childhood obesity in the UK – undertaken by National Institute for Health and Clinical Excellence (NICE) (2006) and the Cochrane collaboration (Summerbell *et al* 2005) – conclude that there is an urgent need for evidence of effective strategies.

This review has similarly highlighted a general lack of available evidence of multi-agency programmes that have been extensively tested and replicated and which could, therefore, readily and effectively be applied elsewhere. However, the evidence does provide many examples of good practice and 'best bet' strategies that could be further developed and tested when applied in a specific context.

What did we find out?

Core considerations

- The wider evidence supports the view that prevention strategies are more likely to be effective in tackling the problem of increasing overweight and obesity in the population than treatment strategies. Current guidelines do, of course, emphasise universal prevention strategies over treatment, because all children are at risk and treatment options are more limited and generally less successful. However, more intensive efforts could profitably target those at particular risk of obesity (for example, children with parents who are obese, particular ethnic groups, or children in less affluent areas). Using a combination of approaches may be beneficial since this may help ensure the

appropriate intensity needed for the population at large, and for those experiencing specific risk factors.

- The focus of both preventive and treatment interventions should remain on those behaviours that are established as modifiable causes of obesity in children and young people. These include altering diet by reduction of high-energy foods and sugar-sweetened drinks, reducing sedentary behaviour and increasing physical activity.
- For population-level improvement, a single-intervention approach, such as a healthy food curriculum in one school, is less likely to be effective than a comprehensive intervention that promotes both healthy nutrition and physical activity in a variety of ways. Further, although many studies have focused largely on school settings, an ecological approach seeking change in all of the contexts and environments in which children find themselves has been shown to be more successful than school-only interventions.
- When considering potential strategies, it is important to not only identify the target audience according to their experience of the problem (for example, children who are (or who are at risk of) overweight or obesity), but also to identify those whose behaviour may contribute to the problem (for example, parents, shop owners, school-food service providers, leisure centre owners, youth leaders, etc).
- Following on from the above, any such comprehensive intervention should be grounded in an assessment of the problem and the conditions that affect the problem at the local level. For example, should this analysis indicate that young children typically obtain unhealthy foods outside of the home, interventions to address parents' skills in selecting and preparing foods in the home may be relatively ineffective. Similarly, while it may be sensible to influence young children in their day care setting, one of the key channels of influence for those aged 11 to 13 could be convenience stores located close to schools. Ultimately, programmes should also aim to be enjoyable, engaging, relevant and accessible to the target audience.
- For approaches with multi-sectored involvement, it is essential that all relevant sectors, including those interested in the issue and those able to leverage resources, are involved in developing and implementing elements of the intervention.

Partnership arrangements

As in other social policy contexts, the benefits of partnership working are well documented, and indeed Swanton and Frost (2007) suggest that multi-agency working to tackle increasing obesity levels will allow much more to be achieved than would be the case if working in isolation. In this context, the benefits of partnership working can be summarised as:

- sharing financial and other resources that may be required to deliver a particular intervention
- sharing information and materials, for example, population data or campaign materials across several agencies
- better access to hard-to-reach audiences where one partner may have greater influence or credibility

- increasing buy-in from other influential partners due to greater collective 'pulling power'.

How can interventions be delivered?

The anthology is structured around a simple classification of different types of intervention. Each of these represents a different approach to delivery, from 'top-down' interventions to much more participative approaches. Each of these has benefits and drawbacks, so there is no clear-cut recommendation emerging for the JRIEP.

'Top-down' studies

We define these as studies that have been designed by a multi-disciplinary team of specialists – public health specialists, dieticians, nutritionists and academics, etc – for delivery to a population of interest. They are typically scalable interventions that can be replicated in different settings.

Strategies implemented in these studies focused on treating obesity among those already identified as obese/overweight, or at risk. Such 'treatment' interventions typically involved weekly sessions delivered over a period of 10 to 12 weeks. These offered a combination of educational and learning opportunities, physical exercise and interactive coaching sessions. Sessions tended to be run in parallel for parents and children, with some opportunities for joint participation.

Encouragingly, all three treatment interventions included in the anthology reported significant benefits to participants in respect of body mass index (BMI) and waist circumference reduction and, to some extent (depending on the particular study), less sedentary behaviour among children and improved self-esteem.

The evaluation quality of these studies was generally high, but participation samples were very small and they offered little opportunity to extend the intervention activity beyond the initial intervention group or over the longer term. A key challenge reported by each of the treatment interventions was in sustaining participation for the duration of the programme.

'Tailored, top-down' studies

We define these studies as those driven by specialist agencies and underpinned by clear design principles and evaluation mechanisms (as in 'top-down' studies), but which allow adaptation of materials and interventions to reflect local circumstances. Such adaptations include tailoring of materials and flexibility in the delivery of interventions to reflect local ethnic, cultural and other socio-political factors. It is especially notable that each of the studies highlighted in this anthology provides evidence of the success and importance of this kind of tailored approach. All report positive outcomes for participants and, unlike in the highly prescriptive trials above, retention of participants was more effective. All three studies reported positive outcomes, though one in particular was clearly more successful than the associated, highly prescriptive national clinical trial.

Capacity building

These interventions include those where local professionals and service providers work to create and sustain an environment conducive to healthy weight management and obesity prevention by facilitating the enhancement of skills, reorienting organisational priorities, and creating partnerships and community ownership. These studies tend to report higher

levels of participation and greater potential for long-term sustainability, but offer less potential for robust evaluation than 'top-down' or 'tailored top-down' interventions.

Pre-school and school-led interventions

There are clear advantages of pre-school and school-based interventions for targeting childhood obesity.

The rationale for early years interventions stems from the view that physical activity and eating habits are shaped early in life, so the opportunity to form positive behaviours at a young age, that will ultimately limit the tendency to overweight and obesity, will be beneficial. Since many young children spend much of their day in childcare, the policies and practices implemented in such settings can contribute significantly to the overall nutritional intake and physical activity of the children there. Consequently, childcare settings are suggested as an ideal environment in which appropriate support can be given to enable young children to develop health behaviours that can be carried forward.

Similarly, the school environment has many beneficial attributes: it is possible to engage with most children regardless of their socio-economic status, domestic arrangements, cultural background or ethnicity; it is relatively easy to deliver interventions through existing structures; and the school itself can act as a hub for wider community involvement.

Although the evaluations included in the anthology have not provided evidence of reduced obesity/overweight, positive impacts are reported in terms of improved behaviours and generally enhanced community capacity.

They also collectively highlight a number of challenges for school-based interventions which should be noted. In particular, it is recognised that schools are increasingly under financial pressure, while at the same time they are predominantly focused on academic achievement scores. In the studies identified, teachers reported additional workload as a consequence of their role in managing or implementing a specific intervention, which competed with their other curricular activities and responsibilities. Consequently, the demands on teacher time need to be effectively managed in any proposed intervention programme.

The studies also indicate the importance of appropriately involving parents and children, since the impact of programmes and initiatives can be very limited if children and their families are not sufficiently engaged.

Community participation

These interventions have the highest level of collaborative community involvement. Specifically, they have engaged a wide range of stakeholders from multiple sectors (from schools and youth organisations, to universities, public health organisations, sports and leisure providers, grocery stores and grassroots community organisations) in programme design and implementation.

As seen in the examples included in the anthology, by placing a broader range of stakeholders at the centre of planning and design, interventions are more closely aligned with local culture and context. Such approaches have been shown to increase the vested interests of community members in the effort, thereby increasing the likelihood of sustained, longer-term efforts to bring about key changes in communities and systems.

Range of strategies

Successful obesity prevention programmes need to promote **both** healthy food choices and physical activity (Veugelers and Fitzgerald 2005). This is reflected in the fact that the majority of successful programmes identified for this anthology combined strategies addressing both these strands.

The range of preventive behaviour change strategies that can be adopted broadly fall into a number of core approaches. A useful summary has been provided by Collie-Akers and Fawcett (2008) which is extracted here and illustrated with examples from the various studies included in the anthology.

- **Providing information and enhancing skills** – for example, ‘It’s your Move’ in Victoria, Australia engaged the country’s best-known nutritionist to give a talk to parents (Mathews *et al* 2010), while the ‘Healthy Weigh’ campaign in the USA offered extensive weekly sessions to educate parents about nutrition and exercise. This could also include media campaigns.
- **Enhanced services and support** – for example, ‘Shape up Somerville’ (Economos *et al* 2007) enhanced access to physical activity in a variety of settings, including a ‘walk to school’ campaign, new games equipment and outreach events, or more affordable pricing at leisure centres.
- **Modifying access, barriers, and opportunities** – for example, ‘Shape Up Europe’ (Simovska and Jensen 2009) enhanced local capacity to identify gaps in provision, resulting in many activities in the participating cities that focused on improving physical spaces and facilities in the community setting. These included renovating a school playground and student participation on the board of a new sports hall.
- **Changing the consequences of key behaviours** – this can include strategies such as marketing fruit and vegetables and ‘taste tests’ as used in the Annapolis Valley Health Promoting Schools Project (AVHPSP) to promote consumption (Veugelers and Fitzgerald 2005).
- **Modifying policies and broader systems** – for example, the CATCH programme (Brown *et al* 2007) which aimed to specifically decrease the fat and sodium content in school meals, and increase the amount of time in school for physical activity.

Adding to the complexity, there are a number of risk factors in the delivery chain which are likely to limit the efficiency and effectiveness of any future initiatives put in place. Briefly, these relate to resources and, in particular, to the lack of ring-fenced money and the short-term approach to funding to support the child obesity target; the need for collaboration and local partnerships involving a variety of different public and private bodies; and a current lack of effective performance management structures (Audit Commission *et al* 2006).

Building in evaluation

Evaluation of strategies and programmes is essential for audit and quality improvement and to assess both cost-effectiveness and sustainability. This is particularly important to note since there is no evidence that points to a fully tested and replicable programme readily available for adoption/adaptation to the East Midlands context. The evidence

suggests that this is a highly challenging task, but nonetheless an important consideration for any intervention programme. In summary:

- Local partnerships would be advised to build an evaluation methodology into any programme to ensure the effectiveness of strategies is monitored.
- Evaluation needs to be considered from the very outset of programme design and planning, with sufficient funds allocated from the budget to allow this.
- In the case of obesity prevention strategies, evaluation is particularly challenging, especially where multi-component strategies are wide-ranging and where individuals have highly variable exposure to different elements. Consequently, obtaining estimates of the dose of an intervention – what intervention components and elements are actually experienced – is an important and difficult consideration in examining the impact of the community intervention for different groups.
- Research on comprehensive interventions should aim to collect multiple measures to monitor the effects of individual strands, in order to develop evidence of their effectiveness. Process evaluations that document system changes (for example, how programmes, policies and practices are developed and implemented) can help discern what elements of the intervention were actually implemented. Measurement of different population-level outcomes (prevalence of overweight and obesity, prevalence of related diseases, for example) will also of course show the varied ways the intervention had an impact.
- A function of appropriate evaluation is allowing sufficient time for the intervention to affect longer-term outcomes. Outcomes related to obesity or chronic diseases tend to develop over a long period of time, so multi-year (or at least year-long) studies are needed to capture related changes in practices, behaviours and especially population-level outcomes.
- Funding is also crucial since the evidence shows that – even when successful – many innovative approaches piloted using short-term funding streams can fail to be rolled out due to changes in the funding environment and competing priorities.

Conclusion

Although the evidence collated here supports the general view that multi-agency, multi-faceted interventions are the best way forward for JRIEP partners, the evidence is such that it is difficult to point to specific formulations of interventions based on tried, tested and proven models that would be more (or less) appropriate.

Indeed, as put forward by Collie-Akers and Fawcett (2008), there is limited evidence that any single intervention will affect population-health improvement in diverse contexts, so effective community interventions will likely consist of many and various changes in programmes, policies, and practices (community and system changes) distributed in the multiple settings that can influence child behaviour.

Nevertheless, the framework proposed by Collie-Akers and Fawcett (2008) offers a useful guide for developing collaborative public health action in communities. This framework is based on five specific behaviour change strategies that the authors suggest can be utilised when developing obesity prevention interventions in community settings.

These strategies reflect much of what is detailed in the various interventions identified in this anthology and as such we recommend the following framework forms the basis for further discussion and local planning.

Collie-Akers and Fawcett (2008) Framework for developing collaborative public health action in communities

- **Assessing, prioritising, and planning** – This phase involves several activities that provide the foundation for subsequent phases. It would begin with an assessment of the prevalence of childhood obesity and related behavioural risk factors, and a prioritising of potential target groups.
- **Implementing targeted action and preventive interventions** – This phase involves initial implementation of the strategic and action plan developed during Phase One. It may, for example, include coalition building or arranging partnerships to facilitate a new programme or advocating for a change in policy.
- **Community and system change** – this is the implementation phase of new or modified programmes.
- **Achieving widespread change in behaviour and risk factors** (for example, physical activity, healthy nutrition). This phase involves continual monitoring and promotion of actions and behaviours, to track progress and allow revisions and iterations to promote the overall success of an intervention over time.
- **Monitoring population-level outcomes** – i.e. the prevalence of overweight or obesity among children.

1. Introduction

This anthology aims to support the East Midlands Joint Regional Improvement and Efficiency Plan (JRIEP) by providing an overview of current best available evidence of effective multi-agency and partnership approaches to preventing and managing childhood obesity. The study was carried out by the National Children's Bureau Research Centre on behalf of the JRIEP and C4EO.

Structured summaries of the 'best evidence' initiatives have been produced to outline, from a very practical perspective, what was delivered in terms of interventions and services, the agencies responsible for delivery, target groups, and the key outcomes (see Appendix A).

Commentary is provided in Sections 3 and 4 to highlight effective practice and inform thinking on how intervention and prevention can best be shared across several agencies.

In the rest of this section we provide some background information on the definition, prevalence and causes of childhood obesity and on the principles underpinning strategies for dealing with child obesity. In Section 2 we outline the methodology used for the review and in Section 3 we present the key findings. Section 4 discusses the implications of the existing body of evidence for the implementation of programmes that aim to reduce and manage childhood obesity.

Defining obesity

The World Health Organisation (WHO) defines obesity and overweight as 'abnormal or excessive fat accumulation that presents a risk to health'. However, measuring body fat content is impractical in most settings, and so a simple proxy measure is required. Body mass index (BMI) is routinely used to measure for overweight and obesity. BMI is weight (kg) divided by height squared (m^2).

It is more complex to measure BMI in children and adolescents than it is in adults since BMI changes naturally with age and differs between boys and girls. To overcome this, children's weight status in the UK is assessed by reference to BMI percentile charts (comparable to growth charts) that represent the BMI distribution of UK children and young people in 1990. A high BMI for age is termed 'obesity'; a slightly lower BMI for age is defined as 'overweight'.

In 2003 a critical review of the evidence by SIGN¹ concluded that the optimal definition for 'overweight' was indicated by a BMI at or above the 85th percentile on the UK 1990 chart, and 'obesity' by a BMI at or above the 95th percentile.

However, the UK 1990 BMI charts do not actually show the 85th and 95th percentile lines so these definitions were not practical for use in clinical settings. A pragmatic decision was made to use the percentile lines nearest to the optimal cut-offs which are printed on the UK 1990 BMI charts, and for percentile lines which are slightly more conservative. As a

¹ Scottish Intercollegiate Guidelines Network (SIGN). Its stated objective is to improve the quality of healthcare for patients in Scotland by reducing variation in practice and outcome, through the development and dissemination of national clinical guidelines containing recommendations for effective practice based on current evidence.

result, the 91st percentile (for overweight) and the 98th percentile (for obesity) have been recommended for clinical use.

Although waist circumference is a more simple proxy measure which is now used to classify adults as obese or overweight, various systematic reviews (NICE 2006 and SIGN 2003) have concluded that there is, as yet, insufficient evidence to recommend this should replace the BMI for children and young people.

Prevalence

The latest WHO estimates are that (in 2008) approximately 1.5 billion people aged 20+ were overweight, of which over 200 million men and nearly 300 million women were obese. Furthermore, almost 43 million children under the age of five were estimated to be overweight in 2010 (WHO 2011).

The WHO notes that in the USA and the UK, prevalence of overweight and obesity has almost doubled in the past 25 years (WHO 2011). With one in three children in the UK currently either overweight or obese, it is predicted that without intervention this figure will rise to two in three by 2050 (Butland *et al* 2007).

Children who are obese are more likely to become obese adults, and this likelihood increases the more obese a child is; the likelihood also increases if the child's parents are obese (Reilly 2009).

Obesity in adults is known to lead to both chronic and severe medical problems. It reduces life expectancy by an average of nine years – and by much more in smokers – and greatly increases the risk of heart disease, cancer, type 2 diabetes and high blood pressure. Obesity in childhood and adolescence similarly has a range of serious adverse health consequences, both in the short term (for the obese child) and long term (for the adult who was obese as a child). Using conservative estimates, high blood pressure and high blood lipids are present in at least one quarter of obese adolescents and conditions not previously seen in children, such as fatty liver disease and type 2 diabetes, are now in evidence (Reilly 2009).

Childhood obesity has also been linked to a range of negative consequences and social inequalities including impaired psychological health, poor quality of life, low self-esteem and poor educational outcomes (Reilly 2009).

In economic terms, National Health Service (NHS) costs attributable to overweight and obesity are projected to double to £10 billion per year by 2050, while the wider costs to society and business are estimated to reach £49.9 billion per year at today's prices (Butland *et al* 2007).

A key challenge for policy makers, public health practitioners and other stakeholders, however, is that the public and the media are somewhat ambivalent about the issue and, if anything, the focus is that excess weight is an appearance issue, rather than one which concerns health.

Prevalence in the East Midlands

Throughout the UK, prevalence of child and adolescent obesity differs only slightly between different regions and overall trends are remarkably similar.

The government's latest National Child Measurement Programme (NCMP) (Ridler *et al* 2009) data for England provides high-level analysis of the prevalence of underweight, healthy weight, overweight and obese children, in Reception (aged four to five years) and Year 6 (aged 10 to 11 years), as measured in state schools in England in the school year 2009/10.

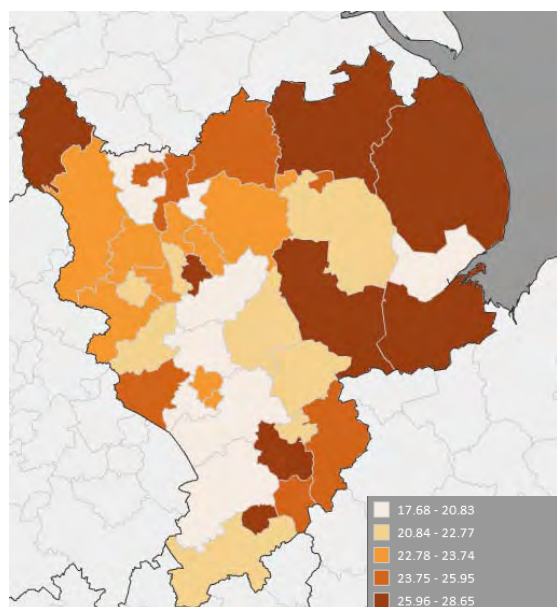
The most recent NCMP data comparing the East Midlands with national trends shows that:

- In Reception, nearly a quarter (23 per cent) of the children measured were either overweight or obese. This reflects the national picture where the same proportion of children were reported as overweight or obese.
- In Year 6, one in three children measured was either overweight or obese (33 per cent in the region and nationally).
- In the East Midlands, the percentage of obese children in Year 6 (18 per cent) was nearly double that of Reception (10 per cent) and the percentage of overweight children was higher in Year 6 (15 per cent) than in Reception (14 per cent). This again reflects the national pattern.
- Obesity prevalence varied by local authority area ranging from 5 per cent in Rushcliffe to 14 per cent in South Holland for Reception, and from 13 per cent in Harborough to 25 per cent again in South Holland for Year 6.

Data presented in the chart below is taken from the Office for National Statistics (ONS) Toolkit to support Local Economic Assessments (ONS 2010). The National Obesity Observatory will produce additional analysis in 2011, and the national dataset will be made available to Public Health Observatories to allow regional and local analysis of the data.

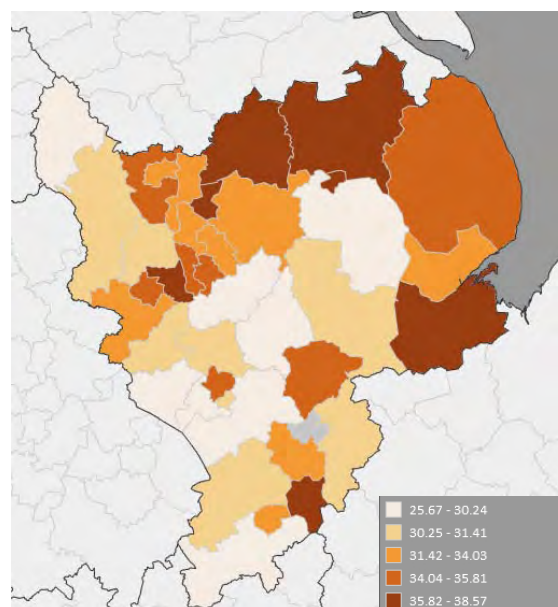
**% Overweight & obese children*
2009/10 East Midlands Region**

At Reception (Aged 4-5)



East Midlands	23.31%
England	23.10%

At Year 6 (Aged 10-11)



East Midlands	32.95%
England	33.35%

*Using BMI classification UK90 population monitoring cut offs (2/85/95)



Source: ONS 2010

The Health Survey for England (HSE) is a series of annual surveys designed to measure health and health-related behaviours in adults and children living in private households in England. Between 1995 and 2001, mean BMI increased overall among boys aged two to 15 from 17.7kg/m² to 18.2kg/m², and among girls aged two to 15 from 18.1kg/m² to 18.6kg/m². Between 2001 and 2009, there was no significant change for either boys or girls aged two to 15. However, among both boys and girls the mean peaked between 2004 and 2005, and has dropped back slightly since then.

While the trends show yearly fluctuations between 1995 and 2009, the prevalence of obesity among boys aged two to 15 increased by five percentage points (from 11 to 16 per cent), and the equivalent increase for girls was three percentage points (from 12 to 15 per cent). However, the pattern has not been one of clear uniform increase over the entire period. The prevalence of obesity increased steadily in most years up to around 2004 and 2005 and since then the pattern has been slightly different for boys and girls. Among boys, the proportion that was obese has remained between 16 and 19 per cent since 2001. Among girls, there was a significant decrease in obesity between 2005 and 2006, and levels have been similar from 2006 to 2009.

Estimates for the most recent years suggest that the trend in obesity may now be flattening out. It will be important to continue to monitor the trends in future HSE data, to

confirm that this is a continuing pattern, rather than a plateau within a longer-term trend that is still gradually increasing (ICHSC 2010).

Prevalence of obesity is even higher than that of the general population in some sub-groups of children and young people, including those living in socio-economically deprived families; children from some minority ethnic groups, particularly of South Asian origin; children who are looked after; children with learning difficulties; and survivors of many childhood cancers (Reilly 2009).

Causes

For obesity to develop, the number of calories consumed by an individual must exceed the number of calories utilised over a period of many months or even years. Once individuals become obese, they need to consume a much larger number of calories than non-obese individuals, and it is difficult to tackle the condition once established.

Rather than place responsibility for increased weight gain solely with the individual, however, Butland *et al's* (2007) report considers the issue a result of the prevailing 'obesogenic environment'. In other words, it suggests that the technological revolution of the 20th century; from changes in food production and food sales, to motorised transportation, and shifts in work and home lifestyle patterns has fostered conditions where individuals are more likely to gain weight. These include, for example, the perceived and actual barriers of time, money and convenience which support convenience food consumption, limited access to healthy food, the relative cheapness of 'junk' foods and promotion of food and drinks high in fat, salt and sugar. There has also been a concomitant shift to more sedentary activities, from TV viewing and other screen time opportunities, to greater reliance on transport for getting about.

The report also suggests that the causes of obesity are embedded in an extremely complex biological system, set within this complex societal framework. It identifies four key components of the system:

- physiological determinants – for example, primary appetite control function in the brain
- eating habits – which can make it difficult to adopt healthier choices
- activity levels – more sedentary behaviour and less physical activity
- psychosocial influences – general ambivalence to the issue experienced by individuals and at the societal level.

This set of circumstances means people become 'passively obese' in the sense that weight gain for many becomes largely inevitable and involuntary – with the more socially and economically disadvantaged and some ethnic minorities even more vulnerable.

For children, the most significant determinant of childhood obesity is parental obesity. While this cannot be dissociated from the 'obesogenic environment' described above, breaking this reinforcing pattern will be important when seeking ways to avert childhood and adult-onset obesity (Butland *et al* 2007).

Dealing with the issue

There is general consensus in the literature that broadly based societal interventions are needed to tackle the problem of increasing overweight and obesity in the population. However, the inherent complexity of the factors influencing weight gain, together with the normalisation of obesity and overweight in society, raises key questions as to how appropriate strategies can be developed to tackle the problem.

The distinction between prevention and treatment is important.

Treatment

Once weight is gained and overweight/obesity established, it is difficult to reverse. Emphasis on prevention is therefore vital and most of this report addresses such interventions. However, there are also significant numbers of children and young people who are already obese and require treatment, and the numbers will continue to rise regardless of any short-term measures (Butland *et al* 2007).

While treatments are generally thought to be of limited effectiveness, and many people find it difficult to maintain weight loss without subsequent gradual weight gain, there have been some successes. Furthermore, modest weight loss (by 5 to 10 per cent of initial weight) is said to reduce the risk of developing type 2 diabetes, improve blood pressure and reduce total cholesterol. There is therefore a strong case for considering treatment strategies alongside prevention (Swanton and Frost 2007).

Health professionals face many obstacles in effectively treating obesity in children and young people. In particular, many obese children and young people, and their parents, believe that obesity is the result of an underlying metabolic problem. While genetic syndromes can offer a possible cause of obesity, underlying pathology is extremely rare and most obesity in children and young people has its origins in their lifestyle. In one study of a paediatric obesity clinic in Germany, 1,405 children and young people were screened for pathological causes of their obesity and pathology was identified in less than 1 per cent (Reilly 2009).

In England, the National Institute for Health and Clinical Excellence (NICE) has produced evidence-based guidance on obesity prevention and management for children (NICE 2006). This states that, in most cases, management should aim for maintenance of body weight rather than weight loss (so that the child will, to some degree, 'grow into' his or her weight) and suggests strategies aimed at reducing sedentary behaviours such as:

- reducing television viewing and other 'screen time' to less than two hours a day
- increasing moderate-to-vigorous physical activity to around one hour per day
- reducing consumption of high-energy foods and drinks
- setting targets for behavioural changes.

The guidance also suggests that treatment is given to children only when there is a significant health problem such as sleep apnoea or type 2 diabetes.

Prevention

In the general context of increasing obesity and overweight in society, and the limitations of treatment interventions in tackling the problem, the case for emphasising prevention strategies to deter the onset of obesity is strong.

It is also important to recognise that the concept of obesity prevention does not simply mean preventing normal-weight individuals from becoming obese. Rather, it encompasses a range of strategies that aim to prevent:

- the development of overweight in normal-weight individuals
- the progression of overweight to obesity in those who are already overweight
- weight regain in those who have been overweight or obese in the past but who have since lost weight

(Swanton and Frost 2007).

Nevertheless, while prevention offers a good way forward, it is also important to note that robust evidence of the effectiveness of such strategies is somewhat scant.

NICE (2006) comments that there is little UK-based evidence on the effectiveness of multi-component interventions among key at-risk groups including young children and families, black and minority ethnic groups, vulnerable groups (for example, looked-after children and young people, lower-income groups and people with disabilities) and people at vulnerable life stages. Guidance suggests that interventions should be undertaken in 'real world' everyday clinical and non-clinical settings and should investigate how the setting, mode and source of delivery influence effectiveness. Further, NICE states there is a need for research evaluating multi-component interventions to manage obesity in primary care, because factors such as the types of participant, the training of staff and the availability of resources may affect the results.

Strategies

There is a predominant view in the literature that successful obesity prevention programmes need to promote **both** healthy food choices and physical activity (Veugelers and Fitzgerald 2005). This is reflected in the fact that the majority of successful programmes identified for this anthology combined strategies addressing both these strands. Only two dealt with a single dimension (Simon *et al* 2004; Johnston 2009).

The range of preventive behaviour change strategies that can be adopted broadly fall into a number of core approaches. A useful summary has been provided by Collie-Akers and Fawcett (2008) which is extracted here and illustrated with examples from the various studies included in this anthology.

- **Providing information and enhancing skills** – for example, 'It's your Move' in Victoria, Australia engaged the country's best-known nutritionist to give a talk to parents (Mathews *et al* 2010), while the 'Healthy Weigh' campaign in the USA offered extensive weekly sessions to educate parents about nutrition and exercise. This could also include media campaigns.
- **Enhanced services and support** – for example, 'Shape up Somerville' (Economos *et al* 2007) enhanced access to physical activity in a variety of settings, including a 'walk to school' campaign, new games equipment and outreach events, or more affordable pricing at leisure centres.

- **Modifying access, barriers, and opportunities** – for example, ‘Shape Up Europe’ (Simovska and Jensen 2009) enhanced local capacity to identify gaps in provision, resulting in many activities in the participating cities that focused on improving physical spaces and facilities in the community setting. These included renovating a school playground and student participation on the board of a new sports hall.
- **Changing the consequences of key behaviours** – this can include strategies such as marketing fruit and vegetables and ‘taste tests’ as used in the Annapolis Valley Health Promoting Schools Project (AVHPSP) to promote consumption (Veugelers and Fitzgerald 2005).
- **Modifying policies and broader systems** – for example, the CATCH programme (Brown *et al* 2007) which aimed to specifically decrease the fat and sodium content in school meals, and increase the amount of time in school for physical activity.

Adding to the complexity, and as identified by the Audit Commission, the Healthcare Commission and National Audit (2006) in its report *Tackling child obesity: first steps*, there are a number of risk factors in the delivery chain which are likely to limit the efficiency and effectiveness of any future initiatives put in place. Briefly, these relate to resources and, in particular, to the lack of ring-fenced money and the short-term approach to funding to support the child obesity target; the need for collaboration and local partnerships involving a variety of different public and private bodies; and a current lack of effective performance management structures.

2. Methodology

This review aimed to produce an anthology of recent, effective multi-agency² and partnership approaches to preventing and managing childhood obesity. To produce the anthology, we utilised a rapid review methodology to identify research; this methodology is described in brief below.

The anthology focuses on research published from 2003–2010 including approaches and programmes aimed at both prevention (i.e. targeted at **all** children to prevent childhood obesity or overweight) and intervention (i.e. targeted at overweight or obese children) for childhood overweight and obesity. The anthology focuses on research sources rather than simple descriptions of programmes to ensure that it highlights approaches and programmes with some demonstrable effectiveness (even if only short term or early stage). Approaches and programmes focusing on children ranging from two to 16 years of age were eligible for inclusion, and sources from outside the UK were included as relevant.

Research literature was identified through systematic searches of relevant databases and websites as well as a general online search for unpublished literature. The initial searches elicited over 1,250 ‘hits’, of which around 200 were deemed potentially relevant for the anthology. Further details of these initial searches are available in Appendix B.

After discarding duplicates and scanning abstracts and summaries for relevance, full text was obtained for around 50 sources. Using these full text sources, non-research sources and programmes that did not obviously include a multi-agency approach were excluded. All full text sources (including non-research sources) were then ‘harvested’ for additional references. Full text for these new sources was obtained, assessed for relevance and further harvested for additional sources. Overall, more than 100 sources were considered for inclusion in the anthology.

Following the comprehensive searching, screening and reference harvesting process, 26 research sources focusing on multi-agency approaches to preventing and managing childhood obesity were identified. Each of these sources was summarised and appraised using a summary template (see Appendix C for the full summary template). This includes programme details as well as information on programme evaluation to gauge effectiveness. Each source was assessed for relevance and overall quality, noting key limitations of the research and overall comments on applicability for the anthology. Twenty per cent of the structured summaries were completed by more than one reviewer.

In most cases, the programme information included in the research sources was insufficient to truly grasp the multi-agency nature of the programmes (i.e. the sources often focused on evaluating outcomes of the programmes rather than the structure of the programmes *per se*). As a result, we completed further online searches of specific multi-agency programmes to retrieve additional programme information.

² By multi-agency we mean ‘the range of organisations, services and professional groups who provide services to children, young people and their families working together across disciplines, as appropriate, to improve outcomes’.

A total of 18 programmes from 2004 to 2010 are included in the anthology.

Detailed summaries are included in Appendix A, with shorter overviews included in Section 3.

As a guide to quality, we have adopted a simple rating scale. For the longer summaries in Appendix A, we have included a rating (High, Medium, Low) for three dimensions; 'Recommended reading (for the Joint Regional Improvement and Efficiency Plan (JRIEP) and others)', 'Relevance' (to the JRIEP and others) and 'Evaluation quality'. For the shorter summaries presented in Section 3, this is reduced to a single measure totalling the achieved score on the three dimensions (where High = 2, Medium = 1 and Low = 0). Consequently, the highest possible rating is 6 and the lowest 0. Inevitably this is a very subjective approach, but each has been rated twice as a test for consistency.

3. The evidence base

For the purpose of this anthology, only interventions that have taken a multi-agency³ approach to delivering strategies to help children and young people to manage or maintain a healthy weight are included. These include interventions focusing on diet, physical activity or both in combination, and a variety of approaches from ‘top-down’, prescriptive interventions, to those developed through a more participatory approach in schools and community settings. It is primarily concerned with interventions aimed at children and young people aged two to 16.

The evidence for this anthology has been extracted from guidance and papers on multi-agency interventions published between 2003 and 2010. The evidence presented is based on evaluations of 18 interventions which were identified after screening more than 100 source documents (see Section 2 for further details on the methodology).

- Despite the extensive search we found only two evaluations of UK programmes, and a third report on 19 European cities which included Hull in the UK. The majority of studies reviewed were in the USA and Canada (10), followed by Australia (3) and other European countries (2).
- The papers reviewed provide limited detail on the precise roles and responsibilities of partners, or the multi-agency framework, so it is difficult to draw any firm conclusions concerning effective partnership arrangements. However, the papers reviewed do provide evidence of the benefits of partnership working.
- While many of the studies included present results indicating positive outcomes, only a few reported a rigorous evaluation methodology. The reasons for this are various: some sources provided a process (rather than impact) evaluation; others report interim data pending full evaluation at a later date; and again others report on a limited number of subjects (programme participants). However, these studies are still important to include as they provide examples of promising practice with some evidence of impact and potential for replication. In its recent systematic review of the evidence for preventing childhood obesity (NICE 2006), the National Institute for Health and Clinical Excellence reported similar limitations, and the need to draw general (as opposed to specific) conclusions.
- For multi-component interventions there is little evidence of the impact delivered (or challenges posed) by the individual components. This is compounded by the fact that there is wide variation in the design and delivery of specific interventions themselves, for example, in the multitude of ways in which nutritional education has been delivered to parents.
- Only one of the studies (Brown *et al* 2007) explicitly addresses the question of cost-effectiveness.

³ By multi-agency we mean ‘the range of organisations, services and professional groups who provide services to children, young people and their families working together across disciplines, as appropriate, to improve outcomes’.

Given the body of evidence it is difficult to highlight off-the-shelf programmes that have been extensively tested and replicated and could be applied elsewhere. However, the evidence provides many examples of good practice and 'best bet' strategies that need to be further developed and tested when applied in a specific context. Certainly, the benefits of partnership working are well documented (Swanton and Frost 2007).

As a result, it seems fair to conclude that multi-agency working allows much more to be achieved than would be the case if working in isolation. Particular benefits of partnership working that are in evidence across the studies include:

- sharing financial and other resources that may be required to deliver a particular intervention
- sharing information and materials, for example, population data or campaign materials across several agencies
- better access to hard-to-reach audiences where one partner may have greater influence or credibility
- increasing buy-in from other influential partners due to greater collective 'pulling power'.

Definitions

In an attempt to guide the reader through the various studies identified, and to allow us to draw some broad conclusions, we have structured the anthology around a simple classification of different types of intervention. These are:

- **'Top-down' studies** – We have defined these as specialist-designed interventions, involving scalable and replicable strategies, which are delivered to a population of interest. Treatment intervention strategies would typically fall into this category. The evaluation quality is generally high, but participation samples tend to be small and sustainability is limited.
- **'Tailored, top-down' studies** – In delivery terms, these studies are driven by specialist agencies and underpinned by design protocols as in 'top-down' studies. However, in these examples implementation allows for adaptation of core strategies and materials to better respond to local circumstances.
- **Capacity building** – These studies emphasise 'experts' working with local professionals and service providers to create and sustain an environment conducive to healthy weight management and obesity prevention. They tend to report higher levels of participation, and greater potential for long-term sustainability, but offer less potential for robust evaluation than 'top-down and 'tailored, top-down'.
- **School-led interventions** – In these studies, schools take a central role in developing health-promoting activities relevant to their own environment, i.e. to their student-parent-community stakeholders. Similar in some respects to capacity building, interventions focused largely in-school are notably less effective than those involving the wider community. Resourcing can be a key challenge.
- **Community participation** – These interventions have the highest level of collaborative community involvement, combining various participatory activities. Three studies identified here focused on ethnic populations in low-income, urban neighbourhoods in

the USA. Retention of participants is a key challenge and evaluations have been of limited quality.

Scoring system – As detailed in Section 2, the score reported for each intervention in the summary tables that follow provides a quick-reference guide to the overall evaluation quality. The highest possible score is 6, the lowest is 0.

Top down – replicable

These are generally studies that have been designed by a multi-disciplinary team of specialists – public health specialists, dieticians, nutritionists and academics etc, for delivery to a population of interest. They are typically scalable and can be replicated in different settings. Strategies focused on treating obesity among those already identified as obese/overweight, or at risk, generally fall into this category.

Among those studies identified here, a range of tried and tested materials were incorporated in the programme designs. For example, the ‘Healthier Options for Public Schoolchildren’ (HOPS) intervention used the ‘Organ Wise Guys’ curricula and materials, and a short classroom-based physical activity programme (WISERCISE). Similarly, the ‘Healthy Choices Collaborative Initiative’ (HCCI) utilised ‘Planet Health’, ‘Healthy Choices’ and the ‘School Health Index’ – all pre-existing tools that had been applied and evaluated in other settings.

Table 1: Examples of top-down interventions

Programme title	Intervention summary	Overview
Healthier Options for Public Schoolchildren (HOPS) Hollar <i>et al</i> 2010a Florida, USA	Quasi-experimental controlled pilot. Used multiple, easily-replicable strategies to change knowledge and behaviours around good nutrition, physical activity and healthy living: i) Modified dietary offerings ii) Nutrition/lifestyle education curricula iii) Physical activity programme iv) Gardening activities Ages: 6-12	Score = 5 Two-year study showing decrease in BMI compared to control group
Prevention through Activity in Kindergarten Trial (PAKT) Roth <i>et al</i> 2010 Germany	Aim to increase young children’s level of physical activity, improve motor skills, and decrease health-risk factors and media use. Also to equip parents and children to continue activities after the programme had ended Ages: 4-5	Score = 4 Positive outcomes in terms of decrease in BMI and increased activity. Low retention of parents
Healthy Weigh Dart <i>et al</i> 2005	Community-based, treatment intervention. Weekly sessions for families including exercise	Score = 4 Positive outcomes, including on at least

Programme title	Intervention summary	Overview
<p>Fort Worth, Texas USA</p>	<p>class, nutrition lesson and family meal with facilitated 'table talk' to engage participants in learning, sharing successes/problems etc. Each family given a healthy food bag to support healthier eating at home. Formally intended as a preventive intervention, the target group comprised 80% obese/overweight adults and 50% children overweight/at risk among the low-income, urban community of mainly Hispanic and Afro-American families Ages: 0-18</p>	<p>one measure of weight management for adult and adolescent participants who were overweight at baseline.</p>
<p>Families for Health Robertson <i>et al</i> 2008 Coventry, UK</p>	<p>Small-scale treatment pilot involving parallel sessions for obese/overweight children and their parents. 12-week intensive programme delivered in a community setting and facilitated by local professionals. Aim to reduce children's BMI; improve quality of life and self-esteem; address parent mental health and parent-child relationships; and promote healthy lifestyle. Behavioural treatment alongside physical activity and diet strategies, specifically giving parents responsibility for behaviour change Ages: 7-13</p>	<p>Score = 3 Data shows positive impacts but only 15 out of 27 children completed the programme. Families who self-referred were most likely to continue</p>
<p>Bienestar Health Programme Trevino <i>et al</i> 2005 San Antonio, Texas, USA</p>	<p>Programme to tackle incidence of type 2 diabetes in low-income Mexican American children which involved: i) Parent education and involvement programme ii) Classroom health and physical education curriculum delivered by PE teachers iii) Student after-school health club and iv) School cafeteria programme. Parents and students who participated</p>	<p>Score = 2 Paper only reports on physical fitness, but positive outcomes reported compared to controls. Small sample for analysis, but well-conducted evaluation</p>

Programme title	Intervention summary	Overview
	received coupons to purchase donated goods. Activities in English and Spanish Ages: 9-10	
Healthy Choices Collaborative Initiative (HCCI) Greaney <i>et al</i> 2007 Massachusetts, USA	Partnership among public bodies – a health insurance company, Harvard School of Public Health (HSPH) and public middle schools which involved: i) Planet Health curriculum including classroom lessons, PE materials and wellness sessions ii) Healthy Choices - a before- and after-school programme including nutrition projects and physical activities and iii) a self-assessment tool for school staff to evaluate their health promotion programmes and guide the improvement action plan Ages: 10-14	Score = 0 Limited evaluation, based on 21 interviews with programme leaders. Offers some key lessons, but little detail on this or partnership working arrangements. Tried and tested materials had been evaluated in 2002

Each of these interventions took a sustained ‘top down’ approach focused on a relatively small target group of children and their parents, and was based in a non-clinical setting.

Treatment interventions typically involved weekly sessions delivered over a period of 10-12 weeks. These offered a combination of educational and learning opportunities, physical exercise and interactive coaching sessions. Sessions tended to be run in parallel for parents and children, with some opportunities for joint participation.

Encouragingly, all three treatment interventions reported significant benefits to participants in respect of BMI and waist circumference reduction and, to some extent (depending on the particular study), less sedentary behaviour among the children and improved self-esteem.

A key challenge reported by each of the treatment interventions was in sustaining participation for the duration of the programme. This was overcome to some extent by adopting creative and somewhat ad hoc approaches to recruitment and retention. ‘Healthy Weigh’ in particular provided a highly supportive environment, with volunteers making calls to remind participants to attend sessions and providing assisted transport. ‘Families for Health’ reported that families who self-referred to the study were more likely to continue their participation than those who were referred by a health professional.

Tailored, top-down

In delivery terms, these studies are driven by specialist agencies and underpinned by tried and tested design protocols as in ‘top-down’ studies. However, in these examples implementation allows for adaptation of core strategies and materials to better respond to local circumstances.

Table 2: Examples of tailored top-down interventions

Programme title	Intervention summary	Overview
<p>Coordinated Approach to Child Health (CATCH)</p> <p>Brown <i>et al</i> 2007</p> <p>EI Paso, Texas USA</p>	<p>The CATCH programme, launched in 1991, is the largest health promotion trial in the US and Canada. The aim here was to translate the programme, implemented elsewhere as a national clinical research trial, into low-income community school settings by allowing schools to tailor it to their resources and needs. CATCH field staff trained each school in implementation, with periodic follow-up and mentoring over a 3-year period</p> <p>Ages: ‘primary school age’</p>	<p>Score = 5</p> <p>Successful outcome in slowing epidemic increase in risk of obese and overweight versus control sample. Multi-agency involvement unclear, but offers clear recommendation for community development. Also cited as cost-effective, based on estimated savings</p>
<p>Mind, Exercise, Nutrition... Do It! (MEND)</p> <p>Sacher <i>et al</i> 2008, 2010; Swain 2009</p> <p>UK – five sites</p>	<p>MEND is a social enterprise driven prescriptive, specialist-designed intervention for those who are, or are at risk of becoming, overweight. Local delivery partners are trained and equipped to provide evidence-based obesity prevention and management programmes to children who are overweight, or who are at risk of becoming overweight and their parents. It includes optional components for local use, alongside core elements. The aim is incremental (not rapid) weight loss and sustainable improvement in families’ dietary intake, fitness levels</p>	<p>Score = 4</p> <p>Significant benefits for intervention group in terms of BMI, physical fitness and activity levels. This paper reports on small sample (54 out of 60) but retention relatively high.</p>

	and general health Ages: 2-13	
Intervention Centred on Adolescents' Physical activity & Sedentary behaviour (ICAPS) Simon <i>et al</i> 2004 Bas-Rhin, France	Four-year randomised controlled trial intervention which aims to change knowledge and attitudes towards physical activity among adolescents, and to provide the social support and environmental conditions that encourage activity inside and outside school. Physical measurements, physical activity and reporting of self-worth/competence (known as self-efficacy) measures recorded over study period Ages:11-12	Score = 4 Six month outcomes only. Showing increased activity and some positive changes in feelings of self-worth and competence. Final data awaited

Each of these studies provides evidence of the success and importance of translating evidence-based interventions into community-based programmes.

The CATCH study undertaken in El Paso, for example, adapted available materials and procedures which had been developed and implemented more widely as part of a national, top-down, highly prescriptive clinical trial. The aim here was to better fit the intervention to the local school environment and the limited available resources. For example, in some schools, the classroom curriculum (as defined by the project authors) was only used as general reference material, with teachers participating instead in school-wide events each year. Other adaptations included variations on materials to reflect ethnic and district/regional/state-wide health and education mandates.

The El Paso intervention was reportedly more successful than the original national programme in terms of its efficacy in influencing overweight outcomes. The authors of the paper reviewed for this anthology (Brown *et al* 2007) did, however, suggest these findings could be due to differences in the El Paso sample of children, who were at much higher risk of overweight than the national sample, and also to the schools being more responsive to the intervention in light of limited school and community resources for nutrition and physical activity.

Capacity building

These interventions include those where local professionals and service providers work to create and sustain an environment conducive to healthy weight management and obesity prevention by facilitating the enhancement of skills, reorienting organisational priorities, and creating partnerships and community ownership. These studies tend to report higher levels of participation, and greater potential for long-term sustainability, but offer less potential for robust evaluation than 'top-down' and 'tailored, top-down' above.

The suite of programmes undertaken in Victoria, Australia, in particular, places emphasis on building community capacity to support environmental change and sustainability.

Table 3: Examples of capacity building interventions

Programme title	Intervention summary	Overview
<p>Be Active, Eat Well</p> <p>Sanigorski <i>et al</i> 2008</p> <p>Victoria, Australia</p>	<p>Core focus on building capacity within pre-schools and primary schools (ages 4-12), families and communities in a disadvantaged rural locale. Project staff focus on social marketing, coordination and implementation of intervention activities. This involves re-orienting schools and other partners toward providing and promoting healthy food choices and opportunities for physical activity. Raft of activities, for example, canteen menu changes, teacher training, social marketing, school events</p> <p>Ages: 4-12</p>	<p>Score = 6</p> <p>BMI and waist circumference decreased in the intervention group. Findings also suggest health inequalities were reduced</p>
<p>Romp & Chomp</p> <p>de Silva-Sanigorski <i>et al</i> 2010</p> <p>Victoria, Australia</p>	<p>Romp & Chomp aims to build and sustain local community capacity to promote healthy eating and active play in early childhood care and education settings. Activities include professional development for early years staff, support for new policy development and governance structures as well as social marketing strands</p> <p>Ages: 0-5</p>	<p>Score = 5</p> <p>Decrease in BMI and those reported as overweight or obese compared to control group. Effective in establishing partnerships and collaborative working among key players. Well-designed evaluation but some data collection issues</p>
<p>Nutrition and Physical Activity Self-Assessment for Child Care (part of Steps to a Healthier Arizona)</p>	<p>Pilot intervention, designed to assist childcare providers in implementing changes to organisational practices, policy and environment to promote healthy eating and physical</p>	<p>Score = 5</p> <p>Improved practice in childcare settings reported and 'ripple effect' extending</p>

Drummond <i>et al</i> 2009 Arizona, USA	activity behaviours in young children. Delivered by ‘Steps’ coordinator via seven workshops. Evaluation based on assessment of best practice in settings Ages: ‘Pre-school’	impact beyond original scope. Sustainable and transferable. No findings on obesity/overweight outcome measures
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Each of these three studies provides evidence of successful attempts to develop and share regional expertise with local partners. The Arizona Steps study, in particular, reports in detail how training and awareness raising initiatives were cascaded through regional, state and local organisations to ‘create a culture of health promotion within the childcare setting’. The impact was primarily through changes to organisational practices to promote healthy eating and increased physical activity, but there was also a psychosocial impact on staff, many of whom embraced a better diet or new activity as a consequence of the training, and took new positive behaviours into the home environment.

Pre-school and school-led interventions

There are clear advantages of pre-school and school-based interventions for targeting childhood obesity.

The rationale for early years interventions stems from the view that physical activity and eating habits are shaped early in life, so the opportunity to form positive behaviours at a young age, that will ultimately limit the tendency to overweight and obesity, will be beneficial. Since many young children spend much of their day in childcare, the policies and practices implemented in such settings can contribute significantly to the overall nutritional intake and physical activity of the children there. Consequently, childcare settings are suggested as an ideal environment in which appropriate support can be given to enable young children to develop health behaviours that can be carried forward.

Similarly, children spend much of their time at school and, again, the school environment has many beneficial attributes: it is possible to engage with most children regardless of their socio-economic status, domestic arrangements, cultural background or ethnicity; it is relatively easy to deliver interventions through existing structures; and the school itself can act as a hub for wider community involvement.

Pre-school

Among the reviews included in this report, three focus specifically on early years interventions in pre-school settings (Drummond *et al* 2009; de Silva-Sanigorski *et al* 2010; Roth *et al* 2010). Although these are discussed separately in the report given that each represents a different type of intervention according to our general categorisation, we note the commonality of the setting and discuss these briefly together here.

Despite the very different focus of each of these three studies, all report positive outcomes for children and their families, including (variously) decreases in BMI and body fat, increased activity and physical capacity, lower intake of packaged snack foods and greater intake of vegetables. The ‘Arizona Steps’ intervention (Drummond *et al* 2009) notes

improved knowledge among parents and staff and unexpected impacts including increased involvement of the family and the wider community in childcare settings, and staff seeing themselves as role models and transferring positive health behaviours to their own home environments.

School-led

In only three cases where schools were a focus of activity does the evidence point towards the school acting as a community leader. These three examples show how individual schools have taken the lead in identifying gaps in local knowledge or provision and worked to develop strategies and initiatives to address these by engaging with external partners.

Although the evaluations themselves do not deliver robust evidence of reduced obesity/overweight, positive impacts are reported in terms of improved behaviours and generally enhanced community capacity.

Table 4: Examples of school-led interventions

Programme title	Intervention summary	Overview
<p>Annapolis Valley Health Promoting Schools Project (AVHPSP)</p> <p>Veugelers and Fitzgerald 2005</p> <p>Nova Scotia, Canada</p>	<p>School-based programme started as parent-initiated grassroots movement in 1997. Aims to enable children to make healthier food choices and increase physical activity by developing positive behaviours. Health Promoting School Teams comprising school staff, food service workers, students, parents, and community members assess needs and develop strategic plans for their school. Schools also work in partnership with local businesses</p> <p>Ages: 6-12</p>	<p>Score = 3</p> <p>Secondary data analysis indicates AVHPSP students had lower rates of overweight/obesity, better diet and higher levels of physical activity.</p>
<p>It's Your Move!</p> <p>Mathews <i>et al</i> 2010</p> <p>Victoria, Australia</p>	<p>School-based initiative aimed at building and sustaining local community capacity for healthy eating, physical activity and healthy bodies. Students, teachers and others formulate a 10-point action plan, strategies and initiatives specific to each school. Supported by a School Project Officer and team of trained Student Ambassadors. Includes capacity building, social marketing, nutrition and physical activity</p>	<p>Score = 3</p> <p>Process evaluation notes positive outcomes for programme implementation, but no information on impact</p>

	Ages: 13-17	
Shape Up Europe Simovska and Jensen 2009 Europe-wide: 19 cities	Teachers, Shape Up staff and others work with students to identify health-related issues in school, family, neighbourhood, local community/city and develop appropriate interventions. A local coordinator and a local promoting group with relevant professional skills support implementation. Activities focus on improving physical spaces and facilities available in the community Ages: 4-16	Score = 2 Very limited evaluation, based on feedback from local coordinators. Generally positive reports, and some examples of innovative activities and partnerships

These studies also highlight a number of challenges for school-based interventions, however, which need to be considered in designing such interventions.

Schools are increasingly under financial pressure, and inevitably there are choices to be made when savings need to be made. Schools are also predominantly focused on academic achievement scores, and teachers themselves may suffer from innovation fatigue. Consequently, the demands on teacher time need to be effectively managed. In the studies identified here, teachers reported additional workload as a consequence of their role in managing or implementing a specific intervention, which competed with their other curricular activities and responsibilities (Mathews *et al* 2010). A secondary issue is in ensuring front-line staff have clear guidance and support on how they can support children in their care, and relevant training where needed.

It is also important to appropriately involve and influence both parents and children. As the various studies identified here show, the impact of programmes and initiatives can be very limited if children and their families are not appropriately engaged. In-school strategies have focused on providing educational seminars, bringing children and parents together to exercise, 'walk to school' days, informational newsletters, and 'activity cards' to engage parents in promoting activity at home.

Community participation

Although all the studies identified for this anthology are necessarily multi-agency in constitution, this report makes a distinction between the studies identified above and those that are participative in the truest sense. That is, those which have engaged a wide range of stakeholders in programme design and implementation in order to reflect and respond to different local, professional and community perspectives. As we have noted previously, these interventions permit the coupling of the specialist knowledge of outside experts – such as that regarding evidence-based interventions – with the experiential knowledge that only community members themselves can bring.

These interventions are inevitably defined by the involvement of multiple sectors – from schools and youth organisations, to universities, public health organisations, sports and

leisure providers, grocery stores and grassroots community organisations. Alliances such as these are better placed to shape relevant activities and interventions in response to local characteristics; leverage local, county and national resources; and mobilise individual communities related to the goals of the initiative.

As seen in the examples here, by placing a broader range of stakeholders at the centre of planning and design, interventions are more closely aligned with the local culture and context. Such approaches have been shown to increase the vested interests of community members in the effort, thereby increasing the likelihood of sustained, longer-term efforts to bring about key changes in communities and systems (Economos *et al* 2007; Johnston 2009; Chomitz *et al* 2010).

Table 5: Examples of community participation interventions

Programme title	Intervention summary	Overview
Healthy Living Cambridge Kids Chomitz <i>et al</i> 2010 Cambridge, Massachusetts, USA	<p>Significant multi-agency input, backed by government funding. Highly collaborative implementation via multi-disciplinary coalition of elected officials, educators, healthcare and public health professionals; researchers and parents. Includes a raft of interventions at civic, community, school and family level</p> <p>Ages: 5-18</p>	<p>Score = 5</p> <p>Over three years participants showed significant decrease in BMI for obese children and improved fitness test score. Substantial attrition of programme participants</p>
Shape Up Somerville: Eat Smart, Play Hard Economos <i>et al</i> 2007 Somerville, Massachusetts, USA	<p>Collaborative participatory initiative to change the whole-child environment for elementary school children. A community council guided development, implementation and evaluation. Community members and professionals from main language communities (Portuguese, Haitian-Creole, Spanish, English) designed and planned study via meetings, focus groups, etc. Interventions involved all stakeholders. Access to physical activity and healthy food enhanced in variety of settings</p> <p>Ages: 6-8</p>	<p>Score = 5</p> <p>Limited evaluation, but showed BMI declined by a small amount over time and this was greater in intervention than control schools</p>
Agaston Urban Nutrition Initiative (AUNI) Johnston 2009	<p>Largely (though not exclusively) a comprehensive nutrition education programme in 20 public schools. Aim: to explore and address nutrition-related issues in a community where obesity is</p>	<p>Score = 2</p> <p>This paper presents a process evaluation, and therefore includes no comprehensive findings on impact. Nevertheless it offers</p>

Programme title	Intervention summary	Overview
Philadelphia, USA	significantly more prevalent among children aged 11-14 than nationally. Took a community-centred approach aimed at fostering long-term partnerships between university, schools and community partners. Strategies ranged from improved lunchroom choices, after-school fruit stands and community farmers' market Ages: 'Pre-school to undergraduate'	interesting examples of strategies developed and adopted locally

Overview of findings

The studies brought together here highlight a general lack of available evidence of multi-agency programmes that have been extensively tested and replicated and which could readily and effectively be applied elsewhere. At the same time, they do offer evidence to suggest that prevention strategies can have a positive and beneficial impact on parents' and children's knowledge, attitudes and behaviours and to some extent on localised incidence of overweight and obesity. They therefore offer examples of good practice and 'best bet' strategies that could be further developed and tested when applied in a specific context.

Notably, these studies support the view that multi-component approaches, are more likely to be effective than a single intervention focusing solely on improvements in nutrition or exercise. The benefits of partnership working are also reinforced here.

The categorisation of interventions from 'top down' to 'community participation' has also highlighted some interesting features, although it is important to state that each of these has benefits and drawbacks, so there is no clear-cut recommendation emerging for the JRIP.

In summary, while 'top down' approaches offer the benefit of being scalable and replicable, allowing dosage and impacts to be closely monitored and evaluated, their impact on population level overweight and obesity is inevitably limited due to the nature of the programme design. These are concentrated interventions targeted at a few individuals over a short period of time. Retention is often poor even among those recruited to participate (reducing the evaluation quality) and sustainability over the long term is limited.

By contrast, increasing involvement of stakeholders (from tailored interventions to highly participative approaches) appears to enhance the effectiveness of intervention programmes. One distinction to draw is collaboration between professionals working to

effect change in an area, versus involvement of non-professionals to develop strategies that are locally relevant. The latter ensures interventions are more closely aligned with the local culture and context and consequently tends to increase the vested interests of community members in the effort, thereby increasing the likelihood of sustained, longer-term activities to bring about key changes in communities and systems.

Furthermore, although many studies here have focused largely on school settings, an ecological approach that seeks change in all of the contexts and environments in which children find themselves appear to be more successful, with broader participation and greater sustainability over the long term.

The studies also collectively suggest that evaluation of multi-component studies can be challenging, especially where different stakeholders are involved and individuals have highly variable exposure to different elements. Nevertheless, overall measures of different population-level outcomes (for example, prevalence of overweight and obesity, prevalence of related diseases) will also of course show the varied ways the intervention had an impact. The process evaluations included here also demonstrate that documenting system changes (how programmes, policies and practices are developed and implemented, for example) can help discern what elements of the intervention were actually implemented and how effectively.

4. Conclusions and implications for the East Midlands JRIEP

Prevalence of childhood and adolescent obesity in the UK is high and has a number of adverse effects. Many public health interventions to prevent obesity are underway, but few are being evaluated. Indeed, the most recent and rigorous systematic reviews of the evidence for preventing childhood obesity in the UK undertaken by the National Institute for Health and Clinical Excellence (NICE 2006) and the Cochrane collaboration (Summerbell *et al* 2005) conclude that there is an urgent need for evidence of effective strategies. While the Cochrane review focuses solely on high-quality data from randomised controlled trials (RCTs), NICE acknowledges that an emphasis on RCTs in future is likely to produce insufficient evidence and, in many cases, will be inappropriate for the types of interventions required.

Furthermore, the most promising childhood obesity prevention models from the USA are only now being tested in the UK, and there is little evidence in favour of any particular preventive intervention. Even the more promising of such interventions cited in the current literature have usually had only modest benefits for behaviour and body weight.

Enhancing impact

Despite this less than encouraging scenario, it is pertinent here to restate a few of the 'givens' when considering likely components of an effective intervention.

First, the wider evidence supports the view that prevention strategies are more likely to be effective in tackling the problem of increasing overweight and obesity in the population than treatment strategies. Current guidelines do, of course, emphasise universal prevention strategies over treatment, because all children are at risk and treatment options are more limited and generally less successful. However, more intensive efforts could profitably target those at particular risk of obesity (for example, children with parents who are obese, particular ethnic groups, or children in less affluent areas). Using a combination of approaches may be beneficial since this may help assure the appropriate intensity needed for the population at large, and for those experiencing specific risk factors.

It is also clear that the focus of both preventive and treatment interventions should remain on those behaviours that are established as modifiable causes of obesity in children and young people. These include altering diet by reduction of high-energy foods and sugar-sweetened drinks, reducing sedentary behaviour and increasing physical activity.

For population-level improvement, a single-intervention approach, such as a healthy food curriculum in one school, is less likely to be effective than a comprehensive intervention that promotes both healthy nutrition and physical activity in a variety of ways. Further, although many studies have focused largely on school settings, an ecological approach seeks change in all of the contexts and environments in which children find themselves and these have been shown to be more successful than school-only interventions.

When considering potential strategies, it is important to not only identify the target audience according to their experience of the problem (for example, children who are (or

who are at risk of) overweight or obesity), but also to identify those whose behaviour may contribute to the problem (parents, shop owners, school-food service providers, leisure centre owners, youth leaders, for example).

Following on from the above, any such comprehensive intervention should be grounded in an assessment of the problem and the conditions that affect the problem at the local level. For example, should this analysis indicate that young children typically obtain unhealthy foods outside of the home, interventions to address parents' skills in selecting and preparing foods in the home may be relatively ineffective? Similarly, while it may be sensible to influence young children in their daycare setting, one of the key channels of influence for those aged 11 to 13 could be convenience stores located close to schools. Ultimately, programmes should also aim to be enjoyable, engaging, relevant and accessible to the target audience.

Furthermore, for approaches with multi-sectored involvement, it is essential that all relevant sectors, including those interested in the issue and those able to leverage resources, are involved in developing and implementing elements of the intervention.

Building in evaluation

Evaluation of strategies and programmes is essential for audit and quality improvement and to assess both cost-effectiveness and sustainability. This is particularly important to note here since there is no evidence that points to a fully tested and replicable programme readily available for adoption/adaptation to the East Midlands context. This suggests that local partnerships would be advised to build an evaluation methodology into any programmes they develop to assess the effectiveness of whatever strategies are implemented.

Further, to ensure successful evaluation, this element needs to be considered from the very outset of programme design and planning, with sufficient funds allocated from the budget to allow this.

In the case of obesity prevention strategies, however, the evidence has shown that evaluation is particularly challenging, as strategies are often wide-ranging and individuals have highly variable exposure to different elements. This was certainly true of most of the programmes included here.

While the RCTs reported here were designed to allow robust evaluation, RCTs are not always possible to test obesity prevention strategies, as has been noted by NICE (2006). The Department of Health recommends that interventions are evaluated using the National Obesity Observatory Standard Evaluation Framework for weight management interventions (Swanton and Frost 2007).

Another research challenge is measuring the 'dose' of an intervention received by members of a community being targeted, and then determining which aspects of the intervention may have contributed to observed changes. Because these interventions will most likely be multi-faceted, it is likely that not all facets of an intervention will be received by all people in the community. For instance, a particular group of children may be more (or less) likely to experience aspects of the community intervention – such as access to

healthier foods or opportunities for physical activity – if these elements are more (or less) prominent in the particular schools, youth organisations, and neighbourhoods they frequent. Obtaining estimates of the dose of the intervention – what intervention components and elements are actually experienced – is an important and difficult consideration in examining the impact of the community intervention for different groups.

It seems an obvious point to make, but research on comprehensive interventions should aim to collect multiple measures to monitor the effects of individual strands to develop evidence of their effectiveness. Process evaluations that document system changes (for example, how programmes, policies and practices are developed and implemented) can help discern what elements of the intervention were actually implemented. Measurement of different population-level outcomes (prevalence of overweight and obesity, prevalence of related diseases, for example) will, of course, show the varied ways the intervention had an impact.

It is also important to structure investigations to allow sufficient time for the intervention to affect longer-term outcomes. Outcomes related to obesity or chronic diseases tend to develop over a long period of time, so multi-year (or at least year long) studies are needed to capture related changes in practices, behaviours and especially population-level outcomes.

Following on from the above is the issue of building in sustainability. While the evidence shows that many innovative approaches are piloted using short-term funding streams – even when successful – they can fail to be rolled out due to changes in the funding environment and competing priorities. This will most likely be another challenge for local partners when implementing and evaluating any strategy to combat childhood obesity in the medium term.

Implications

Although the evidence collated supports the view that multi-agency, multi-faceted interventions are the best way forward, this evidence is such that it is difficult to point to specific formulations based on tried, tested and proven models, or to identify how best to address specific challenges.

Indeed, there is limited evidence that any single intervention will affect population-health improvement in diverse contexts, so effective community interventions will likely consist of many and various changes in programmes, policies and practices (community and system changes) distributed in the multiple settings that can influence child behaviour (Collie-Akers and Fawcett 2008).

Nevertheless, the framework proposed by Collie-Akers and Fawcett (2008) offers a useful guide for developing collaborative public health action in communities. This framework is based on five specific behaviour change strategies that the authors suggest can be utilised when developing obesity prevention interventions in community settings. These reflect much of what is detailed in the various interventions identified in this anthology. As a result, the framework provides a sound basis for further discussion and we have extracted the model in full.

The framework can be summarised as follows:

- assessing, prioritising, and planning
- implementing targeted action and preventive interventions
- community and system change
- achieving widespread change in behaviour and risk factors (physical activity, healthy nutrition, for example)
- improving population-level outcomes in childhood obesity.

Assessing, prioritising, and planning

This phase involves several activities that provide the foundation for subsequent phases. It would begin with an assessment of the prevalence of childhood obesity and related behavioural risk factors, and a prioritising of potential target groups (for example, groups of children from populations with disparities in health outcomes). For instance, school records might be reviewed to assess the prevalence of overweight children. Similarly, behavioural surveys could be conducted with school children to determine how many consume five or more servings of fruits or vegetables each day, or how many spend more than two hours a day in sedentary activities (watching television, for example). Based on this assessment, the community health initiative would look to prioritise the issues (for example, too little physical activity) and target groups (children in schools with higher BMI, for example). An analysis of the problem would also help to identify the personal and environmental factors to be addressed (for example, modifying access and opportunities for physical activity; changing policies for school lunches), among whom, and through what channels of influence (schools, media, business, for example).

Implementing targeted action and preventive interventions

This phase involves initial implementation of the strategic and action plan developed during Phase One. It may, for example, include coalition building or arranging partnerships to facilitate a new after-school recreational programme; advocating for a change in school policy to increase vending machine choices for healthy foods; or lobbying civic authorities for improvements to school facilities.

Community and system change

This phase consists of the implementation of new or modified programmes. It could comprise a youth programme that promotes physical activity, a 'walking school bus' in a particular neighbourhood, policies banning soft drinks in school buildings, or changes to local practice.

Achieving widespread change in behaviour and risk factors

This phase involves continual monitoring and promotion of actions and behaviours, to track progress and allow revisions and iterations to promote the overall success of an intervention over time.

Improving population-level outcomes in childhood obesity

The final phase requires monitoring of the population-level outcomes of interest, such as the prevalence of overweight or obesity among children.

Appendix A: Research summaries

Summaries of the 18 interventions included in and analysed for this anthology are presented in alphabetical order according to the key reference.

The El Paso Coordinated Approach To Child Health (CATCH)

Score = 5

Aim	To translate a school health programme; CATCH (the Coordinated Approach to Child Health), implemented elsewhere as a national clinical research trial, into low-income community school settings. It was hypothesised that low-income schools would tailor the programme to their resources and needs, leading to a significant impact on the rates of child risk for overweight or overweight when compared to matched control schools.
Target group	Four CATCH intervention schools and four control schools in El Paso, Texas. Initial cohort of third-grade pupils (age eight) in low-income schools with primarily Hispanic students.
Rationale	The CATCH programme, launched in 1991, is the largest health promotion trial in the US and Canada. It aims to promote physical activity and healthy choices to children in order to bring about long-lasting behaviour change. This research assesses the impact on children's health of a community-based implementation of CATCH, where schools were allowed to implement each component of the programme in a way that suited the school environment.
Multi-agency involvement	The extent to which implementation in El Paso was multi-agency is unclear. However, the paper states 'Key components of success [were] ... tailoring the protocol for program flexibility to meet local resources, communitywide funding and infrastructure support, and quality control program feedback to participating agencies and schools. We suggest... community institutionalisation and evaluation feedback when translating evidence-based health research to low-income minority communities. In addition, coordinated school health interventions for these communities may be more successful if they not only are classroom curriculum based but also include community development strategies, such as coalition building, concrete activities, fund raising, and social support through training'
Intervention	<p>CATCH includes a classroom curriculum, a physical education programme, modifications to school food, and family- and home-based programmes. CATCH field staff trained each school over the course of a day with periodic follow-up and mentoring over the three-year period. There is a CATCH coordinator in El Paso and three programme directors, responsible for nutrition, physical activity and curriculum, respectively. CATCH aims to:</p> <ul style="list-style-type: none"> • Decrease the fat content of school meals to less than 30 per cent of total calories; sodium content to 600-1000mg; and saturated fat to less than 10 per cent of total calories. • Increase the proportion of each PE lesson spent doing moderate or vigorous physical activity (MVPA) to at least 40 per cent, and the proportion doing vigorous physical activity (VPA) to at least 20 per cent.
Evaluation	<p>Three-year trial following children from 3rd to 5th grade (ages eight to 11). Measures of:</p> <ul style="list-style-type: none"> • BMI • Triceps skinfold • Waist and hip circumference • Aerobic fitness test (nine-minute timed run) • MVPA and VPA measures using System for Observing Fitness Instruction Time • Nutritional content of school-provided breakfasts and lunches over five days.
Outcome	<p>Over the three-year period, CATCH successfully slowed the epidemic increase in risk of overweight or overweight as seen in children not exposed to the programme.</p> <ul style="list-style-type: none"> • By 5th grade, CATCH boys and girls were at lower risk of overweight than national estimates for Hispanic children, but those in control schools were at higher risk. There were, however, no significant impacts on waist-to-hip ratio or BMI.

	<ul style="list-style-type: none"> • In 4th grade, more control school students passed the aerobic fitness test, but in 5th grade, the pass rate was higher in CATCH schools. The results for MVPA and VPA were mixed. • There was no difference in the percentage fat of school lunches provided at CATCH and control schools in 5th grade. Overall, schools did not meet CATCH fat and sodium reduction targets, but CATCH schools were somewhat closer to meeting them than the controls. • Researchers found the CATCH programme to be very cost-effective and net beneficial based on estimates of medical and productivity savings.
<p>NCB assessment</p>	<p>Recommended reading for JRIEP = High</p> <p>Relevance to JRIEP = Medium</p> <p>Evaluation quality = High</p> <p>Successful multi-faceted programme addressing nutrition and physical activity, which succeeded in slowing the epidemic increase in overweight or risk of overweight among low-income school children. Degree of multi agency involvement is unclear, but the report recommends community development as a facet of any such intervention in addition to a school-based curriculum.</p>
<p>Citation(s)</p>	<p>Brown, H.S., Perez, A., Li, Y-P., Hoelscher, D., Kelder, S. and Rivera, R. (2007) 'The cost-effectiveness of a school-based overweight program', <i>International journal of behavioral nutrition and physical activity</i>, vol 4, no 1, p 47.</p> <p>Heath, E.M. and Coleman, K.J. (2003) 'Adoption and institutionalization of the Child and Adolescent Trial for Cardiovascular Health (CATCH) in El Paso, Texas', <i>Health promotion practice</i>, vol 4, pp 157–164.</p> <p>Coleman, K. J., Tiller, C.L., Sanchez, J, Heath, E.M., Sy, O., Milliken, G. and Dzewaltowski, D.A. (2005) 'Prevention of the epidemic increase in child risk of overweight in low-income schools: the El Paso coordinated approach to child Health', <i>Arch paediatric adolescent medicine</i>, vol 159, pp 217–224.</p>

Healthy Living Cambridge Kids	
Score = 5	
Aim	To reduce children’s BMI, increase fitness, raise awareness of healthy eating and active living strategies, and build family, school and community capacity
Target group	Cambridge, Massachusetts, USA_ Ethnically and socio-economically diverse urban area. Children attending 12 public grade schools (ages five to 14) and one public high school (ages 15-18).
Rationale	Placed a community-based programme within a clear research and evaluation framework designed to ensure learning and outcomes could be captured and disseminated. This was in response to many other community-based obesity intervention programmes across the US where there has been limited or no robust evaluation and dissemination.
Multi-agency involvement	Significant multi-agency involvement. Co-funded by the US Department of Education, the US Department of Agriculture Community Foods Projects, a health insurance company and the Massachusetts Department of Public Health. Collaborative implementation via the Health Children Task Force; a multi-disciplinary coalition of elected officials, educators, healthcare and public health professionals; researchers and parents. Over time, other local community initiatives became involved, for example, CitySprouts (a local gardening organisation).
Intervention	Community interventions included: <ul style="list-style-type: none"> • city council policies and guidelines to support and endorse healthy living choices • community advocacy, for example, a youth sports commission • training for after-school providers in new policies/guidelines • raising community awareness of existing healthy eating and active living resources via posters, newsletters, directories, etc. School interventions included: <ul style="list-style-type: none"> • PE curriculum expanded to include alternative activities, for example, yoga, dancing • grants for professional development of PE teachers and new equipment • new recipes, taste tests, etc, as part of improved school food service • school garden • school wellness policy • training for school stakeholders in new policies/guidelines. Families and children: <ul style="list-style-type: none"> • children’s BMI and fitness ‘report card’ sent home to parents • family education nights at school, and fitness ‘expo’ • subsidised weight management counselling offered.
Evaluation	Children aged five to eight at baseline tracked over three years to monitor changes in BMI and fitness scores based on annual fitness tests to measure endurance, cardiovascular, and abdominal strength, flexibility, upper body strength and agility. Gender, age, grade, ethnicity and subsidised school lunch (as a proxy for income) data also collected.
Outcome	A significant decrease in the children’s mean BMI z-score and in the percentage of children categorised as obese. The percentage of children categorised as overweight did not change significantly. Significant decreases in BMI among girls and among children who did not receive

	<p>free/reduced price school lunches. No significant change in BMI among boys or children who did receive free/reduced price school lunches.</p> <p>Fitness test scores improved for all children in terms of mean number of tests passed, and the percentage of children who passed all five tests.</p>
NCB assessment	<p>Recommended reading for JRIEP = High</p> <p>Relevance for JRIEP = High</p> <p>Evaluation quality = Medium</p> <p>A multi-agency, whole-community intervention with positive results in terms of BMI and fitness. Three-year study, but no control group or strategy to account for potentially confounding variables. There was also substantial attrition from the programme, which further limited its quality.</p>
Citation(s)	<p>Chomitz, V.R., McGowan, R.J., Wendel, J.M., Williams, S.A., Cabral, H.J., King, S E., Olcott, D.B., Cappello, M., Breen, S. and Hacker, K.A. (2010) 'Healthy living Cambridge kids: a community-based participatory effort to promote healthy weight and fitness', <i>Obesity</i>, vol18, no1, pp S45–S53</p>

Healthy Weigh/<i>El camino saludable</i> (HW)	
Score = 4	
Aim	Community-based programme to increase awareness of the benefits of healthy eating and physical activity, to improve behaviours and help families reach personal healthy living goals.
Target group	Hispanic and African-American families in the low-income, urban community of Fort Worth, Texas, USA, which has a population at high risk of obesity. Total of 282 participants recruited via flyers distributed in schools, the community centre and door-to-door. 80 per cent of adult participants were overweight/obese and 50 per cent of adolescents/children were overweight/at-risk-of overweight. 82 per cent of participants were Hispanic and 12 per cent African-American. 46 per cent of participants were aged 0-18. Many participants had limited proficiency in English or Spanish.
Rationale	<ul style="list-style-type: none"> • Lower-income families are particularly vulnerable to obesity due to multiple factors, for example, nutritious foods tend to be more expensive and less readily available than unhealthy foods, and poorer neighbourhoods often lack space/facilities conducive to physical activity. • Cultural factors may also contribute, for example, dietary choices, attitudes to physical activity and acceptance of excessive weight. • Research confirms that families are critical in forming children’s health behaviours.
Multi-agency involvement	<p>The programme was funded by United Way of Metropolitan Tarrant County, and was offered free of charge to participants. Five partners collaborated to design and implement the programme:</p> <ul style="list-style-type: none"> • Texas Christian University (TCU) provided faculty consultants from various departments to direct and implement the programme. • Cornerstone Community Center (CCC) a local, independent, faith-based organisation provided the building and facilities for weekly sessions; made weekly reminder calls to families; and provided a major source of participant referrals and community volunteers. • Tarrant Area Food Bank provided ingredients for the weekly meals at cost and fruit and vegetable bags for families to take away. • Texas Cooperative Extension provided nutrition education materials. • Fort Worth Public Health Department provided registered nurses for health screenings. <p>Programme planning also included an element of community participation via focus groups. The programme was delivered by registered nurses, a registered dietician, paid staff, community volunteers and supervised students from TCU.</p>
Intervention	<p>12 weekly sessions – each session including an exercise class, a nutrition lesson based on <i>Dietary guidelines for Americans</i>, and a family meal with a facilitated ‘table talk’ about how families were applying what they had learned, successes/problems, etc. At the end of each session, every family was given a healthy food bag to support healthier eating at home.</p> <p>All documentation was provided in English and Spanish and written at 4th–5th grade (nine-10-year-old) reading level. The CCC made a reminder call to each family before each session to encourage participation and taxi-assisted transport was also offered.</p>
Evaluation	<p>Data collected at pre-, end- and post- (three months after) programme:</p> <ul style="list-style-type: none"> • weight, height, percentage body fat, waist and hip circumferences • self-reported dietary practices and physical activity • quiz used to assess knowledge of the benefits of nutrition and exercise • each participant aged over four asked to set a personal objective relating to changes in eating

	<p>or physical activity, or weight management</p> <ul style="list-style-type: none"> • socio-demographic data, for example, age, gender, ethnicity, race, health history, medication and blood pressure.
Outcome	<p>Almost all participants recorded positive changes at the end of the programme. No follow-up data presented.</p> <ul style="list-style-type: none"> • improvement on at least one measure of weight management for adult and adolescent participants who were overweight at baseline (84 per cent) • at least one dietary improvement among participants aged five and over (92 per cent) • no statistically significant increase in reported physical activity • significant improvement in mean knowledge level • at least one personal goal partially or fully met among adult and adolescent participants (92 per cent) • rating the programme 'very good' (89 per cent). <p>Community-wide benefits included community planning experience for focus group members; job skill development for project staff; and initiation of a Health Action Group to empower the community on an ongoing basis.</p> <p>Implementation challenges included coordinating day-to-day tasks between agencies and partners; dealing with cultural differences; language barriers; limited literacy; and participant retention.</p>
NCB assessment	<p>Recommended reading for JRIEP = High</p> <p>Relevance to JRIEP = Medium</p> <p>Evaluation quality = Medium</p> <p>Good example of a multi-agency partnership delivering a community-based, intervention for low-income families. Participant retention proved a key challenge, and some creative recruitment and retention strategies were used. The evaluation showed some positive outcomes but most were self-reported and there was no control group. It is also unclear how many participants took part in the evaluation. No specific findings for children are presented.</p>
Citation(s)	<p>Dart, L., Frable, P.J., Bradley, P.J., Bae, S. and Singh, K. (2005) 'Working with families to prevent obesity: a community-campus partnership', <i>Journal of family and consumer sciences</i>, vol 97, no 2, pp 20–28.</p>

Romp and Chomp	
Score = 5	
Aim	Part of a suite of programmes, Romp and Chomp aimed to build and sustain local community capacity to promote healthy eating and active play in early childhood care and education settings. Also a focus on changing the wider physical, socio-cultural and political environment.
Target group	Geelong, Victoria, Australia. Children 0-5 years, their families, carers and wider community.
Rationale	As eating and activity patterns are established early in life, and obesity once present is extremely difficult to overcome, early intervention to develop and maintain health-promoting behaviours and healthy weight is key. Core focus on long-term capacity building to create and sustain a local environment conducive to preventing childhood obesity.
Multi-agency involvement	Key organisations in the region designed, planned and implemented the intervention. These included national and state government departments; local health service providers; local government managers in children’s care and health services; the Geelong Kindergarten Association; regional sporting coordinating body; and Deakin University. Extensive community consultation and stakeholder management were also key elements of action plan development and implementation.
Intervention	Romp and Chomp was delivered to and through day care centres, pre-schools, the Maternal Child Health Service, regional immunisation services and community health services. Activities broadly classifiable as: <ul style="list-style-type: none"> • professional development for early childhood workers • support for partnerships and governance structures • resources for staff and parents • communications/social marketing/awareness raising/education • provision of resources, for example, water bottles • support for development of new policies in childcare settings.
Evaluation	A repeat cross-sectional, controlled evaluation, to compare outcomes among children in Geelong versus children in 40 of the 78 other local government areas in Victoria. BMI was measured three years after baseline data collection, and outcomes relating to eating behaviour after two years. Documentary analysis and stakeholder interviews supported an evaluation to determine overall programme success in capacity building (Groot <i>et al</i>).
Outcome	<ul style="list-style-type: none"> • significantly greater decrease in mean BMI among three-and-a-half-year-olds in Geelong compared to control areas • no significant difference between decrease in BMI for two-year-olds (the authors suggest younger children are less likely to attend early years settings where the programme was focused) • significantly greater decrease in the proportion of children classified as overweight/obese among both age groups in Geelong compared to control • significantly lower intake of packaged snacks, fruit juice and cordial, and higher intake of vegetables by the intervention group (parent report). <p>Despite challenges (for example, lack of leadership, limited resources, need for greater clarity around roles/responsibilities), programme seen as effective in establishing key partnerships and collaborative working among key community players</p>
CB assessment	Recommended reading for JRIEP = High

	<p>Relevance to JRIEP = High</p> <p>Evaluation quality = Medium</p> <p>The suite of programmes represents a good example of multi-agency working, and capacity building adapted for different age groups. The Romp and Chomp evaluation has the advantages of a control group, large samples and relatively long-term outcome measures. Its limitations are that only 50-60 per cent of children attended health checks where data were collected; data on eating behaviour were provided by parents in the presence of a nurse and only referred to a single day; and nurses administering health checks decided who to survey.</p>
Citation(s)	<p>de Groot, F., Robertson, N., Swinburn, B. and de Silva-Sanigorski, A. (2010). 'Increasing community capacity to prevent childhood obesity: challenges, lessons learned and results from the Romp & Chomp intervention', <i>BMC public health</i>, vol 10, no 1, p 522 (available at www.biomedcentral.com/1471-2458/10/522, accessed 23 March 2011).</p> <p>de Silva-Sanigorski, A.M., Bell, A.C., Kremer, P., Nichols, M., Crelling, M., Smith, M., Sharp, S., de Groot, F., Carpenter, L., Boak, R., Robertson, N. and Swinburn, B.A. (2010) 'Reducing obesity in early childhood: results from Romp & Chomp, an Australian community-wide intervention program. <i>American Journal of Clinical Nutrition</i>', vol 91, no 4, pp 831-840.</p>

Steps To A Healthier Arizona (Pilot project)	
Nutrition And Physical Activity Self-Assessment For Child Care (NAPSACC) Score = 5	
Aim	A pilot intervention programme, designed to assist childcare providers in implementing changes to organisational practices, policy and environment to promote healthy eating and physical activity behaviours in young children.
Target group	Intervention delivered in 30 childcare centres in six diverse communities in Yuma County, Arizona. Together, these centres employed over 337 staff serving over 1,800 children.
Rationale	<ul style="list-style-type: none"> Because physical activity and eating habits are shaped in early life, the childcare setting is an ideal place to help young children develop healthy behaviours that can be carried into adulthood. Young children may spend most of their day in childcare, so policies and practices implemented in these settings can contribute significantly to the overall nutritional intake and physical activity levels of children.
Multi-agency involvement	<p>NAPSACC is part of the 'Steps to a Healthier Arizona' (Arizona Steps) programme, funded under the federal initiative 'Steps to a Healthier US'. Arizona Steps is led by the Arizona Department of Health Services and is a partnership of local health leaders, sub-contractors and affiliates including the Arizona Department of Education and the University of Arizona.</p> <p>For this pilot, a coordinator was hired to work with the childcare centres and professionals in the early childhood development community. This role was based in the Yuma County Public Health Services District, in the Division for Health Promotion, to ensure the programme was integrated with other nutrition and health services. Other aspects of the role included awareness-raising at the strategic level, providing professional development to those working in related areas and supporting childcare staff to access additional training and resources in the community. The coordinator also provided support and assistance to many Arizona Steps partners, and was an active member of local advocacy groups.</p>

<p>Intervention</p>	<p>Five key components of the programme:</p> <ul style="list-style-type: none"> • self-assessment of best practice within each institution • development of local action plans • educational workshops • targeted technical assistance • ongoing process of evaluation and revision. <p>Delivery was via seven workshops at each childcare site, using tailored materials for different communities. Each workshop addressed a key objective:</p> <ul style="list-style-type: none"> • to raise awareness of child obesity and recruit the centre into the programme • self-assessment: completion of a self-report questionnaire addressing 56 best practices in nutrition and physical activity • self-assessment score feedback and action planning session to identify areas for improvement and develop strategies to address these • informational workshop: ‘Healthy eating for preschoolers’ • informational workshop: ‘Physical activity for preschoolers’ • informational workshop: ‘Personal health – taking care of yourself’ • post-assessment: completion of self-report questionnaire nine months after action planning session.
<p>Evaluation</p>	<p>All centres participating in the pilot completed both a pre- and post-intervention assessment questionnaire, and “<i>generally speaking, the extent to which all centres indicated an improvement or not, was similar</i>”. However, the NAP SACC self-assessment tool was modified after the programme had commenced, so analysis was conducted on a sub set of only 17 of the 30 centres. Documented evidence from action plans, testimonials and feedback forms was also reviewed.</p>
<p>Outcomes</p>	<p>The programme is said to have created a culture of health promotion. It reports:</p> <ul style="list-style-type: none"> • statistically significant increases in the median total number of best practices in child care settings, and separately for both nutrition and physical activity best practices • improvements in nutrition, physical activity and education for staff and parents • unexpected impacts including increased involvement of family and community in childcare centre activities, staff perceptions of themselves as role models, staff transferring positive health behaviours to their own home environment, and wider public and stakeholder engagement • The programme is seen as sustainable, and Yuma County partners are credited with developing an area of expertise that can now be shared with regional/state partners.
<p>NCB assessment</p>	<p>Recommended reading = High Relevance = High Evaluation quality = Reasonable</p> <p>Successful, multi-agency approach, indicating improved practice in child care settings and a wider, unexpected “ripple effect” extending the impact of the programme beyond the original scope of the programme. Although the quality of the evaluation itself is limited due to use of</p>

	self-report measures, absence of control group, small sample size used for statistical analysis, and no direct link to improved outcomes for children, this is overcome to some extent by the use of qualitative feedback illustrating positive impacts on behaviour and practice, and the programme's overall degree of sustainability and transferability
Citation(s)	<p>Drummond, R.L., Staten, L.K., Sanford, M.R., Davidson, C.L., Ciocazan, M.M., Khor, K.-N. and Kaplan, F. (2009) 'Steps to a healthier Arizona: a pebble in the pond: the ripple effect of an obesity prevention intervention targeting the child care environment', <i>Health promotion practice</i>, vol 10, no 2, pp 156S–167S.</p> <p>For more details on the 'Steps to a healthier Arizona' (Arizona Steps) initiative, and the federal 'Steps to a healthier US' programme, see:</p> <ol style="list-style-type: none"> 1. Centers for Disease Control and Prevention (2008) <i>The Steps Program in action: success stories on community initiatives to prevent chronic diseases</i>, Atlanta, GA: US Department for Health and Human Services. 2. Easton, A. (2009) 'Public-private partnerships and public health practice in the 21st century: looking back at the experience of the Steps Program', <i>Preventing chronic disease</i>, vol 6, no 2, pp 1–4.

Shape Up Somerville: Eat Smart, Play Hard	
Score = 5	
Aim	A collaborative community-based participatory research initiative designed to change the whole-child environment to prevent undesirable weight gain among elementary school children. Enhanced access to physical activity and healthy food during the school day, and variety of activities aimed at home and community settings.
Target group	Somerville, Massachusetts, USA. A culturally diverse, urban city, with a population at high risk of obesity. Children attending Grades 1-3 (ages six to eight years) in 10 public elementary schools, their families and the wider community.
Rationale	School environments are favourable settings for obesity prevention programmes targeting children, given the high level of contact opportunities and established channels for programme administration and communication. However, the potential impact of solely school-based obesity prevention is limited because children spend less than 50 per cent of their waking time at school. Thus, a multi-faceted, community-based approach may be required, especially where parents may be difficult to engage.
Multi-agency involvement	A community council guided development, implementation and evaluation of the intervention. Community members and professionals from the four major language communities (Portuguese, Haitian-Creole, Spanish and English) were engaged to design and plan the study via meetings, focus groups, interviews and new advisory councils. The intervention involved children, parents, teachers, school-food service providers, city departments, policy-makers, healthcare providers, before- and after-school programmes, restaurants and the media.
Intervention	<p>Some examples of the wide range of activities delivered:</p> <ul style="list-style-type: none"> • provision of healthy breakfasts before school • walking to/from school campaign • professional development in nutrition and physical activity for all school and after-school staff • improvements to school meals • classroom curriculum including 10-minute 'Cool Moves' daily physical activity programme • new equipment and 'game cards' for recess periods • development of a school wellness policy • new after-school curriculum including physical activity and cooking • parent outreach: newsletters, coupons, nutrition forums, family events • collaboration with ethnic minority community groups • support from local 'community champions' • monthly column in local paper • collaboration with City of Somerville health events • local physician and clinic staff training • identification of 'Shape Up Somerville-approved' restaurants • production of resources guides.
Evaluation	<p>A controlled trial ran from 2002 to 2005 (the paper reviewed relates to 2003-2004).</p> <p>Key data collected:</p>

	<ul style="list-style-type: none"> • BMI. • parent questionnaire collecting socio-demographic information, parents' height and weight, and child's activities, for example, participation in sport/physical activity, dietary intake, TV viewing, etc.
Outcome	On average, BMI z-scores declined by a small amount over time. The decline was greater in the intervention schools than in the control schools.
NCB assessment	<p>Recommended reading for JRIEP = High</p> <p>Relevance to JRIEP = High</p> <p>Evaluation quality = Medium</p> <p>A creative, multi-faceted, city-wide intervention, showing a small positive effect. Evaluation quality is limited by low response rate and key differences between the intervention and control groups that were not controlled for in the analysis. Many parents did not return a questionnaire, limiting the amount of background information available about each child in the study. Also unclear about sustainability of the outcomes given the limited one-year timeframe.</p>
Citation(s)	Economos, C.D., Hyatt, R.R., Goldberg, J.P., Must, A., Naumova, E.N., Collins, J.J. and Nelson, M.E. (2007) 'A community intervention reduces BMI z-score in children: Shape Up Somerville first year results', <i>Obesity</i> , vol 15, no 5, pp 1325–1336.

The Healthy Choices Collaborative Initiative	
Score = 0	
Aim	<p>Three three-year school-based interventions aimed to promote physical activity, reduce television viewing and promote fruit and vegetable consumption among young people by raising awareness and fostering healthy behaviour:</p> <ul style="list-style-type: none"> • Planet Health curriculum focusing on nutrition and physical activity. • Healthy Choices, a before- and after-school programme. • The School Health Index (SHI), environmental assessment and planning tool.
Target group	Massachusetts, USA. Public middle school students aged 10-14.
Rationale	Collaborations between universities and public health partners can foster novel approaches to designing and implementing programmes that use participatory methods to fully engage school personnel and reduce the risk of problems in moving from research evidence to effective 'real world' practice.
Multi-agency involvement	The Healthy Choices Collaborative (HCC) was a partnership among Massachusetts Department of Public Health (MDPH), Blue Cross Blue Shield Massachusetts (a health insurance company), the Harvard School of Public Health (HSPH) and Massachusetts Public Middle Schools. No details are provided of partners' respective roles and relationships.
Intervention	<p>Planet Health, Healthy Choices and the SHI existed before they were brought under HCCI.</p> <ul style="list-style-type: none"> • The Planet Health curriculum included classroom lessons, PE materials, wellness sessions, school fitness funds and teacher training workshops. • Healthy Choices was a before- and after-school programme including nutrition projects, media messages and physical activities. • SHI was a self-assessment tool that allowed school staff to evaluate the strengths and weaknesses of their health promotion programmes and develop an action plan to improve student health and involve students, teachers, parents and communities in promoting health and health behaviours.
Evaluation	<p>A 1999 evaluation showed that Planet Health reduced time spent watching television, improved dietary intake among girls, and was cost-effective in reducing obesity among girls. In addition, a 2002 evaluation of Healthy Choices showed improved nutritional knowledge and stabilised BMI among girls but no statistically significant effects for boys.</p> <p>This current paper presents findings from qualitative telephone interviews with 21 'key leaders' previously involved with the three programmes about what was needed to support the implementation and sustainability of HCCI. Interviewees were divided into three groups:</p> <p>Group 1: key people designing, funding and/or implementing at least one programme.</p> <p>Group 2: school coordinators who oversaw the implementation of at least one programme.</p> <p>Group 3: programme coordinators and teachers implementing the Planet Health curriculum.</p>
Outcome	<ul style="list-style-type: none"> • Buy-in from teachers, staff, students and cafeteria staff was essential, but hard to achieve without administrative support. Teacher incentives could secure buy-in.

	<ul style="list-style-type: none"> • Teachers' time constraints and competing priorities made implementation difficult. • Parental support needed to reinforce messages. • Some difficulties forming staff teams and balancing input from individual members. • Beneficial for schools to collaborate with community groups. • Barriers to implementing Healthy Choices included limits on transportation and students' and parents' competing priorities at those times of day. • Some problems implementing changes in cafeterias as food choices can be driven by multi-level institutional pressures outside food-service directors' control. • Ongoing resources needed to support staff training, both in specific programmes, managing multidisciplinary teams, community engagement, etc. • Useful for programme coordinators to network and learn from each other.
NCB assessment	Recommended reading for JRIEP = Low Relevance to JRIEP = Low Evaluation quality = N/A Provides some interesting lessons from those involved in implementation. The programmes were collectively managed by a team consisting of a university, a public health department and a private health insurer, but no detail is given about how this partnership worked.
Citation(s)	Greaney, M., Hardwick, C.K., Mezgebu, S., Lindsay, A.C., Roover, M.L. and Peterson, K.E. (2007). 'Assessing the feasibility of a multi-program school-based intervention to promote physical activity and healthful eating in middle schools prior to wide-scale implementation', <i>American journal of health education</i> , vol 38, no 5, pp 250–257.
Healthier Options for Public Schoolchildren (HOPS)	
Score = 5	
Aim	A quasi-experimental controlled pilot intervention aimed at keeping elementary school children at a healthy weight, improving their health status and increasing academic achievement, by using multiple, easily-replicable strategies to change knowledge and behaviours around good nutrition, physical activity and healthy living.
Target group	Florida, USA. Children aged six to 12 in four elementary schools in central Florida.
Rationale	Successfully addressing childhood obesity requires multi-level, multi-agency collaboration directed to the multiplicity of factors affecting weight management, since interventions targeting individual behaviours have not been shown to work. Schools, as central institutions for the socialisation of children and hubs of community-wide activity, are ideal for obesity-prevention programming since children of every socio-economic, racial and ethnic group can be reached.
Multi-agency involvement	Broad range of partners including district and local school administrations, school cafeterias, 'Wellness Committee', nutrition educators, US Department of Agriculture Food and Nutrition Service (USDA FNS), USDA master gardeners and the magazine <i>Organic Gardening</i> .
Intervention	The programme included four components:

	<ul style="list-style-type: none"> • Modified dietary offerings. More nutritious and whole foods were incorporated into school meals with the support of a registered dietician. • Nutrition/lifestyle education curricula aimed at children, parents, teachers and other school staff. This included use of the OrganWise Guys (OWG) curricula and USDA Team Nutrition materials www.organwiseguys.com. • Physical activity programme. Schools encouraged to increase physical activity within the school day, including two 10-15 minute classroom physical activity programmes (WISERCISE from OWG and TAKE10 from the ILSO Research Foundation) and other structured physical activities during recess and before school. • Wellness projects, for example, fruit and vegetable gardens.
Evaluation	<p>A quasi-experimental, controlled, longitudinal impact evaluation was built into the intervention. Data collected at five time points over two-year study period. Measures were:</p> <ul style="list-style-type: none"> • BMI and blood pressure. • Academic achievement measured by Florida Comprehensive Achievement Test (FCAT) reading and math scores. FCAT is a standardised measure administered to all Florida public school children from 3rd grade. • Socio-demographic data, for example, age, gender, grade, race/ethnicity, eligibility for free or reduced price school meals (as proxy for low-income status).
Outcome	<ul style="list-style-type: none"> • The four treatment schools experienced a greater decrease in the children’s average BMI percentile than the control school by the second year of the study. This applied to low-income children only, and to girls, but not boys. • Treatment schools had higher than average FCAT maths scores compared to the control across all three years. No significant differences evident for reading scores. • Following this pilot, HOPS has been rolled out to other states in the US.
NCB assessment	<p>Recommended reading for JRIEP = High Relevance to JRIEP = High Evaluation quality = Medium</p> <p>A multi-faceted and multi-agency intervention (though limited detail on roles of the different agencies involved). The evaluation did not track the variable implementation of the programme in different schools nor the involvement of individual children in different programme activities. No information on response rates is provided. It should be noted that, according to the authors, the value of FCAT scores for assessing academic performance is strongly disputed.</p>
Citation(s)	<p>Hollar, D., Lombardo, M., Lopez-Mitnik, G., Hollar, T.L., Almon, M., Agatston, A.S. and Messiah, S.E. (2010b) ‘Effective multi-level, multi-sector, school-based obesity prevention programming improves weight, blood pressure, and academic performance, especially among low-income, minority children’, <i>Journal of health care for the poor and underserved</i>, vol 21, no 2, pp 93–108.</p> <p>Hollar, D., Messiah, S.E., Lopez-Mitnik, G., Hollar, L., Almon, M. and Agatston, A.S. (2010c) ‘Effect of a two-year obesity prevention intervention on percentile changes in body mass index and academic performance in low-income elementary school children’, <i>American journal of public health</i>, vol 100, no 4, pp 646–653.</p> <p>Hollar, D., Messiah, S.E., Lopez-Mitnik, G., Hollar, L., Almon, M. and Agatston, A.S.</p>

(2010a) 'Healthier options for public schoolchildren program improves weight and blood pressure in 6 to 13-year-olds', *Journal of the American Dietetic Association*, vol 110, no 2, pp 261–267.

The Agatston Urban Nutrition Initiative (AUNI)

Score = 2

Aim	To promote nutritional health and community wellbeing by taking a problem-solving approach, in which university and community students work jointly in a curriculum that integrates in-class and service learning.
Target group	West Philadelphia, USA. Public school students of all ages in a deprived region of the city with a predominantly black population.
Rationale	A formative evaluation for the intervention revealed that obesity was significantly more prevalent among 11- to 14-year-olds in West Philadelphia than among all children – and all black children – in that age group across the US. AUNI recognises the complexity of obesity as a problem and the need for broad-based strategies to address it.
Multi-agency involvement	A partnership between the University of Pennsylvania (UPenn) and West Philadelphia public schools, based in UPenn's Netter Center for Community Partnerships. Limited detail provided but the initiative is very much community-centred, aimed at fostering long-term partnerships between UPenn, public schools and community partners.
Intervention	<p>Through 'Eat Right Now', the school district of Philadelphia's comprehensive nutrition education programme, AUNI conducts nutrition education programmes in 20 public schools. University students also work with public school students to:</p> <ul style="list-style-type: none"> • explore and address nutrition-related issues in the community • improve lunchroom choices • maintain community gardens • operate after-school fruit stands • help neighbourhood food stores create convenient healthy food stations • operate community farmers' markets. <p>AUNI also:</p> <ul style="list-style-type: none"> • Works with PE teachers and school coordinators to improve exercise opportunities during PE class and recess time. • Improves opportunities for young people and families to exercise regularly after school, in the evening and during the summer break. • Coordinates job training and youth leadership programmes for high school students. The AUNI internship programme engages teens in organising better food choices in their communities by working after school for 10 hours/week. AUNI interns combine direct service approaches, which include teaching classes in healthy cooking and growing healthy foods in school gardens for sale at farmers' markets, with advocating for broader systems change. In spring 2008, AUNI high-school interns organised the Youth Action Council for the Philadelphia Urban Food and Fitness Alliance. They have also been highly involved in youth organising on a regional and national level.
Evaluation	Aspects of process and impact have been evaluated, but no comprehensive findings are presented in the paper reviewed for this anthology.

Outcome	N/A
NCB assessment	<p>Recommended reading for JRIEP = Medium</p> <p>Relevance to JRIEP = Medium</p> <p>Evaluation quality = N/A</p> <p>Interesting example of a community-oriented university-school partnership. No details given of the nature of community involvement, and no evaluation findings presented.</p>
Citation(s)	<p>Johnston, F.E. (2009) 'The Agatston Urban Nutrition Initiative: working to reverse the obesity epidemic through academically based community service', <i>New directions for youth development</i>, vol 122, pp 61–79.</p>

It's Your Move!	
Score = 3	
Aim	Part of a suite of programmes, It's your Move! aimed to build and sustain local community capacity to promote healthy eating, physical activity, healthy bodies and healthy body image among 13- to 17-year-olds and their families
Target group	East Geelong/Bellarine region of Victoria, Australia. Students aged 13-17, their families, schools and communities
Rationale	Core focus on long-term capacity building to create and sustain a local environment conducive to preventing childhood obesity
Multi-agency involvement	<p>Collaboration among a broad range of community partners:</p> <ul style="list-style-type: none"> • local businesses provided funds for Student Ambassador training • students collaborating with regional newspaper on recipe books • linked with <i>Bicycle Victoria's</i> 'Ride 2 School Program' • student Ambassadors received formal training in health promotion and event management by the local Technical and Further Education College • local sports agency piloted a Physical Education Professional Development Network, for teachers to learn/refresh skills in particular sports/activities • Australia's best-known nutritionist gave a talk to parents. <p>A committee of school principals, government stakeholders and university academics provided strategic direction, budget control and progress monitoring.</p>
Intervention	Students, teachers and other stakeholders formulated a 10-point action plan that was translated into strategies and initiatives specific to each school by a School Project Officer (SPO, a teacher released from teaching duties for one day each week) and a team of trained Student Ambassadors. Activities covered capacity building, social marketing, nutrition and physical activity. Implementation support was provided by a project coordinator at Deakin University.
Evaluation	<p>A detailed process evaluation, based on analysis of:</p> <ul style="list-style-type: none"> • 1,400 activity evaluation surveys (conduct, scale, duration, frequency, reach, resource use) for specific activities • evidence-based reports on each school from personnel involved in delivery • interviews with five SPOs pre- and post-intervention • interviews with 65 Student Ambassadors post-intervention. <p>An outcomes evaluation is being undertaken but no findings were reported in the paper reviewed for this anthology.</p>
Outcome	<p>Overall the programme was successfully implemented:</p> <ul style="list-style-type: none"> • Only 16 of 413 planned actions were either not started or not fully achieved. • Most interventions focused on capacity building and healthy eating strategies. • Teachers said existing physical activity practices, and ability to deal with non-participants in PE/sport, already met student needs. • Engaging parents was challenging. Teachers recommended dovetailing It's Your Move! activities with existing events, for example, parent-teacher nights.

	<ul style="list-style-type: none"> • School Principal support was fundamental to teacher/student buy-in. • Student Ambassador model effective for project ownership, but sustainability questionable in terms of cost (of training) and time (competing priorities). • SPOs reported feeling over-stretched because of time commitment involved. • Overall, time and resource intensive. Ideally evaluation and implementation tasks would be assigned to different personnel. • Schools did not address body image issues, given need for specific expertise. • One-off activities (healthy eating day, for example) often costly but short-term impact.
NCB Assessment	<p>Recommended reading for JRIEP = High</p> <p>Relevance to JRIEP = High</p> <p>Evaluation quality = High</p> <p>The suite of programmes together represents a good example of multi-agency working, and a capacity building approach adapted for different age groups. Key lessons from this paper are for process/programme content. Teacher and student burden is cited as a particular issue, as are the difficulties of engaging parents. The Student Ambassador model was noted as innovative and successful, but with questions around its sustainability.</p>
Citation(s)	Mathews, L.B., Moodie, M.M., Simmons, A.M. and Swinburn, B.A. (2010) 'The process evaluation of It's Your Move!, an Australian adolescent community-based obesity prevention project', <i>BMC public health</i> , vol 10, no 1, p 448.

Families for Health	
	Score = 3
Aim	Pilot intervention involving parallel sessions for obese/overweight children and their parents, delivered in a community setting and facilitated by local professionals to enhance local capacity. Sessions aimed to reduce children's BMI; improve their quality of life and self-esteem; address issues of parent mental health and parent-child relationships; and promote a healthy lifestyle.
Target group	Coventry, UK. Obese/overweight English-speaking children aged seven to 11 and their parents. 21 families recruited for the pilot (13 self-referred via newspaper/radio advert, five via health professionals and three via project team).
Rationale	Systematic reviews have reported an inadequate evidence base regarding interventions aimed at children who are already obese or overweight, and no UK studies. The National Institute for Health and Clinical Excellence (NICE) concluded that programmes incorporating behavioural treatment alongside physical activity and diet were effective, particularly if parents were given the responsibility for behaviour change. This study aimed to take on board these conclusions and fill the gap in the UK evidence base.
Multi-agency involvement	Programme developed by a multi-disciplinary professional and academic group and delivered by a range of community professionals, including a health visitor, school nurse, school lifestyle worker, nutritionist and mental health worker.
Intervention	<p>Programme ran for 12 weeks and included 2.5 hour weekly group sessions for both children and parents, with a shared activity at half-time.</p> <ul style="list-style-type: none"> • Parents: facilitated discussion, role play, goal setting, skill practice, parenting skills (for example, praise, raising self-esteem, consistency, relationships education, emotional health) and family lifestyle (for example, limiting unhealthy foods, portion sizes, family meals, cooking

	<p>advice, decreasing sedentary behaviour and increasing physical activity).</p> <ul style="list-style-type: none"> Children: discussed healthy eating (for example, food labels, trying new foods and practical food preparation); circle time to discuss emotional aspects of their lives and living with obesity to raise emotional literacy, self-esteem and confidence; and physical activity (games, use of pedometers, for example).
Evaluation	<p>Outcomes were assessed by comparing data collected before the intervention, after the intervention and six months later using measures for BMI and body fat, self-report questionnaires on quality of life and relationships, food consumption and physical activity.</p> <p>A process evaluation was also carried out.</p>
Outcome	<p>Of the 27 children who started the programme, 15 completed it, three partially completed and nine withdrew. The data shows generally positive impacts:</p> <ul style="list-style-type: none"> Families who self-referred were more likely to attend more sessions. Sixteen parents reported their perceptions of the programme, and most were positive. Significant reductions in children's BMI z-scores, waist measurements and percentage fat were achieved by the end of the programme and sustained six months later. No long-term improvements reported to children's quality of life, self-esteem or to parent-child relationships. Parents' mental health did show sustained improvement. According to parents, children were less likely to be exposed to unhealthy foods, and had healthier eating habits at home following the intervention. However, children did not report any increase in their consumption of fruit or vegetables. Parents reported that children were less sedentary and accelerometer data showed increased number of steps per day. There was no change in time spent doing physical activity.
NCB assessment	<p>Recommended reading for JRIEP = Medium</p> <p>Relevance to JRIEP = Medium</p> <p>Evaluation quality = Medium</p> <p>An example of a community-based UK programme aimed at the families of obese or overweight children. Participant recruitment seems to have been somewhat ad hoc, retention was a key challenge and the sample of families involved was small, all of which limited the quality of the evaluation. The programme was delivered by a range of professionals, but was not multi-agency in any broader respect.</p>
Citation(s)	<p>Robertson, W., Friede, T., Blisset, J., Rudolf, M.C.J., Wallis, M. and Stewart-Brown, S. (2008) 'Pilot of "families for health": a community-based family intervention for obesity', <i>Archives of disease in childhood</i>, vol 93, pp 921–928.</p>

Prevention through Activity in Kindergarten Trial (PAKT)

Score = 4

Aim	<p>Aim to increase children's level of physical activity, improve motor skills, and decrease health risk factors and media use. Also to equip parents and children to continue the activities after the programme had ended.</p>
Target group	<p>Wurzberg and Kitzingen, Germany. This region was chosen due to a high incidence of</p>

	<p>obesity at the point of school entry.</p> <p>Children aged four to five attending kindergarten.</p>
Rationale	<p>Physical activity can help prevent childhood obesity so efforts to promote such behaviours at an early stage may embed them and have a positive impact on future health. Research has also shown that physical activity intervention programmes can improve coordination skills in pre-schoolers and may prevent accidents.</p>
Multi-agency involvement	<p>Programme developed and delivered by health professionals including PE scientists, paediatricians, dieticians and physiotherapists working with teachers and parents.</p>
Intervention	<p>Children participated in daily 30-minute physical education sessions based on 'early psychomotor education'. This places emphasis on developing perception and coordination using movement and concentration, rhythmic or musical content, acting and motor-skills based tasks. Also games and exercises to improve physical endurance, speed, power, creativity, flexibility, cooperation and throwing skills.</p> <p>Sessions were instructed by kindergarten teachers supervised by the research team (at least once every two weeks) following an initial training workshop.</p> <p>Parents were provided with physical activity homework cards, which described activities for the child and the whole family. Parents also invited to three educational seminars and periodically sent written information regarding the importance of physical activity and healthy eating.</p>
Evaluation	<p>Among 41 kindergartens in the region, 21 were randomly allocated to an intervention group and 20 to a control group. Data were collected pre-, during (3-5 months), end-(of school year) and post- (2-4 months) intervention.</p> <p>The paper reviewed for the anthology presents some of the changes observed, but full impact and process evaluations are yet to be published.</p>
Outcome	<p>At the end of the school year children in the intervention kindergarten showed:</p> <ul style="list-style-type: none"> • an increase in the average percentage of time spent in physical activity • improved average motor skills performance (overall and specific) • decreased body fat (BMI, skin folds) and blood pressure • increased flexibility • decreased media use (parent report) • decreased number of accidents and infections (parent report). <p>Attendance at the three parent seminars was low and declined over time: 45 per cent, 21 per cent and three per cent, respectively.</p> <p>PAKT is to be rolled out across Germany in collaboration with a health insurance company. Teachers from the intervention group will be involved in providing teacher training.</p>
NCB assessment	<p>Recommended reading for JRIEP = Medium</p> <p>Relevance to JRIEP = Medium</p> <p>Evaluation quality = High</p> <p>Some positive outcomes reported, though the full evaluation is not yet available. A range of professionals were involved in programme development, training teachers, and contributing</p>

	to parent seminars. Notably, attendance at parent seminars was low.
Citation(s)	Roth, K., Mauer, S., Obinger, M., Ruf, K., Graf, C., Kriemler, S., Lenz, D., Lehmacher, W. and Hebestreit, H. (2010). 'Prevention through Activity in Kindergarten Trial (PAKT): a cluster randomised controlled trial to assess the effects of an activity intervention in preschool children', <i>BMC public health</i> , vol 10, p 410.

Be Active Eat Well (BAEW)	
Score = 6	
Aim	Part of a suite of programmes, Be Active Eat Well aimed to build and sustain local community capacity to promote healthy eating, physical activity, healthy bodies and healthy weight to four- to 12-year-old children and their families.
Target group	Colac, Victoria, Australia, a disadvantaged rural community. Children aged four to 12, their families, schools and community.
Rationale	Core focus on building capacity within preschools and primary schools, families and communities to create and sustain an environment conducive to preventing childhood obesity.
Multi-agency involvement	Organisations involved in the programme included Colac Area Health (lead agency), Colac Otway Shire and Colac Neighbourhood Renewal. Be Active Eat Well had part-time project staff, whose work focused on social marketing, coordination and implementation of intervention activities. This involved re-orienting schools and other partners toward providing and promoting healthy food choices and opportunities for physical activity.
Intervention	A wide range of activities: <ul style="list-style-type: none"> • Improving nutrition through, for example, canteen menu changes, provision of healthy lunch packs, information/promotion materials and events at school, training for teachers and canteen staff, school nutrition policy, children’s newsletters, tip sheets for parents, community garden. • Encouraging physical activity by providing programmes and equipment, promotional materials, walk to school days, ‘walking school buses’. • Promoting reduced screen time through children’s newsletters, ‘TV power-down week’ event with accompanying classroom curriculum. • General strategies including event sponsorship; incorporation of BAEW into local authority plans; broad media coverage; and training in social marketing and obesity prevention.
Evaluation	A quasi-experimental evaluation was carried out, comparing outcomes between all preschools (n=4) and primary schools (n=6) with more than 20 children in Colac (the intervention group) and a stratified random sample of preschools and primary schools across the remainder (the control group). Follow-up data were collected two to three years after baseline. BMI z-scores were calculated. Children aged 10-12 completed a questionnaire about physical activity, nutrition behaviours, dieting practices, episodes of teasing and satisfaction with body shape and size (findings not presented in the paper reviewed for this anthology). Telephone interviews with parents provided demographic characteristics, which were linked with area-level social deprivation indicators.
Outcome	<ul style="list-style-type: none"> • BMI and waist circumference increased less among children in the intervention group than among children in the control group over the course of the intervention • There were no differences according to socio-economic status in the intervention group but significant differences in the comparison group, suggesting that Be Active Eat Well helped to reduce the social gradient in health disparities

NCB assessment	<p>Recommended reading for JRIEP = High</p> <p>Relevance to JRIEP = High</p> <p>Evaluation quality = High</p> <p>The suite of programmes together represents a good example of multi-agency working, as well as a capacity-building approach adapted for different age groups. The evaluation of Be Active Eat Well benefited from a quasi-experimental design, reasonable sample sizes and relatively long-term outcome measures. It suffered from mediocre response rates and the lack of any indicators of participation.</p>
Citation(s)	<p>Sanigorski, A.M., Bell, A.C., Kremer, P.J., Cuttler, R. and Swinburn, B.A. (2008). 'Reducing unhealthy weight gain in children through community capacity-building: results of a quasi-experimental intervention program, Be Active Eat Well', <i>International journal of obesity</i>, vol 32, pp 1060–1067.</p>

Intervention Centred on Adolescents' Physical Activity and Sedentary Behaviour (ICAPS)	
Score = 4	
Aim	Four-year physical activity controlled intervention to change knowledge and attitudes towards physical activity among adolescents, and to provide the social support and environmental conditions that encourage physical activity inside and outside school. The paper reviewed for this anthology reports outcomes at six months.
Target group	Bas-Rhin region of eastern France. Middle school students aged 11-12.
Rationale	Engagement in physical activity declines strongly during adolescence, beginning when children enter secondary school (at age 11). This is thought to be partly responsible for rising levels of obesity. ICAPS was designed to reflect increasing recognition of the importance of the context in which the person lives, including their family, peers, school, community and society. It is hypothesised that changes in activity patterns both inside and outside school, including in daily life, and also in attitudes and motivation could be important for a long-term health perspective.
Multi-agency involvement	Limited detail provided. The intervention involves 'numerous partnerships intervening at different levels (school boards, teachers and medical staff, club educators, families, local and community agencies in charge of recreational areas and transportation infrastructures, etc.)' (pS97).
Intervention	<ul style="list-style-type: none"> • Educational component focusing on physical activity and sedentary behaviours. • New opportunities for physical activity during school hours (lunchtime/breaks), after school, and arranged to overcome barriers to participation (timing, transport, for example). • Sporting events with bicycle and walk to school events. • Meetings and regular contact with teachers, parental organisations and sports associations to encourage participation in the programme (at least every two months). • Regular visit by ICAPS coordinator to provide support.
Evaluation	<p>A randomised controlled trial compared outcomes for children in four treatment schools and four control schools after six months. Data collected by means of student questionnaire:</p> <ul style="list-style-type: none"> • participation in physical and sedentary activity • self-efficacy, intention towards physical activity and social support • socio-demographic data (also by parent questionnaire). <p>BMI, percentage body fat data and other physical measures also collected but will be reported at study conclusion (not in the paper reviewed for this anthology). Implementation measures included the number of ICAPS activities provided per site and individual attendance at each session.</p>
Outcome	<p>From analysis of the implementation data:</p> <ul style="list-style-type: none"> • a mean of 10-12 ICAPS activities were provided per week on each treatment site • around 50 per cent of students participated in at least one weekly activity • all students were exposed to at least two educational classes or debates focusing on physical activity. <p>From analysis of the student questionnaires:</p> <ul style="list-style-type: none"> • Proportion of adolescents in the treatment schools not engaged in organised physical activity was reduced by 50 per cent over six months, whereas there was no change among adolescents in the control schools. • After adjustment for baseline data the intervention was associated with a significant decrease

	<p>in the proportion of treatment school students falling into the 'high sedentary behaviour' category (more than three hours each day), while this proportion increased among control school students.</p> <ul style="list-style-type: none"> • There were some positive changes in self-efficacy and intention towards physical activity among girls in the treatment schools. Additional analyses linked these effects with increased participation in physical activity. • There were no psychological effects for boys.
NCB assessment	<p>Recommended reading for JRIEP = Medium</p> <p>Relevance to JRIEP = Medium</p> <p>Evaluation quality = High (full evaluation, not reported in paper reviewed for this anthology)</p> <p>A school-based intervention incorporating multi-agency partnerships, though very little detail is provided about these. The evaluation design is high quality, but this paper only reports six-month outcomes based on student self-report.</p>
Citation(s)	<p>Simon, C., Wagner, A., DiVita, C., Rauscher, E., Klein-Platat, C., Arveiler, D., Schweitzer, B. and Triby, E. (2004) 'Intervention centred on adolescents' physical activity and sedentary behaviour (ICAPS): concept and 6-month results', <i>International journal of obesity</i>, vol 28, pp S96–S103.</p>

Shape Up Europe	
Score = 2	
Aim	A wide-ranging, multi-disciplinary three-year EU programme to address the social determinants of childhood obesity through school-family-community partnerships.
Target group	Students aged four to 16 in 19 cities in 19 EU countries, including Hull in the UK.
Rationale	Based on the principle that healthy diet and physical activity are influenced in more efficient and sustainable ways by addressing their determinants on a school, family, community and broader societal level, than targeting individual behaviour.
Multi-agency involvement	Teachers, Shape Up staff and others worked with students to identify health-related conditions at different levels (school, family, neighbourhood, local community/city) and develop appropriate interventions. A local coordinator (LC) in each city coordinated project work and community intervention and a local facilitator (LF) was responsible for relationships with schools. A local promoting group (LPG) supported implementation, via political/professional support, local community knowledge etc. Composition of each LPG differed according to local needs and priorities and included city council employees (for example, in planning, transport, environment departments), national health and/or education representatives, teachers, nutritionists, medical professionals, and academics.
Intervention	<p>Teacher training took place in most participating cities. Many activities focused on improving physical spaces and facilities available in the community including:</p> <ul style="list-style-type: none"> • student participation on the board for a new sports hall and cultural centre • lobbying the city council for a larger school playground and new equipment • work to improve safety, mobility and accessibility in the community • work with parents, architects and the municipality to rehabilitate the school yard/playground • sponsored run with the city council

	<ul style="list-style-type: none"> • improved accessibility of community fitness facilities to students • health professionals and others provided nutrition advice and guidance via healthy eating workshops, canteen food assessment, policy Q&A etc.
Evaluation	Either a LC or a LF in each city was asked to complete a questionnaire about their views of the programme. Every city except Hull responded and, in some cities, both a LC and a LF completed a questionnaire. Their responses were considered alongside information provided by local projects in annual reports and via a web portal.
Outcome	<p>Findings from the project reports and portal contents:</p> <ul style="list-style-type: none"> • There was a need to build Shape Up into the school curriculum from the beginning in order to engage teachers. • It was important to be clear about the role of the LF and teachers, respectively. • It was important to ensure synergy with other school/community interventions. • A number of positive environmental changes occurred as a result of the programme. <p>Findings from the LC/LF questionnaire:</p> <ul style="list-style-type: none"> • 24 of 26 respondents said pupils had increased their knowledge about health • 18 of 26 said pupils had changed eating habits • 22 of 26 said pupils had changed physical exercise habits • 19 of 26 said the community had been involved in activities and 16 of these said that this involvement had been 'very or somewhat fruitful' • 15 of 26 said Shape Up had been 'very successful' in general, and 11 'somewhat successful'.
NCB assessment	<p>Recommended reading for JRIEP = Medium</p> <p>Relevance to JRIEP = Medium</p> <p>Evaluation quality = Low</p> <p>A Europe-wide programme providing some examples of innovative activities and school-community partnerships, and some lessons for implementation. The evaluation is very limited.</p>
Citation(s)	Simovska, V. and Jensen, B.B. (n.d.) <i>A school-community approach to influencing the determinants of childhood overweight and obesity: lessons learnt</i> , Barcelona: PAU Education (available at www.shapeupeurope.net/files/media/media430.pdf , accessed 23 March 2011).

Mind, Exercise, Nutrition... Do It! (MEND)	
Score = 4	
Aim	MEND staff, train and equip local delivery partners to provide a suite of evidence-based obesity prevention and management programmes for children who are, or are at risk of becoming, overweight or obese and their parents. The aim is incremental (not rapid) weight loss and sustainable improvement in families' dietary intake, fitness levels and general health to encourage healthy growth and weight maintenance.
Target group	<p>Three strands to the MEND suite of programmes:</p> <ul style="list-style-type: none"> • MEND 7-13: children aged seven to 13 who are clinically overweight or obese. Operates in 300 locations through England, Wales, Northern Ireland, Scotland, Australia, Denmark

	<p>and US. Approx 25,000 children to date.</p> <ul style="list-style-type: none"> • MEND 2-4 ('Mini-MEND'): children aged two to four. No specific weight criteria but those 'at-risk' are targeted i.e. at least one overweight/obese parent/sibling; displaying unhealthy eating or drinking habits, or sedentary lifestyle. Over 200 families have participated at 30 sites across the UK. Aim to offer Mini-MEND in all UK Sure Start Children's Centres. • MEND 5-7 piloted at six sites in the UK; roll-out from September 2009. <p>Families were able to self-refer via the MEND website or Freephone or via referral from health professionals with the family's agreement. Attendance was free.</p>
Rationale	<p>Making a reliable, specialist-designed intervention (based on nutritional and sports science, psychology, learning and social cognitive theories and therapeutic processes) more readily accessible to those who are, or at risk of becoming, overweight, by training and developing non-specialists to deliver intervention strands in community settings.</p>
Multi-agency involvement	<p>A social enterprise funded via the Big Lottery Fund, Sport England, Legal & General and Sainsbury's and developed by specialists including dieticians, nutritionists, physical activity specialists, clinical psychologists and early years experts at leading institutions. Programmes are implemented in community and primary care settings in partnership with local authorities, Primary Care Trusts, local, leisure service providers and other community groups etc.</p>
Intervention	<p>As MEND places a strong emphasis on replication and scalability, the three core programmes are relatively prescriptive.</p> <p>MEND 7-13: Ten weeks of twice-weekly two-hour sessions embedded in a two-year weight management strategy with tapering local and online support. Sessions combine one-hour classroom-based interactive learning, alternating between 'mind' (behaviour change) and nutrition (improving eating behaviour) topics, and one-hour exercise for the children while the parents engage in facilitated discussion.</p> <p>MEND 2-4 (Mini-MEND): Ten weeks of weekly 90-minute sessions including 30 minutes of active parent-child play, 15 minutes' snack time and 45 minutes for parent workshops while children engage in crèche-style play activities. Workshops cover healthy lifestyle topics including healthy eating, understanding food labels, fussy eating, portion control, getting active and reducing sedentary behaviour, and family routines. All sessions are designed to improve parenting skills and meet the specific health and psycho-social needs of two- to four-year-olds. Parents are encouraged to set weekly challenges. At the end of the programme, local delivery partners are encouraged to organise reunion sessions and to signpost families to local activities (for example, parent-toddler groups, cooking clubs and walking groups).</p> <p>MEND 5-7: Pilot of a family support package focusing on parental engagement with nutritional education, play and physical activity and healthy habit development through monitoring, structured goal setting and rewards.</p>
Evaluation	<p>This study reports results for a randomised controlled trial (RCT) of modified MEND 7-13 with 60 obese children aged eight to 12 and their parents at five UK sites. Involved two-hour sessions delivered twice weekly over a nine-week period (total of 18 sessions). Each participating family was then given a 12-week free family swim pass.</p>

	<p>Data collected pre- and post six-month intervention period:</p> <ul style="list-style-type: none"> • BMI and waist circumference • body composition using measures of fat mass and fat-free mass • cardiovascular health in heart rate recovery • self/parental report of physical and sedentary activities • self-esteem • socio-demographic variables. <p>A RCT of Mini-Mend is also planned.</p>
Outcome	<p>The study reports several significant benefits to those in the intervention group compared to the control, all of which were sustained six months after completion:</p> <ul style="list-style-type: none"> • significantly lower waist circumference, BMI and fat mass • better heart rate recovery • more time engaged in physical activity and less in sedentary activity • higher self-esteem <p>Participation in the study was also sustained:</p> <ul style="list-style-type: none"> • 54 of the original 60 children completed the programme, and 42 provided data six months on • mean attendance at sessions: 86 per cent • 32 per cent of families used the free swimming pass, on average five times in the 12-week period.
NCB assessment	<p>Recommended reading for JRIEP = High Relevance to JRIEP = Medium Evaluation quality = Medium</p> <p>Model of multi-agency collaboration involving a core team of specialists training non-specialists to deliver programmes in local community and health settings. MEND programmes have reached large numbers of children in several countries and documented outcomes are positive, although the quality of this evaluation is limited due to the small sample of children involved and the relatively short duration.</p>
Citation(s)	<p>Swain, C. (2009) 'MEND programmes: community solutions to a national problem', <i>Primary health care</i>, vol 19, no 6, pp 20–23.</p> <p>Sacher, P.M., Kolotourou, M., Chadwick, P.M., Cole, T.J., Lawson, M.S., Lucas, A. and Singhal, A. (2010) 'Randomized controlled trial of the MEND program: a family-based community intervention for childhood obesity', <i>Obesity</i>, vol 18, no 1, pp S62–S68.</p> <p>Sacher, P., Wolman, J., Chadwick, P. and Swain, C. (2008) 'Mini-MEND: MEND's early years health lifestyle programme for 2-4 year olds and their families', <i>Nursing bulletin</i>, vol 33, pp 364–367.</p>

Bienestar Health Program	
Score = 2	
Aim	School-based health and physical fitness intervention to reduce risk factors (poor diet/overweight and lack of physical fitness) associated with the onset of type 2 diabetes in low-income Mexican American children.
Target group	San Antonio, Texas, USA. Low-income inner-city district 4th grade children (aged nine to 10) attending five elementary schools. All pupils were invited to take part but almost all (97 per cent) of those providing complete data were Mexican American and from low-income households.
Rationale	Type 2 diabetes is increasingly being diagnosed in low-income Mexican American children. Studies have suggested that most of those so diagnosed are overweight, report low levels of physical activity, come from low-income households and are generally unaware of their disease. The Bienestar Health Program was an attempt to tackle this problem by promoting healthy eating and physical fitness to 4th grade children and their parents.
Multi-agency involvement	Limited information provided. San Antonio City Parks and Recreation staff helped deliver the after-school health club.
Intervention	The programme had four components: <ol style="list-style-type: none"> 1. Parent education and involvement programme – four interactive, fun activities for children and their parents, facilitated by Bienestar staff. 2. Classroom health and physical education curriculum made up of 16 complete ready-to-use lessons and materials, delivered by certified PE teachers. 45-minute lessons held once every two weeks, plus students do 45 minutes of specified physical activity four days per week. 3. Student after-school health club offering 32 hour-long weekly sessions aimed at reinforcing the lessons learned in the classroom and promoting leisure time physical activity, song, drama, puppet shows. Parents encouraged to attend. 4. School cafeteria programme. Six 20-minute lesson plans designed to improve nutrition knowledge of food service staff and persuade students to eat more fruit and vegetables and less fatty foods. <p>All activities were delivered in English and Spanish.</p> <p>Parents and students who participated in programme activities received Bienestar coupons which could be used to purchase donated clothes, household appliances, school supplies, toys and gift certificates at a 'pop-up' store held at each school.</p>
Evaluation	Of nine elementary schools in the district with similar socio-demographic profiles, five were randomly assigned to a treatment group and four to a control group. The children's physical fitness was measured before and after the eight-month intervention using a modified Harvard step test – a standard exercise task, with data collected using a heart rate transmitter. A 'physical fitness score' was calculated from combining the time taken to do the task and the heart rate data. Data on BMI, gender and age were also collected.
Outcome	Physical fitness scores increased significantly among children in the treatment schools and decreased slightly among children in the control schools. The difference between the treatment and control schools was significant after adjusting for age and pre-intervention BMI.
NCB assessment	Recommended reading for JRIEP = Medium Relevance to JRIEP = Medium

	<p>Evaluation quality = High</p> <p>Although it is not clear from the paper, the programme does not seem to have involved many different agencies. The evaluation was of good quality, but only effects on fitness scores are reported. The samples for analysis were relatively small (about 200 children per group).</p>
Citation(s)	<p>Trevino, R.P., Hernandez, A.E., Yin, Z., Garcia, O.A. and Hernandez, I. (2005) 'Effect of the Bienestar Health Program on physical fitness in low-income Mexican American children', <i>Hispanic journal of behavioral sciences</i>, vol 27, no 1, pp 120–132.</p>

Annapolis Valley Health Promoting Schools Project (AVHPSP)	
Score = 3	
Aim	School-based programme that began as a parent-initiated grassroots movement to change menus in eight schools (1997), and is now in most elementary schools in Nova Scotia. Aims to enable children to make healthier food choices and increase opportunities for physical activity, to reduce risk of developing chronic diseases and provide skills to develop healthy food and activity behaviours for life. Activities are planned with input from students, parents, teachers and other school staff.
Target group	Nova Scotia, Canada. Students aged six to 12 attending public elementary and middle schools.
Rationale	To build on successes of current health-promoting activities in schools, to involve those who don't normally participate and create sustainability over time
Multi-agency involvement	Health Promoting School Teams comprising school staff, food service workers, students, parents, community members (dietitians, recreation directors, for example) assess needs and develop strategic plans for their school. Schools also work in partnership with local businesses, organisations and community groups. Project Advisory Committee comprising representatives from academia, health, sport and recreation agencies, and the food industry supports and evaluates the schools' health-promoting initiatives. Core AVHPSP team facilitates capacity building and ideas sharing through multi-agency workshops.
Intervention	Initiatives and activities introduced in schools include: <ul style="list-style-type: none"> • interdisciplinary unit in school to facilitate learning outcomes directed at healthy eating and physical activity • strategy to sustain nutritious, low-cost recess/lunch food programme for all students, with additional fruits and vegetables on offer • marketing strategies to promote fruit and vegetable consumption, and introducing fruits and vegetables to students at taste tests or exam time • opening school gyms to students after hours and offering a variety of non-competitive activities • playground games handbook from which new games can be introduced • changing the name/content of annual 'Field Day' to 'Active Living Day' • establishing a 'kids teaching kids' coaching clinic • Wellness Fair where students and parents can take part in physical activities, nutrition activities (food preparation, taste tests) and seminars.
Evaluation	The BMI, dietary habits and physical activity of children attending schools involved in the programme were compared with those of children attending schools offering only healthy menu alternatives. Researchers undertook secondary analysis of data from the 2003 Children's Lifestyle and School-Performance Study (CLASS). Surveys were also undertaken among 5th graders (aged 10-11), their parents and school principals.
Outcome	Students attending the AVHPSP schools had lower rates of overweight and obesity and better dietary habits than those attending schools where only healthy menu alternatives were offered. They also had higher levels of participation in organised sports or leisure time physical activities, and spent less time engaged in sedentary activities.

<p>NCB assessment</p>	<p>Recommended reading for JRIEP = Medium</p> <p>Relevance to JRIEP = Medium</p> <p>Evaluation quality = Medium</p> <p>A school-based initiative with community input. Approach to evaluation used existing survey data to compare schools involved with this programme to those where only healthy menu alternatives were offered. Evaluation has several weaknesses, including small sample of children attending the AVHPSP schools, relatively low response rate, and no 'before-after' comparison.</p>
<p>Citation(s)</p>	<p>Veugelers, P.J. and Fitzgerald, A.L. (2005) 'Effectiveness of school programs in preventing childhood obesity: a multilevel comparison', <i>American journal of public health</i>, vol 95, no 3, pp 432–435.</p>

Appendix B: Details of search strategy

Below are details of the systematic searches carried out to identify potentially relevant research sources for inclusion in the anthology. Table 6 summarises the database searches.

Table 6: Summary of database searches

Database	No of results	No selected
Applied Social Sciences Index and Abstracts (ASSIA)	39	7
Australian Education Index (AEI)	19	1
British Education Index (BEI)	3	1
British Education Index Free Collections	20	1
Database of Promoting Health Effectiveness (DoPHER)	6	0
Education Resources Information Center (ERIC)	78	14
Health Technology Assessment (HTA) Database	3	1
HWSE Database	696	16
PubMed	335	35
Social Policy & Practice	24	7
Social Care Online	27	5

The keywords used in the searches, together with a brief description of each of the databases searched, are outlined below. Throughout, (ft) has been used to denote free-text search terms and * to denote truncation of terms.

Applied Social Sciences Index and Abstracts (ASSIA)

(searched via CSA 23/11/2010)

ASSIA is an index of articles from over 600 international English language social science journals.

- #1 Obese children
- #2 Obesity
- #3 Body weight
- #4 Body mass
- #5 Body fat
- #6 Body Mass Index (ft)
- #7 BMI (ft)
- #8 Overweight (ft)
- #9 Weight gain (ft)
- #10 Weight control (ft)
- #11 Weight (ft)
- #12 Over-eating (ft)
- #13 Over eating (ft)
- #14 Fat (ft)
- #15 #1 or #2 or #3 or #4 or #5 or #6 or #7 or #8 or #9 or #10 or #11 or #12 or #13 or #14

- #16 Interagency collaboration
- #17 Agencies collaboration
- #18 Partnerships
- #19 Cooperation
- #20 Integrated services
- #21 Agency cooperation (ft)
- #22 Interagency (ft)
- #23 Inter agency (ft)
- #24 Multiagency (ft)
- #25 Multi agency (ft)
- #26 Partnership (ft)
- #27 #16 or #17 or #18 or #19 or #20 or #21 or #22 or #23 or #24 or #25 or #26

#28 #15 and #27

Australian Education Index (AEI)

(searched via Dialog 16/11/10)

AEI is Australia's largest source of education information covering reports, books, journal articles, online resources, conference papers and book chapters.

- #1 Obesity
- #2 Obese
- #3 Body-weight
- #4 Body-composition
- #5 Body Mass Index (ft)
- #6 BMI (ft)
- #7 Obesity
- #8 Overweight (ft)
- #9 Weight gain (ft)
- #10 Weight control (ft)
- #11 Weight (ft)
- #12 Overeating (ft)
- #13 Over eating (ft)
- #14 Over-eating (ft)
- #15 Obesity
- #16 Fat (ft)
- #17 Fatness (ft)
- #18 #1 or #2 or #3 or #4 or #5 or #6 or #7 or #8 or #9 or #10 or #11 or #12 or #13 or #14 or #15 or #16 or #17
- #19 Agency-cooperation
- #20 Coordination
- #21 Cooperative-planning
- #22 Integrated-services
- #23 Interagency (ft)
- #24 Inter agency (ft)

- #25 Multiagency (ft)
- #26 Multi agency (ft)
- #27 Partnerships in education
- #28 Partnership* (ft)
- #29 Collaboration (ft)
- #30 Interagency collaboration (ft)
- #31 Integrated working (ft)
- #32 #19 or #20 or #21 or #22 or #23 or #24 or #25 or #26 or #27 or #28 or #29 or #30 or #31

- #33 #18 and #32

British Education Index (BEI)

(searched via Dialog 16/11/10)

BEI provides information on research, policy and practice in education and training in the UK. Sources include over 300 journals, mostly published in the UK, plus other material including reports, series and conference papers.

- #1 Obesity
- #2 Obese (ft)
- #3 Bodyweight
- #4 Body composition
- #5 Body Mass Index (ft)
- #6 BMI (ft)
- #7 Obesity
- #8 Over weight (ft)
- #9 Overweight (ft)
- #10 Weight gain (ft)
- #11 Weight control (ft)
- #12 Weight (ft)
- #13 Over eating (ft)
- #14 Overeating (ft)
- #15 Fat (ft)
- #16 Fatness (ft)

#17 #1 or #2 or #3 or #4 or #5 or #6 or #7 or #8 or #9 or #10 or #11 or #12 or #13 or #14 or #15 or #16

#18 Agency cooperation

#19 Cooperative planning

#20 Interagency (ft)

#21 Multiagency (ft)

#22 Multi agency (ft)

#23 Partnership* (ft)

#24 Cooperation

#25 Collaboration (ft)

#26 Interagency collaboration (ft)

#27 Integrated working (ft)

#28 Integrated services (ft)

#29 #18 or #19 or #20 or #21 or #22 or #23 or #24 or #25 or #26 or #27 or #28

#30 #17 and #29

British Education Index Free Collections

(Searched 18/11/10)

The free collections search interface of the British Education Index (BEI) (formerly the British Education Internet Resource Catalogue) includes access to a range of freely available internet resources as well as records for the most recently indexed journal articles not yet included in the full BEI subscription database.

#1 Obesity

#2 Body composition

#3 Body weight

#4 Overweight (Excessive body fat)

#5 Obese (ft)

#6 Body mass

#7 Body Mass Index (ft)

#8 BMI (ft)

#9 Weight gain (ft)

#10 Weight control (ft)

- #11 Weight (ft)
- #12 Overeating (ft)
- #13 Over eating (ft)
- #14 Fat (ft)
- #15 #1 or #2 or #3 or #4 or #5 or #6 or #7 or #8 or #9 or #10 or #11 or #12 or #13 or #14

- #16 Agency cooperation
- #17 Cooperation
- #18 Cooperative planning
- #19 Educational cooperation
- #20 Institutional cooperation
- #21 Interagency cooperation
- #22 Interagency coordination
- #23 Multi agency (ft)
- #24 Multiagency (ft)
- #25 Partnership* (ft)
- #26 Integrated working
- #27 Integrated services
- #28 #16 or #17 or #18 or #19 or #20 or #21 or #22 or #23 or #24 or #25 or #26 or #27 or #28 or #29 or #30 or #31

- #29 #15 and #28

Database of Promoting Health Effectiveness (DoPHER)

(searched 23/11/10)

DoPHER contains focused coverage of systematic and non-systematic reviews of effectiveness in health promotion and public health worldwide.

- #1 General search using the term Obesity

Education Resources Information Center (ERIC)

(searched via Dialog 19/11/10)

The ERIC database is sponsored by the US Department of Education to provide extensive access to education-related literature.

- #1 Obesity
- #2 Body composition
- #3 Body weight
- #4 Obese (ft)
- #5 Body Mass Index (ft)
- #6 BMI (ft)
- #7 Weight gain (ft)
- #8 Weight control (ft)
- #9 Weight (ft)
- #10 Overeating (ft)
- #11 Over eating (ft)
- #12 Fat (ft)
- #13 Childhood obesity (ft)
- #14 #1 or #2 or #3 or #4 or #5 or #6 or #7 or #8 or #9 or #10 or #11 or #12 or #13

- #15 Agency cooperation
- #16 Cooperative planning
- #17 Educational cooperation
- #18 Institutional cooperation
- #19 Integrated services
- #20 Interagency (ft)
- #21 Inter agency (ft)
- #22 Multiagency (ft)
- #23 Multi agency (ft)
- #24 Partnerships In education
- #25 Partnership* (ft)
- #26 Cooperation
- #27 Collaboration (ft)
- #28 Interagency collaboration (ft)
- #29 Integrated working (ft)
- #30 Integrated services (ft)

#31 #15 or #16 or #17 or #18 or #19 or #20 or #21 or #22 or #23 or #24 or #25 or #26 or #27 or #28 or #29 or #30

#32 #14 and #31

Health Technology Assessment (HTA) Database

(searched 25/11/10)

The HTA database brings together details of completed and ongoing health technology assessments from around the world.

#1 General search using the term Obesity

HSWE Database

(searched 25/11/10)

HSWE Database provides comprehensive and up-to-date coverage across the disciplines of health, community studies and education.

#1 General search using the term Obesity

Pubmed

(searched 22/11/10)

PubMed comprises more than 20 million citations for biomedical literature from MEDLINE, life science journals, and online books.

#1 Obesity

#2 Body weight

#3 Body Mass Index

#4 Overweight

#5 Weight gain

#6 #1 or #2 or #3 or #4 or #5

#7 Interagency

#8 Interinstitutional relations

- #9 Partnership practice
- #10 Cooperative behavior
- #11 #7 or #8 or #9 or #10
- #12 #6 and #11

Social Policy and Practice

(searched via OvidSP16 23/11/10)

Social Policy and Practice is a bibliographic database with abstracts covering evidence-based social policy, public health, social services, and mental and community health. Content is from the UK with some material from the USA and Europe.

- #1 Obesity
- #2 Obese
- #3 Body weight
- #4 Body Mass Index
- #5 Overweight
- #6 Weight
- #7 Weight gain
- #8 Weight loss
- #9 Weight loss programme
- #10 Fat
- #11 BMI (ft)
- #12 Weight control (ft)
- #13 #1 or #2 or #3 or #4 or #5 or #6 or #7 or #8 or #9 or #10 or #11 or #12

- #14 Interagency
- #15 Interagency co operation
- #16 Interagency collaboration
- #17 Interagency cooperation
- #18 Interagency coordination
- #19 Interagency working
- #20 Multiagency
- #21 Multiagency approach
- #22 Multiagency partnerships
- #23 Partnership

- #24 Partnership working
- #25 Partnerships
- #26 Collaboration
- #27 Integrated
- #28 Integrated working
- #29 Integrated service
- #30 Integrated service provision
- #31 Integrated services
- #32 Agency cooperation (ft)
- #33 #14 or #15 or #16 or #17 or #18 or #19 or #20 or #21 or #22 or #23 or #24 or #25 or #26 or #27 or #28 or #29 or #30 or #31 or #32

- #34 #13 and #33

Social Care Online

(Searched 23/11/10)

Social Care Online is the Social Care Institute for Excellence's database covering an extensive range of information and research on all aspects of social care. Content is drawn from a range of sources including journal articles, websites, research reviews, legislation and government documents and service user knowledge.

- #1 obesity
- #2 obese (ft)
- #3 body weight (ft)
- #4 body mass index (ft)
- #5 bmi (ft)
- #6 overweight (ft)
- #7 weight gain (ft)
- #8 weight control (ft)
- #9 weight (ft)
- #10 over-eating (ft)
- #11 over eating (ft)
- #12 fat (ft)
- #13 #1 or #2 or #3 or #4 or #5 or #6 or #7 or #8 or #9 or #10 or #11 or #12

- #14 Agency cooperation (ft)
- #15 Interagency (ft)
- #16 Inter Agency (ft)
- #17 Multiagency (ft)
- #18 Multi Agency (ft)
- #19 Partnership (ft)
- #20 Partnerships (ft)
- #21 Collaboration (ft)
- #22 Interagency collaboration (ft)
- #23 Integrated working (ft)
- #24 Integrated services (ft)
- #25 #14 or #15 or #16 or #17 or #18 or #19 or #20 or #21 or #22 or #23 or #24

- #26 #13 and #25

Website Searches

We also carried out a range of website searches; the results of which are detailed in Table 7 below.

Table 7: Summary of website searches

Website	No selected
Chimat	3
EPPI-Centre	0
Intute	7
Joseph Rowntree Foundation	2
National Obesity Observatory	2

Appendix C: Research summary template

Citation	
Reviewer initials	
REVIEW DESCRIPTION	
Purpose of review	
Review methodology	
Key inclusion criteria (e.g. year, location, population, programme type, outcomes, design, etc.) including quality assessment	
Inclusion of 'multi-agency' programmes (describe)?	
FINDINGS (relevant to multi-agency programmes)	
Main findings and degree to which data support conclusions	
Overall relevance	Overall relevance rating (1-5; 5=most relevant):
	Comments:
Transferability (if programme outside UK)	
Quality rating (1-5; 5=best quality) & justification	Overall quality rating (1-5; 5=highest quality):
	Justification (including main limitations of study):
OVERALL	
Additional sources to look up	
Other comments	
Main messages and implications	

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