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Social and environmental interventions to reduce childhood obesity: a systematic map of reviews

Technical report written by Jenny Woodman, Theo Lorenc, Angela Harden, Ann Oakley

EPPI-Centre
Social Science Research Unit
Institute of Education
University of London

EPPI-Centre report no. 1610 · September 2008

Social and environmental interventions to reduce childhood obesity

A systematic map of reviews

TECHNICAL REPORT

Review conducted working with support staff

Report by Jenny Woodman (EPPI-Centre)
Theo Lorenc (EPPI-Centre)
Angela Harden (EPPI-Centre)
Ann Oakley (EPPI-Centre)

The results of this systematic review are available in two formats. See over page for details.

The results of this systematic review are available in two formats:

SUMMARY

Explains the purpose of the review and the main messages from the research evidence

REPORT

Includes the background, methods and main findings

These can be downloaded or accessed at <http://eppi.ioe.ac.uk/reel/>

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Contributions

The protocol was developed by Ann Oakley, Angela Harden and Jenny Woodman. The searching, mapping and data-analysis procedures were undertaken by Jenny Woodman and Theo Lorenc. The report was written by Jenny Woodman, Theo Lorenc, Angela Harden and Ann Oakley.

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NB This version of the report contains some amendments to Chapter Three compared to the version originally published. This concerns a correction in Table 3.2, and the change is reflected within the text and Table 3.11. It reflects a recoding of the study focus of Glanz (1999) to being about healthy eating instead of physical activity. The conclusion is unchanged.

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List of abbreviations

BMI	Body mass index
GP	General practitioner
IOTF	International Obesity Task Force
LA	Local authority
NHS	National Health Service
NICE	National Institute for Health and Clinical Excellence
OECD	Organisation for Economic Co-operation and Development
PCT	Primary care trust
PE	Physical education
RCT	Randomised controlled trial
SR	Systematic review
WHO	World Health Organization

Summary

Background

Both internationally and in the UK, there is widespread concern about increasing rates of obesity and overweight. There is interest from both policymakers and researchers in the social and environmental determinants of obesity, including factors related to the physical environment, social values, technology and the economy. Children and young people are an important focus of initiatives to prevent or reduce obesity. However, these policy concerns are not yet matched by a robust evidence base on the effectiveness of social and environmental interventions.

Aims and review question

This report describes a systematic map of existing research reviews relating to social and environmental interventions aimed at reducing or preventing obesity and overweight. Its focus is on research which has included children and young people.

The research questions were as follows:

- What are the methodological characteristics and scope of reviews which have been conducted on ‘social and environmental’ interventions for reducing or preventing obesity and obesity-relevant behaviours?
- What types of interventions are evaluated and which outcomes do the reviews measure?
- What is the focus of each review and how reliable are the findings?
- How do researchers conceptualise ‘social and environmental’ interventions?
- What does this work suggest in the way of future research priorities?

Methods

The authors located reviews through searches of databases in several fields, as well as specialist websites and contact with experts. Database searches used a broad strategy to maximise inclusiveness. Reviews were included if they investigated some obesity-relevant topic; reviewed the effectiveness of interventions; included the 4-18 age group; were published in 1996 or later; and focused on social and environmental interventions. Included reviews were coded and quality-assessed by two reviewers independently. The authors did not look in detail at the studies included in the reviews on account of the wide variation in the way that authors presented their study findings.

Results

Fifty-four reviews were found. Of these, 32 were classified as systematic reviews (reporting their aims, search strategy and inclusion criteria). The reviews covered a wide range of intervention types and settings. Most of the reviews covered the population as a whole and did not have a specific focus on children or young people. The reviews were divided into seven groups defined by topic.

Mass media (N = 8; systematic reviews N = 5)

These reviews evaluated mass-media campaigns (TV, radio, internet), either alone or in combination with individual-level interventions. Most reviews (N=5) focused on physical activity.

Financial incentives and pricing strategies (N = 3; systematic reviews N = 2)

These reviews included a range of strategies which changed the relative price of food items to increase healthy eating. These strategies included 'micro-environmental' interventions which were set in individual retail sites as well as provision of extra resources to individuals, and 'macro-environmental' interventions which took place on a wider scale, such as taxes and subsidies. All these reviews focused on healthy eating.

Point-of-sale information and availability (N = 3; systematic reviews N = 2)

These reviews focused on interventions to promote healthy eating through changing the availability of food in local settings, and/or altering its attractiveness through point-of-sale information and marketing, in either public eating places or the home. All these reviews focused on healthy eating.

Active transport (N = 3; systematic reviews N = 3)

Three reviews focused on the promotion of active transport (walking and cycling). These reviews all included a wide range of intervention types, from individual-level behaviour change programmes to mass media, community events, and changes to the physical environment.

School-based environmental change (N = 6; systematic reviews N = 4)

These reviews evaluated a range of multi-component interventions taking place in the school setting. The social and environmental components of the interventions included modifications to the physical environment, school rules and policies, and various strategies to impact on the social environment within the school. Some programmes also included educational curricula and/or physical exercise classes. The reviews focused equally on healthy eating and physical activity.

Community-based programmes (N = 16; systematic reviews N = 8)

These reviews evaluated multi-component projects in a community setting. The programmes included in these reviews generally focused on a geographical area and used multiple settings (for example, workplaces, public community sites, schools, food retailers, mass media). Social and environmental components included physical environmental change, policies and regulations, community mobilisation and development, and mass media and point-of-sale campaigns; many interventions also included individual-level components, such as education and screening. Five reviews focused on reducing the risk of cardiovascular disease, and one on diabetes; the remainder looked at healthy eating, physical activity, or obesity-related behaviours in general.

Reviews containing programmes in more than one category (N = 15; systematic reviews N = 8)

These reviews included several different intervention settings and types. Some focused on social and environmental interventions, while others also included individual-level strategies. The reviews were split between those that focused jointly on healthy eating and physical activity, and those that focused only on physical activity.

Conclusion

Building a strong evidence base for policy means locating and using the most relevant and reliable research. This research includes both individual primary studies and reviews of research areas and topics. The ‘map of reviews’ described in this report shows that there is a substantial body of review-level evidence. However, the reviews varied widely in quality. Although 32 of the 54 reviews that were found used a systematic approach, 22 (41%) did not.

Authors used a wide range of terms and concepts to identify the ‘social and environmental’ field. Some reviews defined it as all ‘population-based’ interventions: that is, all which are not primarily targeted at the individual level or at particular high-risk groups. Some reviews specifically sought interventions which combined individual-level and social or environmental components. A useful distinction made by several reviews was that between ‘midstream’ and ‘upstream’, or ‘local’ and ‘structural’ interventions: that is, between interventions limited to a particular setting (such as a school), and those which address broader determinants of behaviour, such as policy or the physical environment in the community.

Research and policy implications

Research priorities identified by review authors included improving the design of effectiveness evaluations and, particularly, using study designs which include a control group for evaluating policy; including cost-effectiveness analysis and improving measures for other outcomes; measuring impact for population subgroups; investigating impact on health inequalities; conducting and integrating qualitative research; and developing a common framework.

The overview of the 54 reviews identified some obvious gaps. Relatively little review-level evidence is available on the impact of social and environmental interventions for children and young people, particularly younger children (under age 11). Most reviews considered research relating to whole populations. Reviews contained limited evidence from robust prospective study designs relating to large-scale macro-level interventions, such as policy change, taxation, or changes to the built environment. There were few systematic reviews of community-based programmes which primarily targeted obesity and measured a range of outcomes. There was very limited data relevant to health inequalities or to the cost-effectiveness of interventions. It was not always clear how review authors conceptualised ‘social and environmental’ or how the concept was operationalised in the review. Future research priorities include the following:

- reviews focusing on the impact of interventions on children and young people
- reviews focusing on ‘structural’ or ‘macro’ interventions, such as policy interventions or changes to the built environment
- reviews integrating data from intervention studies and the findings of qualitative research and correlational studies
- new systematic reviews of community-based programmes for obesity, healthy eating, and physical activity, especially for a UK population
- reviews examining the effectiveness of interventions in reducing health inequalities and improving the health of disadvantaged groups
- a clearly defined theoretical framework for obesity-relevant research, developed through consensus
- policies for addressing the problem of childhood obesity taking account of the considerable review-level evidence about the effectiveness of different social and environmental approaches

CHAPTER ONE

Background

1.1 Aims and rationale

This report describes a review about of what is known from existing research reviews about social and environmental interventions to reduce obesity and overweight among children and young people. It is part of a programme of work in this area conducted by the Health Promotion and Public Health team at the EPPI-Centre. A parallel report describes large-scale and local schemes to promote healthy weight among obese and overweight children in England (Aicken et al. 2008). These two reports will be followed by a review of qualitative research on children's understanding of obesity and overweight (Rees et al. 2008).

Both internationally and in the UK, there is widespread concern about rising rates of obesity and overweight, and the consequences of this for individuals, population health and for the wider society. There is increasing interest from both policymakers and researchers in the social and environmental determinants of obesity. These determinants include the physical environment, social values, technology and the economy. However, this interest is not yet matched by a robust evidence base on the effectiveness of social and environmental interventions. The aim of the work described in this report is to locate and describe existing review-level evidence on the effectiveness of social and environmental interventions for the prevention or reduction of obesity and overweight. The focus of the work is on evidence relating to children and young people. It is a 'systematic map of reviews', rather than of primary studies. The report brings together wide-ranging research from health, transport, physical activity and food policy to create a systematic map for use by policymakers in assessing what is known from existing reviews about interventions for children and young people which address the social and environmental determinants of obesity and overweight.

1.2 Definitional and conceptual issues

1.2.1 *Measuring obesity and overweight*

The most commonly used measurement of healthy weight for adults is the body mass index (BMI) which uses height and weight (kg/m²) to determine weight status (Lobstein and Jackson Leach 2007, World Health Organization 2000). Although BMI is straightforward to measure, its limitations are widely acknowledged: there are more accurate measures both of 'fatness' and of an individual's risk of obesity-related disease. For example, indices of body fat distribution, such as waist-to-height ratio, are likely to indicate risk of metabolic disorders and cardiovascular disease more accurately than BMI measures (Maffeis et al. 2008). An additional problem is that BMI or other measures may be based on self-reported height and weight information, which is not always accurate and tends to underestimate obesity and overweight (Lobstein and Jackson Leach 2007).

For children, growth and the onset of puberty complicate standardised measurements, such as BMI. Obesity and overweight in children are therefore usually measured using age- and gender-specific cut-off points for BMI, such as those developed by the International Obesity Task Force (IOTF) in 2000 (Cole et al. 2000).

1.2.2 Social and environmental determinants of obesity and overweight

There are both individual and population level determinants of obesity and overweight, and, at an individual level, the interactions between physiological and behavioural factors are complex. Obesity exhibits both genetic and familial associations, which suggests an element of individual susceptibility to weight gain. However, the recent population shift in many countries towards increased BMI is likely to be primarily attributable to environmental or behavioural changes, rather than genetic or metabolic factors (Butland et al. 2007, Prentice and Jebb 1995).

Researchers have recently constructed ‘system maps’ to describe the complex and multi-levelled pathways which influence body weight. The most ambitious of such models have sought to integrate biological and genetic factors, individual behaviour, and influences from individuals’ social and physical surroundings to provide a complete picture of the ‘obesogenic environment’ (Butland et al. 2007, Swinburn and Egger 2004, Swinburn et al. 1999).

The UK Government’s Foresight team recently published a report (2007) which describes obesity as ‘the consequence of interplay between a wide variety of variables and determinants related to individual biology, eating behaviours and physical activity, set within a social, cultural and environmental landscape’ (Butland et al. 2007, p 79). The framework in the report models the relationship between individuals’ choices and the built environment (all man-made structures in our environment such as roads, pavements, buildings, sports facilities, parks, escalators/stairs etc) , social norms, industry and economics. Although the Foresight report categorises the components of the obesogenic environment differently from earlier conceptual research, essentially the frameworks identify the same diverse and complex range of societal, environmental, economic and personal factors (Butland et al. 2007, Kumanyika et al. 2002, Swinburn et al. 1999). It is likely that children and young people’s needs differ from those of the general population, and the causal pathways of obesity-relevant behaviours may also be different: for example, family-related factors are likely to influence dietary and physical activity behaviours and leisure-time activities in children and young people differently from adults. The Foresight group’s main report provides a version of their model adapted for children which gives an indication of important factors (Butland et al. 2007, map 34). However, little is known about how such differences may impact on the effectiveness of general-population interventions for children and young people.

Ecological models have also been used to conceptualise the domains of causal factors relevant to childhood obesity. Such models conceive of the determinants of obesity as a series of levels ranging from the proximate level of individual physiology and behaviour, to the family and the community, and to the wider society and environment (Davison and Birch 2001, Hawkins and Law 2006). These models are useful in providing a broad categorisation of causal factors.

An important point to note about all these frameworks is that they include many factors which have traditionally been seen as outside the health arena, including policy and legislation, the built environment, transport, the media and the economy.

1.2.3 Obesity-relevant outcomes

The question of how best to measure the prevalence of obesity and overweight has been mentioned earlier.

When the amount of energy acquired through eating is greater than the amount of energy used, people gain weight (Butland et al. 2007, Swinburn and Egger 2004). Hence, any variable which affects the balance between energy acquired and energy expended is potentially relevant to obesity and overweight. Such variables include:

- physiological variables (e.g. adiposity, aerobic capacity, blood pressure)
- changes in dietary or physical activity behaviour (e.g. walking to work)
- mediating behavioural, economic and neighbourhood variables where these lead to behavioural change at an individual level (e.g. price of food, access to physical activity facilities)
- knowledge, perceptions or attitudes relating to obesity-relevant factors where these lead to changes in individual behaviour or policy (e.g. (perceived) safety of cycling and walking)
- factors relating to availability or access (e.g. availability of healthy foods, access to green spaces or sports facilities)

Even taking account of these multiple factors, the relevant causal pathways may be hard to substantiate empirically at a population level. For example, a systematic review of risk factors for childhood overweight found inconclusive evidence for a significant relationship between physical activity and overweight in young children, and no evidence of association between parental perceptions of neighbourhoods, proximity to fast food outlets or playgrounds, and child overweight (Hawkins and Law 2006).

Relatively small changes in dietary or physical activity behaviour cannot be expected to have a short-term measurable impact on weight. In addition, it is difficult to calculate the potential weight-loss benefits of certain activities since (a) the calorie deficit needed varies between individuals according to gender, weight and other physiological factors (Hall 2008), and (b) isolated changes in energy intake or expenditure may have limited impact on overall energy balance due to 'compensatory' behaviours, such as increased consumption of energy-dense food following increased activity (Butland et al. 2007, Hall 2008).

Obesity is part of an interlinked complex of issues, and factors addressed by obesity prevention efforts, such as increased physical activity and healthy eating, may also reduce the risk of a number of chronic diseases (Cavill et al. 2006, Warburton et al. 2006). Such changes may also have positive effects at a broader social level: for example, an increase in active transport, if it leads to a modal shift away from car use, may bring benefits in terms of sustainability and reduced local pollution (Davis et al. 2007). On the other hand, there are also potential harms of increased sport, such as injury and accidents. Hence, outcomes relevant to obesity include a diverse range of factors related to the wider public health.

1.3 Policy and practice background

1.3.1 Increasing prevalence of obesity and overweight

Obesity and overweight were identified as serious threats to global public health by the World Health Organization (WHO) in 1997 (Butland et al. 2007, World Health Organization 2000, World Health Organization 2002). Adult obesity in most industrialised nations has more than doubled over the last 25 years, with the most dramatic increases occurring recently (Butland et al. 2007). The increase in childhood obesity predicts even higher rates of adult obesity in the future, and is accompanied by significant child health problems (Lobstein and Jackson Leach 2006). Some researchers question the urgency of the problem and argue that the characterisation of obesity as an 'epidemic' has elements of a 'moral panic' (Campos et al. 2005). However, all agree that the populations of industrialised nations are heavier than they were 50 years ago. Obesity is unequally distributed both between and within countries. In richer countries, the socially disadvantaged are most likely to be overweight, whereas in poorer countries the reverse is true (Friel et al. 2007).

In 2003, almost one-quarter of men (22%) and women (23%) in England were classified as obese (BMI >30) and a further 43% of men and 33% of women were classified as overweight (BMI 25-30) (Zaninotto et al. 2006). In 2002, approximately one-quarter of English primary-school-aged children were classified as overweight (21% of boys and 29% of girls) and between 6% (boys) and 8% (girls) were obese (Lobstein and Jackson Leach 2006).

1.3.2 Consequences of obesity and overweight

The negative consequences of obesity and overweight occur at both the individual and population levels. Overweight and obesity pose a major risk for chronic diseases (Butland et al. 2007, World Health Organization 2002), and some reports suggest an elevated risk for some diseases even at low levels of overweight (Butland et al. 2007). The WHO estimates that, without action, there may be a one-third increase in the loss of healthy life internationally as a result of overweight and obesity in 2020 compared with 2000 (World Health Organization 2002). The financial costs to health care systems and to the economy of obesity and overweight are also huge (Butland et al. 2007).

1.3.3 Policy background

In 2002, the World Health Organisation advised the governments of middle- and high-income countries to ‘urgently consider’ the steps necessary to manage the risks posed by non-communicable health threats such as obesity. In 2004, the UK government identified obesity as a policy priority and set targets to halt the year-on-year rise in childhood obesity by 2010 (HM Treasury 2004). In 2008, the government extended its target to reduce levels of childhood obesity to those of 2000 in the next 12 years (by 2020) (Cross-Government Obesity Unit et al. 2008, HM Treasury 2007).

These goals are part of a vision which outlines a sustained response to obesity (Butland et al. 2007, Cross-Government Obesity Unit et al. 2008). ‘Healthy weight’ is being promoted as part of a generally healthy lifestyle that seeks to reduce morbidity and mortality across the population, and envisages multiple benefits from cross-sector policies, such as those to reduce traffic and car use (Butland et al. 2007, Cross-Government Obesity Unit et al. 2008, Thommen Dombois et al. 2006). The holistic approach has been applied to schools, with encouragement of ‘health promoting schools’ and government initiatives, such as free fruit and vegetables for the under-fives, policies on healthy lunch boxes and school dinners, and increases in physical activity in the curriculum. The government is also working with the food and advertising industries to develop policies regarding food labelling and the advertising of unhealthy foods to children (Cross-Government Obesity Unit et al. 2008). The broad, cross-cutting aims in tackling obesity and obesity-relevant behaviours are reflected in policies across a number of European countries (Davis et al. 2007).

1.3.4 Practice

In March 2008, the UK government published guidance for local areas on tackling obesity and achieving healthy weight (Cross-Government Obesity Unit et al. 2008). The guidance is aimed at leaders within primary care trusts (PCTs) and local authorities (LAs) and frontline staff such as health visitors, planners, teachers and general practitioners (GPs). It sets out suggestions for how local partners can develop their own plans, set local goals, choose interventions and ensure evaluation. The guidance highlights public policy priorities, such as climate change, that may share goals with healthy weight. It encourages a multi-agency approach. Local agencies are encouraged to focus on the whole family; to adopt an early identification and intervention approach to children at high risk of unhealthy weight; and to use a broad range of targeted, population-level and structural interventions for healthy eating and physical activity to address the issue of obesity.

In 2006, the National Institute for Health and Clinical Excellence (NICE) published guidelines on the prevention, identification, assessment and management of overweight and obesity in adults and children. These guidelines contain specific recommendations for the public, the NHS, local authorities and partners in the community, which can be put into practice in early-years settings, schools, workplaces, and self-help, commercial and community programmes. The types of factors and interventions covered range from individual-level to environmental and structural (NICE Public Health Collaborating Centre 2006a).

NICE has also published related guidelines with recommendations about how to create environments which encourage physical activity, and active transport (NICE 2006, NICE 2008). This guidance is targeted at a range of practitioners and professionals who have a direct or indirect responsibility for the built or natural environment and/or transport, including those working in local authorities and the education, community, voluntary and private sectors. The recommendations cover areas such as the use of urban spaces and planning, transport and road building, building design and schools (NICE 2008). The guidelines on physical activity and the environment are based on five separate evidence reviews (NICE Public Health Collaborating Centre 2006b, NICE Public Health Collaborating Centre 2006c, NICE Public Health Collaborating Centre 2006d, NICE Public Health Collaborating Centre 2006e, NICE Public Health Collaborating Centre 2007). The transport guidelines are based on a map of reviews, which was conducted specifically for this purpose (NICE 2006), and which are described later in this map of reviews.

1.4 Research background

International and UK policymakers have recognised that all public health issues, including those involving complex social and environmental determinants, need policies which are based on sound evidence. There are particular challenges to this goal in the area of social and environmental interventions intended to address obesity and overweight that have not yet been resolved.

Reviews of the evidence

Several high-profile systematic reviews on obesity and overweight in the UK have been conducted since 2003. As noted earlier, NICE conducted an evidence briefing for its guidelines on obesity and overweight using review level evidence (NICE Public Health Collaborating Centre 2003). Summerbell et al. conducted two separate Cochrane reviews of primary studies investigating the prevention and treatment of obesity and overweight in children (NICE Public Health Collaborating Centre 2003, Summerbell et al. 2003, Summerbell et al. 2005). All three reviews focus on lifestyle and behavioural interventions to prevent and treat obesity and overweight, rather than on social and environmental interventions.

There have also been several recent evidence reviews aiming to collate the diverse primary evidence on social and environmental aspects of obesity, overweight and obesity-relevant behaviours. The Foresight report is based on a series of evidence reviews which investigate the 'obesogenic environment', 'lifestyle changes' and 'international comparisons of obesity trends and determinants' (Butland et al. 2007). This report adopts the methodologically diverse approach suggested by the World Health Organization and includes quantitative correlation and effectiveness data, views from children, young people and the food industry, and conceptual work. The Foresight review, together with the linked report on 'obesogenic environments' (Jones et al. 2007), is one of those commented on later in the report.

As noted earlier, in 2006, NICE published six relevant systematic reviews (or evidence briefings) for two guidelines. The reviews include, but do not focus exclusively on, children and young people (NICE Public Health Collaborating Centre 2006b, NICE Public Health Collaborating Centre 2006c, NICE Public Health Collaborating Centre 2006d, NICE Public Health Collaborating Centre 2006e, NICE Public Health Collaborating Centre 2007). One review is a review of secondary (review-level) evidence (NICE 2006). Relevant existing reviews also include four previous EPPI-Centre health promotion and public health systematic reviews relating to children and healthy eating (Thomas et al. 2003), children and physical activity (Brunton et al. 2003), young people and healthy eating (Shepherd et al. 2001) and young people and physical activity (Rees et al. 2001).

There are many reviews which focus on or include 'social and environmental' type interventions for obesity, overweight, physical activity or eating behaviours. It is also clear that there is much variation in topic focus, scope, outcomes measured, and methodological quality of reviews in this broad field, which may lead to confusion for policymakers. This systematic map of reviews aims to provide a 'map' of the review-level evidence by systematically locating, characterising and quality appraising reviews across the field. It is anticipated that policymakers, funders and researchers will be able to use the map as a guide to the mass of available evidence when planning policies and designing or appraising research proposals.

CHAPTER TWO

Research questions and methods

2.1 Research questions

The research questions driving the systematic map described in this report are as follows:

- What are the methodological characteristics and scope of reviews which have been conducted on ‘social and environmental’ interventions for reducing or preventing obesity and obesity-relevant behaviours?
- What types of interventions are evaluated and which outcomes do the reviews measure?
- What is the focus of each review and how reliable might the findings be?
- How have researchers conceptualised and defined ‘social and environmental’ interventions?
- What does this work suggest in the way of future research priorities?

2.2 Identifying and describing relevant reviews

2.2.1 Inclusion and exclusion criteria

The authors have included reviews measuring ‘obesity-relevant outcomes’, which were defined as any measure of weight (or weight loss or gain), any measure of dietary or physical activity behaviour, or any mediating outcome which affected or might affect levels of physical activity (or sedentary behaviour) and/or the type and amount of food consumed. Mediating outcomes included self-reported intentions, knowledge and attitudes relating to diet or physical activity, and intermediate behavioural variables, such as foods purchased. Reviews could be either systematic or non-systematic.

A two-stage process was used to find relevant reviews. First, the literature was searched and one of two reviewers (JW and TL) applied six basic inclusion criteria to all titles and abstracts. These criteria are outlined below.

1. *The reviews investigated at least one ‘obesity relevant’ topic, defined as:*

- eating
- physical activity
- sedentary behaviour
- obesity/overweight

Reviews were excluded if they focused on under-eating, malnutrition, intake of a specific micro-nutrient (such as calcium) or eating disorders, such as anorexia or bulimia. Reviews were also excluded if they investigated only the impact of obesity or obesity-relevant behaviours (i.e. those measuring the health consequences of obesity, or non-obesity-related consequences of dietary or physical activity behaviours); the prevalence of obesity or of obesity-relevant outcomes; ways of measuring and/or defining obesity or obesity-relevant behaviours; or service configuration and/or delivery.

2. The reviews reviewed research data.

The authors took a broad approach to the concept of a 'review' and included any which investigated published or unpublished evidence (whether they were systematic or non-systematic). Opinion pieces, position statements, or reviews of policy and/or practice (rather than research evidence) were excluded.

3. The reviews focused on interventions in Organisation for Economic Co-operation and Development (OECD) countries.

4. The reviews did not exclude children and young people aged 4 to 18 years.

Reviews were included which focused on children and young people between the ages of 4 years and 18 years, or which covered the whole population, so long as these included children and young people.

5. The reviews had a 'social and environmental' element.

The authors included all reviews which addressed social and environmental determinants or interventions in some way, regardless of the main focus of the review, or the quantity of data on social and environmental determinants or interventions were reported. 'Social and environmental' was defined as those factors (or interventions seeking to impact primarily on those factors) included in the four thematic clusters of the Foresight framework (Butland et al. 2007): food production, food consumption, social psychology, and physical activity environment.

6. The reviews were published during or after 1996.

1996 was chosen as a cut-off point for the included studies as this year represents the point at which public health organisations started officially labelling obesity as a 'serious threat' to public health. It also marks the dramatic rise in childhood obesity rates in England, as reported in the Foresight report (WHO 1997, Lobstein and Leach 2007, p 4).

When an abstract met these six criteria, or when there was insufficient information in the abstract to tell if it did or not, the full text of the report was retrieved. The following additional three criteria were applied to all full text reviews in order for them to be included in the map:

7. The reviews were published in the English language.

8. The reviews reviewed the effectiveness of interventions or the impact of a social and environmental change.

The authors included reviews of studies using prospective designs which evaluated the impact of formal interventions or non-formal changes in the environment (randomised controlled trials, non-randomised controlled trials, and one-group pre-post). Also included were reviews of reviews of studies using such designs. The authors included reviews which contained both data about effectiveness of interventions and correlation data, but they only reported effectiveness data.

9. The reviews focused on interventions which sought to impact on 'social and environmental' factors.

The authors excluded reviews which did not aim primarily to evaluate interventions falling within the scope of 'social and environmental', as described above (criteria 5). Although reviews had to have some social and environmental element to be included on criterion 5, many which were

included on criterion 5 did not primarily evaluate interventions aiming at social or environmental change. Most of these were reviews of school-based interventions which primarily focused on health promotion classes but which made minimal changes to the school environment. The authors included school-based interventions which aimed to change the school environment or ethos. They did not include reviews of interventions which consisted only of education or prescribed exercise, in schools or other environments.

2.2.2 Identification of potential studies: search strategy

The following sources were searched: 21 electronic databases from the fields of health, social science, physical activity and transport; 17 websites (16 topic-relevant and Google Scholar). The authors also conducted non-systematic citation-chasing and asked experts to identify reviews.

Bibliographic databases

- ASSIA (Applied Social Science Index and Abstracts (ASSIA))
- Arts and Humanities Citation Index
- Campbell Collaboration Library (C2 RIPE)
- Cumulative Index to Nursing and Allied Health(CINAHL) database
- Cochrane Library
(<http://www3.interscience.wiley.com/cgi-bin/mrwhome/106568753/HOME?CRETRY=1&SRETRY=0>)
- Database of Abstracts of Reviews of Effects (DARE)
(www.york.ac.uk/inst/crd/crddatabases.htm)
- Database of Promoting Health Effectiveness Reviews (DoPHER)
(<http://eppi.ioe.ac.uk/webdatabases/Intro.aspx?ID=2>)
- Education Resources Information Centre (ERIC)
- Health Technology Assessment (HTA) database
- ISI Science and Technology Proceedings
- Physical Education Index
- PsycInfo
- PubMed
- Science Citation Index
- Social Care Online
- Social Policy and Practice
- Social Science Citation Index
- Social Services Abstracts
- Sociological Abstracts
- SPORTSDiscus
- TRANSPORT (includes TRANSDOC, TRIS, IRRD, NTIS)
- ZETOC (British Library Table of Contents)

Websites

- Aberdeen Centre for Energy Regulation and Obesity (ACERO - Robert Gordon University) (www.rgu.ac.uk/acero/publications/)
- Association for the Study of Obesity (www.aso.org.uk)
- Children's Activities, Perceptions And Behaviour in the Local Environment (CAPABLE) at University College London (www.casa.ucl.ac.uk/capableproject/about.html)
- Centers for Obesity Research and Education (CORE) (www.uchsc.edu/core/)
- Eastern Region Public Health Observatory (www.erpho.org.uk/default.aspx)
- Economic and Social Research Council (ESRC) Society Today (www.esrcsocietytoday.ac.uk)
- Google Scholar (<http://scholar.google.co.uk/>)
- International Obesity Task Force (<http://www.ietf.org/>)
- International Physical Activity and the Environment Network (www.ipenproject.org/index.htm)
- International Life Sciences Institute (ILSI): obesity section (www.ilsina.org/science/obesity.htm)
- National Institute of Environmental Health Sciences (www.niehs.nih.gov)
- Merck Frosst / CIHR (Canadian Institute of health Research) Chair in Obesity (<http://obesity.ulaval.ca/resources/ressources.php?strcible=P>)
- Open Space Research Centre, Edinburgh (www.openspace.eca.ac.uk)
- The International Association for the Study of Obesity (IASO) (www.iaso.org/)
- Resource for Urban Design Information (RUDI) (www.2.rudi.net/)
- Sport, physical activity and eating behaviour: environmental determinants in young people (SPEEDY) at the MRC Epidemiology Unit Cambridge, University of East Anglia (www.preventivemedicine.nrp.org.uk/cms.php?categoryid=41#cassidy)
- US Center for Disease Control and Prevention: Publications 2004- 2005 (www.cdc.gov/nccdphp/dnpp/publications/manuscripts/index.htm#overweight)

All concepts were searched for in databases as thesaurus terms and, where possible, as free-text terms in the title and abstract. The search strategy was developed by adapting thesaurus terms, index terms and keywords from four key articles (Foster and Hillsdon 2004, Heath et al. 2006, Ogilvie et al. 2004, van Sluijs et al. 2007). Search strategies were also adapted from two previous EPPI-Centre reviews, one on active transport, and one on young people and healthy eating and physical activity (Brunton et al. 2003, Shepherd et al. 2001), and from two recent reviews on active transport (Ogilvie et al. 2004, Ogilvie et al. 2007).

An example of one strategy can be found in Appendix 1. An account of the search strategies used for all 21 databases and 17 websites is available on our website, <http://eppi.ioe.ac.uk/cms/Default.aspx?tabid=2395>.

Direct requests to key informants

Lastly, the authors contacted key professionals working in the field of evidence-based policy and research via the Evidence Network's Associates Newsletter (<http://www.evidencenetwork.org>) and requested any unpublished reviews or other potentially relevant evidence. The newsletter is circulated electronically to over 1,350 associates, comprising a mixture of academics, and staff from central and local government, consultancies and research institutes, charities and the voluntary sector from about 28 countries.

2.2.3 Characterising the reviews in the systematic map

The relevant reviews that fitted the inclusion criteria were coded, using an EPPI-Centre review-specific keywording tool (see Appendix 2). Coding of each review was conducted by the same two reviewers who worked independently and then compared decisions before reaching a consensus. The quality of the reviews was assessed using eight questions about the quality of the review which were adapted from criteria used by Database of Abstracts of Reviews of Effects (DARE), Database of Promoting Health Effectiveness Reviews (DoPHER) and the 'seven stages of a systematic review' by Pettigrew and Roberts (2006). Reviews were classified as either 'systematic' or 'non-systematic'. 'Systematic' reviews met three criteria: reporting a clear research question; reporting adequate details of search (sources and strategies); and had clearly defined (and reported) inclusion criteria. The authors did not take into account the exhaustiveness of the searching, appropriateness of the inclusion criteria or nature of critical appraisal. They only extracted data on research priorities from reviews that were classified as systematic.

In order to describe and classify the reviews, a coding framework, based on the content of the reviews themselves, was developed. This framework related to 'clusters' of research activity around modes of intervention and research activity.

An attempt was made to code each review, according to the relevant social and environmental thematic clusters from the UK Foresight report (Butland et al. 2007). In the Foresight report, seven thematic clusters are used to group determinants of the core energy-balance: social psychology, food production, food consumption, physical activity environment, individual psychology, individual physical activity and physiology. Four of these seven clusters to be focused on 'social and environmental' determinants of obesity and weight were judged to be social psychology, food production, food consumption and physical activity environment.

CHAPTER THREE

Results

3.1 Included reviews

Our searches identified a total of 6,197 records. Figure 3.1 describes how these records were sifted to identify those relevant to the research questions. After removing 697 duplicate references, 5,500 records were screened on the basis of title and abstract (where abstracts were available). Most of these (N=5,167, 94%) did not meet the inclusion criteria and so were excluded from the map.

The remaining 333 records were then retrieved and screened for inclusion again on the basis of the full report. A further 272 were excluded.

Of the 5,439 records excluded, the highest proportion were excluded because their main focus was not reducing or preventing obesity, promoting physical activity, reducing sedentary behaviour, or promoting healthy eating (N=4,372, 85% of all those excluded). A further 318 records were not reviews of research (for example, they described primary studies or gave an overview of policy) and 273 records were excluded because they did not have any social or environmental component (for example, they described only individual-level determinants of or interventions for obesity).

The main reason for excluding reviews on the basis of full reports was that these did not address the effectiveness of interventions or assess the impact of an environmental or social change (N=100, 37% of the 272 excluded at this stage).

We were left with 61 reports to include in our research map. Seven of these were found to be linked to other studies (that is, both reports were of the same review), so the final total was 54 reviews. See Appendix 3 for details of linked reviews.

3.2 Characteristics of included reviews

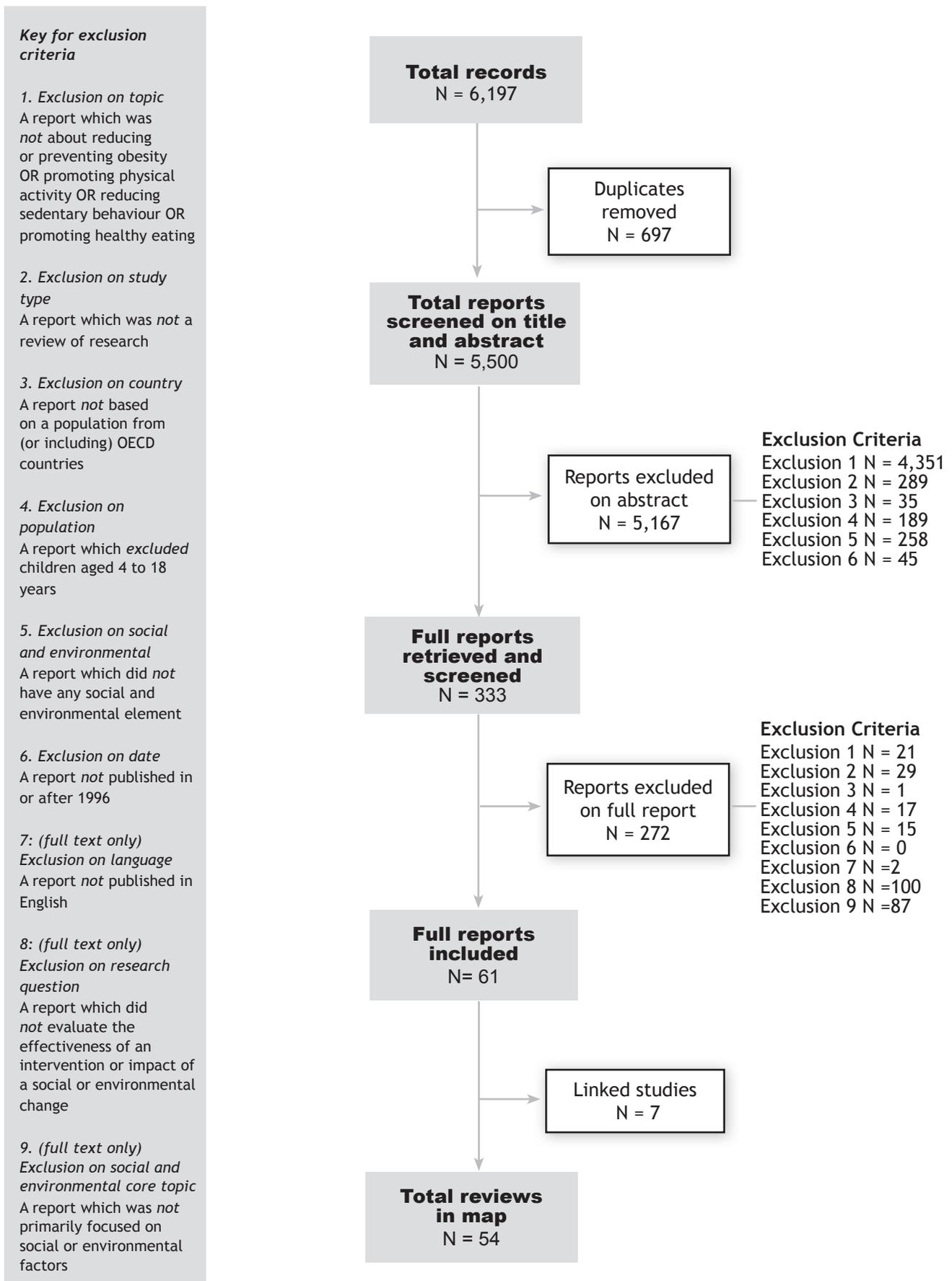
3.2.1 Bibliographic details

Date

Most of the 54 reviews were published towards the end of the period covered (1996-2007), with over half the reviews (N=28) published in 2004 or later.

Country of reviews

Over half the reviews (N=27) were conducted by research teams based in the USA. Thirteen studies were conducted in the UK. The remaining teams were based in Australia, Canada, Finland, the Netherlands, New Zealand and South Africa.

Figure 3.1 Flow of literature through the map

3.2.2 Review methodology and quality assessment

In this section we describe the methods used by the included reviews, and use these descriptions as quality markers to distinguish between higher- and lower-quality reviews.

Aim and research question

Most reviews (N=51, 94%) clearly described their objective and/or research question.

Searching

A lower proportion (N=34, 63%) clearly reported the methods used to locate studies for inclusion. Most of these (N=28, 52%) listed at least some of the search terms and strategies used. Twenty reviews gave no information on searching.

Databases searched

Table 3.1 shows the frequency with which different databases were searched by those reviews which reported the relevant information. We have included data on databases searched by more than 1 included review. Most reviews searched databases covering a range of topic areas. The most commonly searched databases were Medline (N=29, 88% of those providing search information), followed by PsycInfo (N=20, 59%) and Embase (N=13, 39%).

Inclusion criteria

Thirty-two reviews (59%) clearly stated their inclusion criteria; in 22 the inclusion criteria were unclear or not stated.

Quality assessment of included studies

Fifteen reviews (28%) carried out some form of quality assessment of the included studies; 39 did not state that any quality assessment was carried out.

Data extraction methods

Fourteen reviews (26%) clearly described the procedures used to extract data from the included studies; 40 did not describe any such procedures.

Quality assurance measures

Eighteen reviews (33%) stated that researchers had used some form of quality assurance measure, for example, screening and/or data extraction were carried out by two reviewers independently. Thirty-six described no such measures.

Evidence tables

Thirty-three reviews summarised the characteristics of the included studies in an evidence table, or provided relevant information for comparing included studies in some other accessible form. Twenty-one did not include such a table.

Overall quality of the reviews

We used the above questions about aim, searching and inclusion criteria to construct an overall quality measure. Studies which reported information on all these three areas were classified as 'systematic reviews', with the others classified as 'non-systematic'. Thirty-two studies were systematic reviews by this criterion, and 22 non-systematic. Further details about the exact inclusion criteria employed by each systematic review can be found in Appendix 3. Because systematic reviews generally provide a more reliable guide to the evidence, we extracted more data from these than from the non-systematic reviews.

Table 3.1 Databases searched by reviews reporting search methods (N=33)

Database	N
Medline	29
PsychInfo	20
CINAHL	15
EMBASE	13
Cochrane Library / CENTRAL	12
ERIC	12
Web of Science / Science Citation Index / Social Science Citation Index	11
SportsDiscus	9
PubMed	8
HTA (UK)	6
PsychLit	6
Sociological Abstracts	7
BiblioMap	5
DARE	5
Dissertation Abstracts	5
HealthPromis	5
ASSIA	4
Agricola	3
Current Contents	3
GEOBASE	3
NHS EED	3
Transport	3
U.S. Department of Transportation	3
C2-SPECTR	2
Chronic Disease Prevention File	2
ECONLIT	2
Enviroline	2
HealthStar	2
PAIS (Public Affairs Information Service) International	2
REGARD	2
SciSearch	2
Social SciSearch	2
SocioFile	2
U.S. Department of Agriculture	2

3.2.3 Economic evaluations

Only two of the 32 systematic reviews reported any findings from economic evaluations of interventions or data relating to cost-effectiveness. Both these reviews found very few data on the economic impact of interventions.

3.2.4 Health inequalities

A number of systematic reviews discussed equality-related issues in general terms, and several observed that social and economic interventions are particularly promising for reducing health inequalities and reaching disadvantaged or excluded groups, because they are potentially available to the population as a whole (e.g. Marcus et al. 1998). However, Holdsworth and Haslam (1998) observe that labelling schemes in public eating places may be less likely to reach lower-socio-economic-position or less well-educated groups. Only one systematic review (Yancey et al. 2004) focussed on particular disadvantaged groups (ethnic minorities). Apart from this, five systematic reviews stated an explicit intention to locate data relevant to disadvantaged groups, or data on intervention outcomes in different subgroups of the population (Jackson et al. 2005b, Marcus et al. 1998, Rees et al. 2001, Shepherd et al. 2001, Wall et al. 2006).

3.3 Scope and focus of reviews

In this section we describe the scope and focus of all 54 reviews as a whole (systematic and non-systematic). There appears to have been a shift in the focus of included reviews over time. Reviews that we included and that were published before 2000 tend to focus on interventions delivered through the media or community heart health programmes. In contrast, review activity around active transport and financial incentives to reduce obesity seems to have started much more recently (see Appendix 3 for full details of the focus of each review, with dates).

3.3.1 Outcomes measured by the reviews

All the included reviews measured either physical activity, healthy eating or both as outcomes (see Table 3.2). Some reviews focussed on either or both of these as their primary outcome(s) of interest, while others focussed either on obesity-relevant behaviours in general, or on other outcomes such as reducing cardiovascular risk. It can be seen from Table 3.2 that the distribution of outcome was about the same in reviews classified here as systematic and non-systematic. Physical activity and healthy eating combined (N=20, 38%) and physical activity alone (N=19, 35%) were similarly common outcomes.

Table 3.2 Healthy eating and physical activity as outcomes in the systematic reviews (N=32) and the non-systematic reviews (N=22)

Outcome	Systematic reviews N	Non-systematic reviews N
Physical activity	12	6
Healthy eating	9	7
Both healthy eating and physical activity	11	9

3.3.2 Populations included in the reviews

Table 3.3 shows the age groups included in the reviews. Most reviews included populations across the age range. Only 12 focussed specifically on children and young people.

Table 3.3 Age groups included in systematic reviews (N=32) and in non-systematic reviews (N=22)

Age group	Systematic reviews N	Non-systematic reviews N
4-10 years only	0	0
11-16 years only	2	0
4-16 years	6	4
Whole population	24	18

3.3.3 Topic clusters

In order to describe and classify the included reviews, we identified seven clusters of research activity. This framework was designed during the analysis stage of the project. Four of these clusters are defined by specific types or modalities of intervention: mass media; financial incentives; point-of-sale information and availability; and active transport interventions. A further two are defined primarily by setting (community or school), and include interventions of multiple types (and generally include many multi-component interventions). Finally, the category of 'reviews containing interventions from more than one category' includes all reviews which were too broad to be included in any of the preceding categories. Table 3.4 shows the distribution of reviews across the seven research activity clusters.

Table 3.4 Distribution of included studies across the topic clusters

Topic cluster	N of included studies
Mass media	8
Financial incentives and pricing strategies	3
Point-of-sale information and availability	3
Active transport	3
School-based environmental change	6
Community-based programmes	16
Programmes covering >1 category	15
Total included studies	54

Most common were community-based programmes (N=16, 30%), followed by mass media (N=8, 15%) and school-based programmes (N=6, 11%). Fifteen of the reviews (28%) spanned a range of categories.

3.4 Reviews by topic cluster

In this section we describe the reviews by topic cluster. Within each cluster, we look at the characteristics of included reviews (the country in which the review team was based, whether the review focussed primarily on physical activity, healthy eating or both, whether they were systematic or non-systematic reviews, and, for systematic reviews only, how many studies using a prospective intervention design were included in each review). We also describe briefly the aims and research questions of the reviews, give an overall characterisation of the types of studies included in the reviews, and address questions of how review authors defined social and environmental interventions. For systematic reviews we also describe the key research priorities identified by review authors.

3.4.1 Mass media (N=8)

One well-defined cluster concerns reviews of interventions using the mass media such as print media, television, and the internet. While some reviews in other categories also utilised media campaigns (in particular, they were a frequently-used intervention modality in the community-based campaigns), reviews in this group are distinguished by focussing specifically on media campaigns.

Table 3.5 Mass media reviews (N=8)

Authors	Country	PA / HE	SR / non-SR	Included studies N
Cavill and Bauman (2004)	Australia	PA	SR	15
Cavill (1998)	UK	PA	non-SR	-
Finlay and Faulkner (2005)	Canada	PA	SR	17
Hastings et al. (2003)	UK	HE	SR	29
Marcus et al. (1998)	USA, Australia, UK	PA	SR	28
Marshall et al. (2004)	UK	PA	SR	34
Snyder (2007)	USA	HE	non-SR	-
Viswanath and Bond(2007)	USA	HE	non-SR	-

Some reviews focussed narrowly on mass media interventions, while others synthesised mass media approaches with interventions using print media or telephone-delivered counselling intended to bring about behaviour change at an individual level (Marcus et al. 1998, Marshall et al. 2004). Two reviews used a broader notion of ‘health communication’ (Snyder 2007, Viswanath and Bond 2007) which included certain types of educational strategies. One review focussed on any form of food promotion to children and includes data on commercial and social marketing of food. It included all forms of food promotion including advertising (mass media), the internet, packaging and labelling, branding, point-of-sale material, merchandising, film and TV tie-in characters and the commercial sponsorship of commercial material. However, in practice the vast majority of food promotion evaluated by this review were in the form of mass media, largely television. (Hastings et al. 2003)

Reviews in this group used a range of measures to look at intervention effectiveness, including recall of the campaign, knowledge and attitudes, as well as physical activity or dietary behaviour. One review (Viswanath and Bond 2007) aimed primarily to synthesise evidence on mediators of intervention effectiveness, such as socio-economic position and ethnicity. One (Finlay and Faulkner 2005) used insights from media studies to provide a critique of the assumptions embodied in interventions in this field, and argued for greater awareness of the active role in constructing meaning of ‘consumers’ of media messages.

On the whole, the reviews in this cluster did not conceptualise the interventions reviewed as ‘social and environmental’, and defined themselves primarily by the mode of intervention delivery or, as in one study, by the goal of the intervention (Hastings et al. 2003). In only one review did the authors explicitly argue that mass media campaigns represent an attempt to address obesity “at a societal and environmental level” by influencing social norms (Cavill and Bauman 2004, p772).

Two reviews made the point that mass media campaigns are useful because they can effect ‘population level’ change by reaching a large number of people relatively inexpensively, but did not explicitly describe the mechanisms of such change (for example, as aiming to change social values rather than individual beliefs and motivations) (Cavill 1998, Marcus et al. 1998). In addition, two reviews focussed on the effect of socio-environmental context (Finlay and Faulker 2005, Viswanath and Bond 2007).

A range of research priorities were identified by systematic reviews in this group. Two reviews reported a general need for more rigorous evaluation of a larger number of campaigns, and a need for process evaluations (Cavill and Bauman 2004, Marcus et al. 1998). The review which evaluated the impact of food promotion of children identified a need for research into the impact of mediums other than television (Hastings et al. 2003). Two studies reported the need for further understanding of what makes specific populations receptive (or not) to mass media messages and the socio-cultural factors that influence the interpretation (or distortion) of the message (Finlay and Faulkner 2005, Marcus et al. 1998). One argued for a greater use of qualitative research in answering such questions (Finlay and Faulkner 2005). One review argued for a greater investigation into the motives of commercial advertisers and the responses of audiences to these messages and how these can be harnessed to promote healthy eating (Hasting et al. 2003). The same review suggested that for future research to be most profitable, prospective designs should be used and the food industry and public health organizations should work together to achieve this.

3.4.2 Financial incentives and pricing strategies (N=3)

One small group of reviews focussed on modifying the economic determinants of obesity-related behaviours, through changes in the relative price of food items. While pricing changes were a feature of interventions included in other categories (including school environment and community-based programmes), only these reviews specifically focussed on financial interventions.

Table 3.6 Financial incentives and pricing strategy reviews (N=3)

Authors	Country	PA / HE	SR / non-SR	Included studies N
French (2004)	USA	HE	non-SR	-
Goodman and Anise (2006)	USA	HE	SR	20
Wall et al (2006)	New Zealand	HE	SR	4

The potential range of such interventions was widely defined, from changes to the prices of items in specific retail sites to large-scale structural changes based on taxes and/or subsidies. Some reviews in this group also considered the provision of incentives to individuals in the form of cash or vouchers.

Outcomes included physiological measures such as BMI and behavioural measures such as food consumption. One of the systematic reviews included only randomised controlled trials (RCTs) (Wall et al. 2006), while the other (Goodman and Anise 2006) included many different types of evidence and was correspondingly wider in scope.

Although the reviews in this category defined their scope primarily in terms of intervention type, two used ‘social and environmental’ concepts to provide an overall structure for their description of the evidence. Goodman and Anise (2006), while defining their overall scope as including any ‘economic instruments’, divided these into two. They focussed upon policy-related economic instruments (taxes, prices, subsidies) implemented by governments in nations or other “macroenvironments”, and local or site-specific economic instruments (prices, incentives, etc.) implemented in “micro-environments” such as schools, worksites, restaurants, cafeterias, and food markets. Wall and colleagues (2006) made a slightly different and less explicit distinction between “population-based” interventions which modify the environment by changing price structures, and “individually focussed” interventions such as cash or voucher payments. The third review described the impact of financial interventions in terms of environmental determinants of individual choice, but offered no clear definition of the term (French 2003).

Both systematic reviews in this group identified a need for prospective trials (rather than correlational data) of community or regional interventions (as distinct from site-specific interventions in schools or workplaces). Wall and colleagues (2006) also recommended the collection of data on subgroup outcomes and cost-effectiveness.

3.4.3 Point-of-sale information and availability (N=3)

Three reviews focussed on interventions to change the availability of food in local settings, or to alter its attractiveness to individuals through point-of-sale information and marketing. Such interventions were also included in a number of broader reviews in other categories. In particular, interventions in reviews in the ‘school environment’ category of our report, frequently included changes in the availability or price of food in schools.

Table 3.7 Point-of-sale information and availability reviews (N=3)

Authors	Country	PA / HE	SR / non-SR	Included studies N
Glanz and Hoelscher (2004)	USA	HE	non-SR	-
Holdsworth and Haslam (1998)	UK	HE	SR	20
Jago et al. (2007)	UK, USA	HE	SR	7

Two of these three reviews (Glanz and Hoelscher 2004, Holdsworth and Haslam 1998) focussed on public eating places, and one (Jago et al. 2007) on the home environment. One focussed on healthy eating behaviour in general (Holdsworth and Haslam 1998), and the other two specifically on fruit and vegetable consumption. One review (Holdsworth and Haslam 1998) adopted a narrow approach in terms of intervention type, with a focus on providing nutrition information in the form of point-of-choice labelling. One (Glanz and Hoelscher 2004) included a range of interventions: price reductions and changes to availability of selected foods by modifying menus, as well as point-of-choice information. Jago et al. (2007) focussed relatively less on evaluating the effectiveness of interventions, and more on understanding fruit and vegetable availability as a mediator of consumption. They synthesised a broad range of types of evidence; most of the interventions included in the review involved developing children’s ‘asking skills’ to increase the availability of fruit and vegetables at home.

Two of three reviews in this category defined their scope as ‘social and environmental’. The review by Jago and colleagues (2007) conceptualised changes in food availability as changes in the environment, defined as a particular geographical setting such as the home, school or work cafeteria (Jago et al. 2007). Glanz and Hoelscher defined their scope as follows: “environmental, policy, and pricing interventions for fruit and vegetables are those efforts that aim to improve the health of all people through better nutrition, not just small groups of motivated or high-risk individuals” (Glanz and Hoelscher 2004, p89). The third review stated that interventions in its scope (point-of-sale interventions) constitute a “modification to the environment”, but did not offer any further definitions (Holdsworth and Haslam 1998, p442).

Of the two systematic reviews in this group, one (Holdsworth and Haslam 1998) did not report any research priorities. The main research priority identified in the other review, which investigated the effect of availability on fruit and vegetable consumption, was for the evaluation of policy-level interventions in community settings. This review also reported a need for research using measures which take into account total consumption as this can further understanding of displaced consumption, and for research investigating the wider economic impact of fruit and vegetable policies (Jago et al. 2007).

One of these three active transport reviews (NICE 2006) was a review of reviews with a dual focus on promoting active transport and increasing the safety of active transport. One (Ogilvie et al. 2007) focussed on increasing walking, and the third (Ogilvie et al. 2004) on both walking and cycling. All these reviews covered a wide range of intervention types and components, including individual-level behaviour change programmes, mass media, community events, and changes to

Table 3.8 Point-of-sale information and availability reviews (N=3)

Authors	Country	PA / HE	SR / non-SR	Included studies N
NICE Public Health Collaborating Centre (NICE 2006)	UK	PA	SR	34
Ogilvie et al. (2004)	UK	PA	SR	22
Ogilvie et al. (2007)	UK	PA	SR	48

the physical environment such as the construction of walking or cycling paths. All the active transport reviews aimed primarily to evaluate the effectiveness of interventions, and used physical activity behaviour as the outcome measure.

Only one of these reviews framed its review question in ‘social and environmental’ terms (Ogilvie et al. 2004). This review of interventions to promote walking and cycling only included interventions which changed the ‘transport environment’, which was taken as synonymous with population-level interventions (interventions to promote behaviour change on an individual level were excluded).

The other two reviews included ‘upstream’ interventions (encompassing national, regional and local transport and land-use policies and schemes) or ‘population-level’ interventions alongside ‘downstream’ or individual-level interventions. However, the scope of these reviews was defined in terms of the desired outcome (active transport) rather than any social and environmental concept (NICE 2006, Ogilvie et al. 2007).

All three reviews reported that transport policy went beyond the evidence base and recommended that policies, which often represent large-scale natural experiments, be evaluated as they are implemented, using a prospective design and, where appropriate, a control group. As well as a move towards quasi-experimental evaluation design, the NICE review suggested that longitudinal data could be employed to estimate long term impacts and that the impact of altering separate environmental variables should be evaluated (NICE 2006). Two reviews (both by the same group of authors) highlighted the need for research which measures, and is adequately powered to detect, harms as well as benefits of interventions, such as the widening of social and health inequalities or accidents and injuries (Ogilvie et al. 2004, Ogilvie et al. 2007). The review by NICE also recommended that researchers build a common theoretical framework and develop understanding of what constitutes a ‘transport intervention’ (NICE 2006).

3.4.5 School-based environmental change (N=6)

Six reviews evaluated a range of multi-component interventions taking place in the school setting. These reviews examined the impact of making changes to the physical or social environment of schools. Some of the included interventions consisted of environmental change alone, while others also incorporated educational curricula and exercise or Physical Education (P.E.) programmes.

Table 3.9 School-based environmental change reviews (N=6)

Authors	Country	PA / HE	SR / non-SR	Included studies N
French and Stables (2003)	USA	HE	SR	13
French and Wechsler (2004)	USA	HE	non-SR	-
Jago and Baranowski (2004)	USA	PA	SR	9
Lister-Sharp et al. (1999)	UK	PA+HE	SR	12
Mukoma and Flisher (2004)	South Africa	PA+HE	SR	9
Wechsler (2000)	USA	PA+HE	non-SR	-

Most of the interventions included in these reviews comprised several different components. Intervention components included changes to the physical environment, educational curricula, exercise and PE programmes, staff development and training, changes to the structure of the school day, changes to the price and availability of food in school canteens, and in-school marketing. Several reviews stressed the role of social norms and of school rules and policies in the school environment, and focussed on interventions which targeted these factors. Two reviews focussed specifically on 'health-promoting school' programmes which aim to change the school ethos, and which include both environmental change and education (Lister-Sharp et al. 1999, Mukoma and Flisher 2004). One looked at 'noncurricular' interventions including active travel to school as well as interventions to promote physical activity in break times, after school or during the holidays (Jago and Baranowski 2004).

While the components of interventions described by reviews in this group overlap with those in other groups, they form a well-defined group by their focus on the school setting. In addition, several reviews classified here as 'reviews including programmes from more than one category' included substantial numbers of multi-component school-based interventions (Brug and van Lenthe 2005, Hider 2001, Rees et al. 2001, Shepherd et al. 2001), but did not focus exclusively on schools.

Five authors defined their review scope in terms of 'environmental' interventions (French and Wechsler 2004, French and Stables 2003, Lister-Sharp et al. 1999, Mukoma and Flisher 2004, Wechsler 2000). Two of these five, aimed to review 'holistic' or 'whole-school' interventions which included an environmental component (Lister-Sharp et al. 1999, Mukoma and Flisher 2004). Three of the reviews, which shared some authors, defined 'environmental interventions' as those which do not require individuals' active engagement, or which target factors external to the individual (French and Wechsler 2004, French and Stables 2003, Wechsler 2000). All five reviews operationalised their understanding of 'environmental interventions' similarly and included a similar range of interventions.

The remaining review in this category (Jago and Baranowski 2004) included many of the same intervention components as the five other reviews, but was confined to 'non-curricular' interventions and did not conceptualise the interventions as 'social and environmental'.

Of the four systematic reviews in this category, three identified research priorities that addressed the multi-component nature of the interventions. One study recommended that the environmental components of multi-component interventions be evaluated separately and that the different components be compared for effectiveness (French and Stables 2003). Similarly, the 'health promoting schools' review by Lister-Sharp and colleagues recommended that research studies should be more diverse in their approach, employing different methods for evaluating each part of an intervention where appropriate (Lister-Sharp et al. 1999). Mukoma and Flisher identified a need for the multidisciplinary evaluation of interventions (Mukoma and Flisher 2004).

Methods for evaluation were a second area of research priorities identified. The two 'health promoting schools' reviews recommended further research on valid measurements for the effectiveness of health promoting schools (Lister-Sharp et al. 1999, Mukoma and Flisher 2004). Review authors also recommended that research go beyond effectiveness to consider implementation issues such as feasibility, acceptability and cost (French and Stables 2003). One review particularly highlighted the need for both quantitative and qualitative research in order to investigate effectiveness and questions of feasibility and implementation (Mukoma and Flisher 2004). In addition, all four systematic reviews recommended that research should be more fully reported, particularly the process of implementing the intervention, and one encouraged researchers to report fully the theoretical framework behind the research (Mukoma and Flisher 2004).

3.4.6 Community-based programmes (N=16)

Sixteen reviews evaluated multi-component community-based projects. Similarly to the 'school environment' group, these interventions contained multiple components, but were distinguished by their focus on community settings.

Table 3.10 Community-based programme reviews (N=16)

Authors	Country	PA / HE	SR / non-SR	Included studies N
Desjardins and Schwartz (2007)	USA	PA+HE	non-SR	-
Dobbins (1996)	Canada	PA+HE	SR	33
Dobbins and Beyers (1999)	Canada	PA+HE	SR	13
Fogelholm and Lahti-Koski (2002)	Finland	PA+HE	SR	5
Jackson et al. (2005a)	Australia	PA	SR	-
Jackson et al. (2005b)	Australia	PA+HE	SR	-
King (1998)	USA	PA	non-SR	-
Murphy and Bauman (2007)	Australia	PA	SR	30
Parker and Assaf (2005)	USA	PA+HE	non-SR	-
Pate et al. (2000)	USA	PA+HE	non-SR	-
Sellers et al. (1997)	USA	PA+HE	SR	7
Sharpe (2003)	USA	PA	non-SR	-
Shilton and Brown (2004)	Australia	PA	non-SR	-
Simmons et al. (1997)	New Zealand	PA+HE	non-SR	-
Teufel-Shone (2006)	USA	PA+HE	non-SR	-
Yancey et al. (2004)	USA	PA+HE	SR	23

Interventions reviewed in these reports included a wide range of components, for example, group-based education, environmental or policy change, community mobilisation and development initiatives, access to services such as sports facilities, and mass media and point-of-sale marketing interventions.

This group of reviews can be sub-divided according to the outcome focus of the intervention. Five reviews looked at projects to reduce the risk of cardiovascular disease and increase heart health (Dobbins 1996, Dobbins and Beyers 1999, Fogelholm and Lahti-Koski 2002, Parker and Assaf 2005, Sellers et al. 1997), and one reviewed interventions to reduce the risk of diabetes (Simmons et al. 1997). These interventions generally focussed on educating individuals about risk factors and offering medical services such as screening, but used community mobilisation strategies in order to achieve these goals. In most cases they also included social and environmental components such as mass media campaigns or increased access to sports facilities. In addition, some of these reviews had an explicit focus on changing social norms and values. Most of the reviews in this sub-group used as outcomes physiological measures of risk, such as blood pressure and BMI, as well as behavioural variables such as physical activity behaviour and smoking. One (Fogelholm and Lahti-Koski 2002) specifically examined obesity-related outcomes of heart health programmes.

Seven reviews (only one of which was a systematic review) evaluated interventions to promote physical activity (King 1998, Sharpe 2003, Shilton and Brown 2004), promote healthy eating and physical activity (Pate et al. 2000), or reduce obesity (Desjardins and Schwartz 2007, Teufel-Shone 2006, Yancey et al. 2004) at the community level. Interventions included in these reviews comprised components such as: group-based activity promotion, e.g. walking groups; provision of facilities, e.g. swimming pools; marketing and mass media; education; policy changes, e.g. land-use regulations; competitions and other events. These interventions generally had less emphasis on biomedical-related components such as screening and clinician counselling than did the heart health interventions. Many review authors emphasised the important role of community development and consultation, and the involvement of multiple organisations and stakeholders. Three of the reviews focussed on ethnic minority populations (Shilton and Brown 2004, Teufel-Shone 2006, Yancey et al. 2004).

Three reviews looked more specifically at sport. Two reviews focussed on policy interventions implemented through sporting organisations (Jackson et al. 2005a, Jackson et al. 2005b), and one on mass sporting and physical activity events (Murphy and Bauman 2007). This latter review examined the impact of elite sporting events such as the Olympics, as well as population-based physical activity promotion events, on physical activity behaviour. The two reviews by Jackson and colleagues aimed to examine interventions to increase participation in sport and a broad range of interventions targeting behaviours including physical activity, healthy eating and smoking. Both reviews only included controlled evaluation designs and, despite extensive searching of electronic databases (N=19 in each review), neither review located any primary studies which met the authors' inclusion criteria. The authors concluded that this may have been due to limitations of their searches (employing a study design filter and no systematic internet searching), to publication bias or, most likely, to the fact that the only evidence currently available to answer these type of questions is located in uncontrolled case studies or in qualitative data on facilitators and barriers (Jackson et al. 2005b).

Of the reviews in this group, 13 gave explicit definitions of 'community' or 'community-based' interventions. This concept cuts across our notion of 'social and environmental' interventions', with community-based interventions most often defined as those targeting both individual-level and social and environmental determinants. King (1998, p54), for example, offered the following definition: "Community approaches often include these two levels of intervention [personal and interpersonal] in addition to approaches focused on organizational, environmental, institutional, and societal levels of analysis. While theories and perspectives for individual behaviour change tend to focus primarily on psychosocial and behavioural conceptualizations of change, the community approach additionally includes theoretical conceptualizations drawn from the fields of communications, systems and diffusion theory, as well as social marketing". Seven reviews used similar definitions of community interventions as simultaneously individual and social and environmental in nature (Dobbins 1996, King 1998, Parker and Assaf 2005, Pate et al. 2000, Sellers et al. 1997, Sharpe 2003, Yancey et al. 2004). Of these, one review defined 'community-based' interventions as those which emphasised structural and environmental changes, while also including individual-level components (Yancey et al. 2004).

Five reviews saw 'community involvement', including the involvement of community organisations and networks, as a key feature of community based interventions (Dobbins 1996, Dobbins and Beyers 1999, Parker and Assaf 2005, Teufel-Shone 2006, Yancey et al. 2004). One review defined its scope as interventions targeted at the whole population within a geographically defined area (Fogelholm and Lahti-Koski 2002). Another distinguished 'community-based' interventions from those targeting high risk groups (Simmons et al. 1997). The remaining studies did not give clear and explicit definitions of their scope.

Research priorities were suggested by five of the eight systematic reviews. Three reviews agreed that more rigorous research design and evaluation methods should be used (Dobbins 1996, Jackson et al. 2005a, Jackson et al. 2005b). One review highlighted the need for better measures of effectiveness for 'upstream' interventions which may have small or delayed effects (Yancey et al. 2004), and another recommended identifying a threshold for community participation likely to result in improved outcomes (Dobbins and Beyers 1999). Two studies suggested that differences in intervention implementation and effectiveness between different populations should be a focus of research, using the dimensions of place of residence (urban or rural) (Dobbins and Beyers 1999) and ethnicity and socioeconomic status (Yancey et al. 2004).

3.4.7 Reviews containing programmes in more than one category (N=15)

The remainder of the reviews did not fall into any clear single category, as they covered different intervention settings and types.

Table 3.11 Reviews containing programmes in more than one category (N=15)

Authors	Country	PA / HE	SR / non-SR	Included studies N
Brug and van Lenthe (2005)	Netherlands	PA+HE	SR	49
Faith et al. (2007)	USA	HE	SR	11
Glanz (1999)	USA	HE	non-SR	-
Hider (Hider 2001)	New Zealand	HE	SR	13
Jeffery and Utter (2003)	USA	PA+HE	non-SR	-
Jones et al. (2007)	UK	PA+HE	SR	6
Kahn et al. (2002)	USA	PA	SR	95
Marcus and Forsyth (1999)	USA	PA	non-SR	-
Matson-Koffman et al. (2005)	USA	PA+HE	SR	129
Orleans et al. (1999)	USA	PA+HE	non-SR	-
Rees et al. (2001)	UK	PA	SR	42
Sallis et al. (1998)	USA	PA	non-SR	-
Shepherd et al. (2001)	Uk	HE	SR	75
Swinburn and Egger (2002)	Australia	PA+HE	non-SR	-
Swinburn and Egger (2004)	Australia	HE	non-SR	-

The reviews in this category were, by definition, heterogeneous in nature. The non-systematic reviews offered very broad overviews of obesity prevention efforts across a wide range of interventions, settings, and types of evidence, from individual behaviour change to national policies. Some of these reviews used a more structured framework distinguishing individual from social and environmental determinants, or ‘downstream’ from ‘upstream’ interventions (Glanz 1999, Marcus and Forsyth 1999, Orleans et al. 1999). Most aimed to provide an overview of the field with illustrative examples, rather than synthesise a body of research evidence in a rigorous way.

Of the eight systematic reviews, one (Kahn et al. 2002) covered the whole range of interventions, and the remaining seven focussed more specifically on social, environmental or policy-level interventions. Rees and colleagues (2001) and Shepherd and colleagues (2001) included all levels of intervention in the mapping stages of the review, but focussed on interventions at the ‘community or society’ level for an in-depth review which provided a synthesis of studies.

While these reviews have in common a shared intention to evaluate interventions across a range of settings and levels, they varied in the kinds of interventions that were actually included. Table 3.12 shows the categories of interventions included in the eight systematic reviews. The rows relating to ‘classroom-based education/PE’, ‘family education/support’, ‘training health care professionals’ and ‘individual behaviour change’ refer to individual- or family-level factors which are not social or environmental in nature. The category ‘point-of-decision for PA’ in refers to visual prompts to encourage physical activity, usually stair use, and ‘neighbourhood physical environment’ refers to changes to the built environment such as cycle paths or sports facilities. Table 3.12 only presents data on those studies included in the reviews for which information about the intervention content could be extracted; in some cases this means numbers of total studies are lower than those presented in Table 3.11 (which refer to all included intervention studies).

The categories of interventions are presented (in Table 2.12) in order of decreasing frequency. The most frequent type of primary data included in the reviews is about school environmental change, financial incentives (etc) and community based or worksite programmes. There were comparatively few included studies evaluating mass media, training health care professionals or changes to the neighbourhood physical environment.

Table 3.12 Studies included in the systematic reviews containing programmes in more than one category (N=8 reviews)

	Brug and van Lenthe (2005)	Faith et al. (2007)	Hider (2001)	Jones et al. (2007)	Kahn et al. (2002)	Matson-Koffman et al (2005)	Rees et al. (2001)	Shepherd et al.(2001)	TOTAL (not unique studies)
School environmental change	19	0	7	0	0	39	4	7	76
Financial incentives / pricing / point-of-sale / availability	9	11	4	0	0	46	0	0	70
Community-based / worksite programmes	3	0	0	3	28	28	0	0	62
Classroom-based education / PE	9	0	0	0	30	0	0	0	39
Family education / support	9	0	0	0	11	0	0	0	20
Individual behaviour change	0	0	0	0	18	0	0	0	18
Point-of-decision for PA	0	0	0	0	5	7	0	0	12
Mass media	0	0	0	0	3	4	0	0	7
Training health care professionals	0	0	0	0	0	4	0	0	4
Neighbourhood physical environment	0	0	0	3	0	1	0	0	4
Total	49	11	11	6	95	129	4	7	312

The table is based on studies included in the reviews which used a prospective evaluation design and for which the reviews provided sufficient description to allow categorisation.

Several reviews searched for interventions aiming to impact on the wider determinants of obesity, such as the neighbourhood environment or policy and legislation, but found few or no studies; review authors frequently commented on the dearth of intervention data at this level. Four reviews (Brug and van Lenthe 2005, Faith et al. 2007, Jones et al. 2007, Kahn et al. 2002) adopted a mixed approach, drawing together data from intervention studies with data from studies using correlational or qualitative designs.

Thirteen of the 15 reviews in this category provided a definition of ‘social and environmental’ interventions (Brug and van Lenthe 2005, Faith et al. 2007, Glanz 1999, Hider 2001, Jeffery and Utter 2003, Jones et al. 2007, Marcus and Forsyth 1999, Matson-Koffman et al. 2005, Orleans et al. 1999, Rees et al. 2001, Sallis et al. 1998, Shepherd et al. 2001, Swinburn and Egger 2002).

Several reviews clarified their scope by offering sub-divisions or models of the ‘social and environmental’ sphere. Three reviews divided the whole field of potential interventions into ‘downstream’, ‘midstream’ and ‘upstream’ (Glanz and Hoelscher 2004, Marcus and Forsyth 1999, Orleans et al. 1999). Downstream interventions were defined as individual-level interventions for those at risk; midstream as interventions using social or community channels such as schools; and upstream as interventions which aim to change socio-political structures and norms. In the context of the current map, both ‘midstream’ and ‘upstream’ would count as ‘social and environmental’. Two reviews (Rees et al. 2001, Shepherd et al. 2001) defined their scope in terms of ‘community-level’ and ‘society-level’ interventions, concepts corresponding roughly to ‘midstream’ and ‘upstream’; similarly, two made a distinction in terms of intervention setting between ‘micro-environments’ and ‘macro-environments’ (Brug and van Lenthe 2005, Swinburn and Egger 2002). Three reviews used complex models of the determinants of obesity, two the ANGELO model (Brug and van Lenthe 2005, Swinburn and Egger 2002) and one the Foresight framework (Jones et al. 2007).

The Foresight report provides a framework which models the influence of the built environment, social norms, industry and economics upon individuals’ choices about their lifestyle and health. It reflects the fact that the impact of social and environmental influences upon an individual’s eating, activity behaviour and weight is mediated by the biological and psychological characteristics of that individual (Butland et al. 2007). The Foresight framework further divides these influences into seven ‘thematic clusters’. The ANGELO framework published by Swinburn and colleagues in 1999 dissects the environment into environmental size (micro and macro) by type, using the following categories: the physical environment (what is available?); the economic environment (what are the costs?); the political environment (what are the ‘rules?’); the socio-cultural environment (what are the beliefs and attitudes?) (Swinburn et al. 1999).

In terms of overall definitions of the ‘social and environmental’ field, a frequent strategy was to include in the scope of the review all interventions targeted at groups beyond the individual level (Brug and van Lenthe 2005, Faith et al. 2007, Hider 2001, Rees et al. 2001, Shepherd et al. 2001). Three reviews used ‘environmental’ terminology, defining this broadly and implicitly to include both ‘midstream’ and ‘upstream’ interventions (Jeffery and Utter 2003, Matson-Koffman et al. 2005, Sallis et al. 1998). Two distinguished between, and included, both ‘environmental’ and ‘policy’ interventions (Matson-Koffman et al. 2005, Sallis et al. 1998). Policy intervention covered legislation, regulation, and large-scale organisational change. The remaining two reviews were driven by outcome measure rather than type of interventions and did not provide definitions of social and environmental interventions, although both mentioned the ecological model and the importance of ‘environmental’ determinants (Kahn et al. 2002, Swinburn and Egger 2004).

We extracted data on research priorities reported by the eight systematic reviews in this category. A number of key themes were highlighted by the authors. Authors recommended improving measurements so as to avoid reliance on self-reports, increase accuracy and consistency across studies, and provide further evidence about the impact of mediating variables (such as TV watching and public transport use) on target variables such as physical activity (Jones et al. 2007, Kahn et al. 2002, Matson-Koffman et al. 2005, Rees et al. 2001). Review authors recommended that future evaluations use prospective rather than cross-sectional designs, and include control groups where possible (Brug and van Lenthe 2005, Jones et al. 2007, Rees et al. 2001), and evaluate cost-effectiveness and effectiveness for subgroups of the population, especially socially excluded groups (Hider 2001, Kahn et al. 2002, Matson-Koffman et al. 2005). It was suggested that future studies should consider harms or secondary effects of interventions (Jones et al. 2007, Kahn et al. 2002). The importance of evaluating long- and short-term impacts, and finding the optimum duration and intensity of interventions, was also highlighted (Faith et al. 2007, Hider 2001, Kahn et al. 2002, Rees et al. 2001). Two reviews (by the same group of authors) recommended that young people be treated as stakeholders and their views collected and used to inform interventions (Rees et al. 2001, Shepherd et al. 2001).

3.5 Reviews by thematic cluster from the UK Foresight report

As mentioned in the background section of this report, the UK Government's Foresight team recently published a comprehensive report on the topic of obesity. The report presents a detailed framework for conceptualising physiological, behaviour, social and environmental influences on eating, physical activity and energy-balance. This framework or 'systems map' was devised following an evidence review and multiple consultations and consensus sessions with a wide range of multi-disciplinary experts. The determinants of energy balance (consumption versus expenditure) are grouped into seven thematic clusters. We judged four of these seven thematic clusters to be focussed on 'social and environmental' determinants of obesity and weight: social psychology, food production, food consumption and physical activity environment. (The other three thematic clusters are: individual psychology; individual physical activity; physiology). In order to investigate where research gaps might lie, we mapped the systematic reviews we had identified onto the four relevant thematic clusters based on the review authors' discussions of the included studies and the stated aim of the review (table 3.12). For illustrative purposes we have listed as footnote to the table the individual determinants of the core energy-balance within each thematic cluster. We did not attempt to classify the reviews according to which of the individual determinants they covered due to a lack of detail provided in the reviews. To do this accurately would have meant going back to the original studies included in each review which was beyond the scope of this study. We have, however, offered our impressions of where review activity appears to have been focussed in terms of the individual determinants based on the descriptions of the interventions given by review authors

Because the thematic clusters are fairly broad, Table 3.12 shows that many of the systematic reviews covered more than one cluster. The reviews evaluating school-based interventions, for example, included data on interventions which simultaneously aimed to change 'access to opportunities for physical exercise' and the 'sociocultural valuation of exercise' (the 'physical environment' cluster), the 'market price of food offerings' in the canteen (the 'food production' cluster), the 'variety of food available' or the 'energy-density of food offerings' in the canteen (the 'food consumption' cluster) and the 'sociocultural valuation of food' in the school (in the 'social psychology' cluster). Similarly, reviews in the 'community-based programmes group' such as Fogelholm and Lahti-Koski (2002) included data evaluating: the impact of walking and cycling paths (i.e. impacting on the 'opportunity for activity' in the physical activity environment cluster), the impact of policy changes to food, including labelling of food in supermarkets and restaurants (i.e. impacting upon the 'social pressure to consume' determinant in the 'Food production' cluster and the 'sociocultural valuation of food' determinant in the 'Social psychology cluster'); and the impact of interventions such as physical activity contests, having opinion leaders and models who championed activity or organized social support groups, all of which aimed to change the 'sociocultural valuation of activity' (a determinant in the Physical activity environment cluster).

Some of the empty cells in Table 3.12 represent gaps in the available body of systematic reviews. (However, not every empty cell in Table 3.12 represents a gap. For example, reviews which aimed to investigate the effectiveness of active transport would not be expected to include studies that targeted determinants in the 'Food production' and 'Food consumption' clusters.) The 'mass media' reviews (investigating the effectiveness of interventions using social advertising) were all focussed mainly on determinants in 'The physical activity environment' cluster, namely the 'sociocultural valuation of activity' determinant. One mass media review focused on changing 'children's exposure to food advertising' (in the 'social psychology' cluster) (Hastings et al. (2003). However, we did not find any systematic reviews which investigated the effects of social advertising for example the variety of food eaten, the energy-density, fibre content or nutritional quality of food consumed (all in the 'food consumption' cluster). Nor did we find any systematic reviews which investigated the impact of social advertising ('mass media' reviews) on the 'sociocultural valuation of food' or the 'conceptualisation of obesity as a disease' ('Social psychology' cluster).

The two systematic reviews in our 'financial incentive and pricing strategies' group, focussed on interventions targeting the 'market price of food offerings' (in the 'food production' cluster. We did not find any systematic reviews that focussed on financial incentives and pricing strategies which aimed to impact on the determinants in the 'Physical activity environment' cluster (such as the 'cost of physical exercise').

Table 3.13 Included systematic reviews according to the Foresight thematic clusters relating to social and environmental factors

Groups used in this report		Four thematic clusters from the Foresight report relating to social and environmental factors			
	The physical activity environment ¹	Food production ²	Food consumption ³	Social Psychology ⁴	
Mass media	Cavill and Bauman (2004) Finlay and Faulkner (2005) Marcus et al. (1998) Marshall et al. (2004)			Hastings et al. (2003)	
Financial incentives and pricing strategies		Goodman and Anise (2006) Wall et al. (2006)			
Point of sale and availability			Holdsworth and Haslam (1998) Jago et al. (2007)	Holdsworth and Haslam (1998)	
Active transport	NICE (2006) Ogilvie et al. 2004 Ogilvie et al. 2007			Ogilvie et al. 2004 Ogilvie et al. 2007	

¹ The Physical activity environment cluster contains the following determinants: Opportunity for team-based activity; sociocultural valuation of activity; access to opportunities for physical exercise, cost of physical exercise; safety of unmotorised transport; opportunities for unmotorised transport; dominance of motorised transport; walkability of living area; ambient temperature; social deprivation of labour; reliance on labour saving devices and services; and dominance of sedentary employment.

² The Food production cluster contains the following determinants: Female employment; societal pressure to consume; effort to increase efficiency of consumption; pressure for growth and profitability; pressure on job performance; effort to increase efficiency of production;; desire to minimise cost; level of employment; desire to maximise volume; pressure to improve access to food offerings; pressure to cater for acquired tastes; desire to differentiate food offerings; standardisation of food offerings; cost of ingredients; market price of food offerings; demand for health; and purchasing power.

³ The Food consumption cluster contains the following determinants: Food exposure; food abundance; de-skilling; demand for convenience; convenience of food offerings; food variety; alcohol consumption;; palatability of food offerings; energy-density of food offerings; portion size; rate of eating; nutritional quality of food and drink; fibre content of food and drink; force of dietary habit; children's control of diet; and tendency to graze.

⁴ The social psychology cluster contains the following determinants: Education; media availability; availability of passive entertainment options; acculturation; social acceptability of fatness; conceptualisation of obesity as a disease; peer pressure; importance of 'ideal' body-size image; sociocultural valuation of food; social rejection of smoking; smoking cessation; exposure to food advertising; TV watching; perceived lack of time; parental control

Four thematic clusters from the Foresight report relating to social and environmental factors				
Groups used in this report	The physical activity environment ⁵	Food production ⁶	Food consumption ⁷	Social Psychology ⁸
School based environmental change	Jago and Baranowski (2004) Lister-Sharp et al. (1999) Mukoma and Flisher (2004)	French and Stables (2003)	French and Stables (2003) Lister-Sharp et al. (1999) Mukoma and Flisher (2004)	French and Stables (2003) Lister-Sharp et al. (1999)
Community-based programmes	Fogelholm and Lahti-Koski (2002) Jackson et al. (2005a) Jackson et al. (2005b) Murphy and Bauman (2007)	Fogelholm and Lahti-Koski (2002)	Dobbins (1996) Jackson et al. (2005b) Sellers et al. (1997) Yancey et al (2004)	Dobbins et al. (1996) Dobbins and Beyers (1999) Fogelholm and Lahti-Koski (2002) Jackson et al. (2005a) Jackson et al. (2005b) Murphy and Bauman (2007) Yancey et al (2004)
Programmes covering more than one category	Brug and Van Lenthe (2005) Kahn et al. (2002) Jones et al. (2007) Matson-Koffman et al. (2005) Rees et al. (2001)	Brug and Van Lenthe (2005) Faith et al. (2007) Hider (2001) Jones et al. (2007) Matson-Koffman et al. (2005)	Brug and Van Lenthe (2005) Faith et al. (2007) Hider (2001) Jones et al. (2007) Matson-Koffman et al. (2005) Rees et al. (2001) Shepherd et al. (2001)	Brug and Van Lenthe (2005) Hider (2001) Kahn et al. (2002) Matson-Koffman et al. (2005) Rees et al (2001) Shepherd et al (2001)

5 The Physical activity environment cluster contains the following determinants: Opportunity for team-based activity; access to opportunities for physical exercise, cost of physical exercise; safety of unmotorised transport; opportunities for unmotorised transport; dominance of motorised transport, walkability of living area, ambient temperature, social depreciation of labour, reliance on labour saving devices and services, dominance of sedentary employment.

6 The Food production cluster contains the following determinants: Female employment; societal pressure to consume, effort to increase efficiency of consumption, pressure for growth and profitability, pressure on job performance, effort to increase efficiency of production, desire to minimise cost, level of employment, desire to maximise volume, pressure to improve access to food offerings, pressure to cater for acquired tastes, desire to differentiate food offerings, standardisation of food offering, cost of ingredients, market price of food offerings, demand for health and purchasing power.

7 The Food consumption cluster contains the following determinants: Food exposure,; food abundance, de-skilling, demand for convenience, convenience of food offerings, food variety, alcohol consumption, palatability of food offerings, energy-density of food offerings, portion size, nutritional quality of food and drink, fibre content of food and drink, demand for convenience, force of dietary habit, tendency to graze

8 The social psychology cluster contains the following determinants: Education; media availability; availability of entertainment options; acculturation; social acceptability of fatness; conceptualisation of obesity as a disease; peer pressure; importance of 'ideal' body-size image; social rejection of smoking; smoking cessation; exposure to food advertising; TV watching; perceived lack of time;; parental control

The two systematic reviews which included interventions which used point-of-sale methods or which altered availability focussed on impacting upon the 'food exposure' (by changing food labelling) and 'de-skilling' (by providing training to canteen staff) determinants in the 'Food consumption' cluster. One of these also covered the 'socioculturation of food' determinant (by advertising the new food labelling) in the 'Social psychology' cluster. We did not find any systematic reviews which focussed on interventions which used changes in availability to impact upon determinants in the 'Physical activity environment' cluster, such as 'access to opportunities for physical exercise'.

Despite the fact that many reviews straddled more than one cluster, Table 3.12 does highlight areas which appear to be well served by systematic reviews. Most of the systematic reviews focussed upon determinants in either the 'Physical activity' environment cluster or the 'Social psychology' cluster. However, on closer inspection the majority of these systematic reviews focussed upon two specific determinants: the 'sociocultural valuation of food' and the 'sociocultural valuation of activity', respectively, rather than large-scale macro-level interventions that changed the built environment or access to facilities through taxation or subsidies.

CHAPTER FOUR

Discussion

4.1 Summary of findings

4.1.1 Overview of reviews

We located 54 reviews of obesity-relevant research with a social and environmental focus, of which 32 were systematic reviews. Our results reflect the rapid recent growth in interest in this topic. Over half the reviews were published in 2004 or later.

Most of the reviews covered the population as a whole and did not have a specific focus on children or young people. The reviews covered a wide range of intervention types and settings. Some were focussed on specific intervention strategies such as mass media campaigns, financial instruments, or point-of-sale information. Some investigated multi-component interventions which integrated social and environmental change with education and strategies for individual behaviour change, in either school or community settings. A number of reviews included studies covering all of these areas.

4.1.2 Definitions of ‘social and environmental’

The reviews varied in the extent to which they defined their scope in terms of social and environmental interventions or determinants. Several authors defined this scope in the broadest terms as interventions which are not primarily targeted at individuals (Faith et al. 2007, Ogilvie et al. 2004, Rees et al. 2001, Shepherd et al. 2001, Wechsler 2000). Similarly, reviews also defined their focus as interventions which include the whole population as distinct from high-risk groups (Glanz and Hoelscher 2004, Simmons et al. 1997), or as distinct from those who self-select into an intervention (Brug and van Lenthe 2005, French and Wechsler 2004, French and Stables 2003, Hider 2001). This category of all supra-individual interventions is often referred to as ‘population-based’.

Reviews which were defined by setting (school-based or community-based programmes) often provided more detailed definitions of their scope, and explicitly sought interventions which combined social or environmental change with individual-level components such as education or face-to-face counselling. Reviews whose scope was defined by intervention type, such as media or financial interventions, typically did not define their scope primarily in social and environmental terms.

Some review authors distinguished two levels within the social and environmental sphere, using pairs of terms such as ‘midstream’ vs. ‘upstream’, ‘community’ vs. ‘society’, ‘local’ vs. ‘structural’, or ‘micro-environment’ vs. ‘macro-environment’. Such terminology was not consistently used across the reviews. ‘Midstream’ or ‘micro-environment’ usually referred to the environment (physical, organisational, social) within local settings such as schools, workplaces or

homes. Upstream' or 'macro-environment' referred to broader determinants of behaviour such as government policy and legislation, national economies, or the values which prevail across whole societies.

This distinction is valuable in providing an overall structure for analysing the range of social and environmental interventions, and reasonably intuitive in its content. However, certain ambiguities should be noted. Some aspects of the social and environmental field, such as the physical built environment, cut across the distinction, insofar as they both shape individual decisions at the local level (e.g. availability of a particular walking path) and reflect macro-level determinants (e.g. national planning regulations). Another ambiguity is whether this distinction is primarily one of the content of interventions, or their scale. Interventions which are 'upstream' in terms of their content (e.g. pricing or policy change) may be implemented in local settings (such as a single school or retail site). Conversely, some interventions (e.g. mass media campaigns) may be implemented on a wide scale, but seek to target primarily local factors such as individuals' beliefs and motivations.

An important implication is that "population-based approaches must not automatically be construed as upstream" (Yancey et al. 2004, p8) or, in other words, that 'social and environmental' interventions are not always 'structural'. Overall, more high-quality intervention research appears to be available for micro- than macro-environmental strategies (and, within the latter, for programmes which are relatively limited in extent). Research syntheses which aim to incorporate the whole range of social and environmental interventions are usually dominated by interventions consisting of micro-environmental changes in local settings. Some of the reviews included in our data set addressed this issue by using data from studies employing correlational designs to investigate macro-level strategies.

4.1.3 Research priorities

Some research priorities were clear across the review topic areas. A primary concern among review authors was the reliance in primary studies on correlational data. Future evaluations of social and environmental interventions, especially large-scale policy interventions, should adopt a prospective design and, where appropriate, use a control group (Brug and van Lenthe 2005, Goodman and Anise 2006, Hastings et al. 2003, Jones et al. 2007, NICE 2006, Ogilvie et al. 2004, Ogilvie et al. 2007, Rees et al. 2001, Wall et al. 2006). Another key concern was the lack of effectiveness data for subgroups such as children, those living in rural areas or active/inactive populations, and for socially excluded groups. Future research should investigate the impact of social and environmental interventions on health inequalities (Dobbins and Beyers 1999, Hider 2001, Kahn et al. 2002, Matson-Koffman et al. 2005, Wall et al. 2006, Yancey et al. 2004). Other priorities raised across the groups included: measuring the effectiveness of each (type of) component of multi-component interventions and investigating the mechanisms for effectiveness; evaluations of cost-effectiveness and wider economic implications of interventions (Jago et al. 2007, Wall et al. 2006); developing common and accurate measurements of physical activity and mediating variables for obesity and overweight; and conducting qualitative research about acceptability, implementation and views on barriers and facilitators (Goodman and Anise 2006, Mukoma and Flisher 2004, Rees et al. 2001, Shepherd et al. 2001). One study suggested that the commercial sector and public health organisations work together to fully investigate the impact of food promotion on children (Hastings et al. 2003).

4.2 Strengths and limitations of this map

This systematic map of reviews is an attempt to describe review-level research activity across the whole field of social and environmental interventions for obesity. This is an area of increasing policy concern in many countries. Our map makes an important contribution to strengthening the evidence base for strategies aiming to prevent or reduce obesity that go beyond the individual level. Our searches were designed to locate relevant research, whether or not self-defined as relevant to social and environmental determinants. We included reviews of research focussing on any social or environmental intervention types, and on any obesity-relevant outcomes.

Our searches were extensive, including a wide range of databases and websites. The strategies used were designed to locate any review published from 1996 onwards with a focus on obesity,

healthy eating, physical activity or sedentary behaviour in OECD countries. We did not hand search any journals or carry out citation chasing, and searches of grey literature and contact with experts in the field were limited. We would like to invite readers to contact us with any references for reviews that we may have missed as a consequence of concentrating on the database searching.

After an initial screening of reports, we excluded reports not published in English. Only two reviews were dropped because of this.

We also excluded reviews which did not report data on the effectiveness of interventions or the impact of changes to the social, physical or financial environment. Most of these were reviews of correlational data. Since some of these were concerned with large-scale structural (environmental or policy) change, their inclusion might have resulted in a more complete picture of the research field.

Although the focus of our map was children and young people, we included reviews of interventions across the age range, so long as they did not specifically exclude 4- to 18-year-olds. The nature of social and environmental interventions - except where carried out in age-limited settings such as schools - is that they are available to communities or populations as a whole. Hence, it would not have been appropriate to exclude studies of the general population. We did exclude reviews whose central focus was not social and environmental interventions. Most of the reviews excluded on this criterion focussed on interventions which consisted primarily of education.

This report describes a map of the research, not a synthesis of findings. The wide range of topics covered by the included reviews, and the differences in their scope and definitions of key terms, would have made such a synthesis difficult.

In addition, few reviews presented their findings in a form that could be easily extracted and used in a cross-review synthesis. We found that review findings were often presented at the level of individual studies, rather than as a synthesis (e.g. Holdsworth and Haslam 1998, Jago et al. 2007 and Yancey et al. 2004). Two reviews did not have any results to synthesis as they did not find any primary data which met the inclusion criteria (Jackson et al. 2005a and Jackson et al. 2005b). Only one of the 30 systematic reviews conducted a meta-analysis (Sellers et al. 1997). Some review authors stated that they aimed to conduct numerical synthesis but, due to the disparity of the data, diversity of interventions, populations and study methods decided that this was not appropriate and they undertook a narrative synthesis (Kahn et al. 2007, Ogilvie et al. 2007, Ogilvie et al. 2004 and Wall et al. 2006). Even amongst those reviews that attempted a narrative synthesis, review authors were cautious about drawing conclusions about effectiveness due to the poor quality of the evidence.

In conclusion, the disparity of data both within and between reviews and a necessary reliance on the review author's interpretation made a synthesis of review results inappropriate.

We screened and classified reviews on the basis of the aims stated by the authors. However, these intentions may not have been consistently reflected in the data actually included in reviews. Because of the lack of consensus on how key terms such as 'environmental' and 'population-based' should be defined and operationalised in terms of review inclusion, even reviews with similar stated aims may have included different primary studies. This is a well-known problem in comparing the results of different reviews conducted in a similar topic area and (Peersman et al. 1999).

In addition, reviews which were similar in terms of the studies included may have been different in their intentions, so that some were included in our systematic map, and others excluded. For example, reviews conducted in the EPPI-Centre on young people and healthy eating (Shepherd et al. 2001) and young people and physical activity (Rees et al. 2001) were included in our systematic map because they explicitly sought to include interventions at the level of the "society and community". However, reviews from the same programme of research on children and healthy eating (Thomas et al. 2003) and children and physical activity (Brunton et al. 2003) were excluded as not having a focus on social and environmental interventions, because they did not utilise concepts which can be understood as 'social and environmental' to define the scope of the review. The range of intervention types included in the four reviews, however, was substantially similar.

In terms of using the Foresight systems map as a framework, the fact that we were dealing with review-level evidence meant that we were limited to using the broad clusters rather than the individual determinants in the map. Future reviews of primary data or reports of primary data may benefit from further investigation of how the individual determinants outlined in the Foresight framework might be used to describe interventions in this complex field.

Three of the 54 reviews also included review-level evidence and the challenges of comparing reviews which we discuss above are heightened when comparing reviews of review-level evidence' (Goodman and Anise 2006, Lister-Sharp et al. 2006 and NICE 2006, see Appendix 1).

This systematic map is part of a series of work around childhood obesity. We plan to use the findings about gaps in the evidence identified by this map, alongside the results from a systematic review of qualitative and other types of research on children's views relating to obesity or body shape, size or weight (Rees et al. 2008), which we are currently undertaking, to inform a new systematic review.

4.3 Conclusion

There is considerable review-level evidence relating to social and environmental approaches to the prevention or reduction of childhood obesity. An encouraging proportion (59%) of the 53 reviews we found reported systematic attempts to retrieve the research literature. An indication of the effort that has gone into evaluating social and environmental strategies for obesity is that the 32 systematic reviews covered, between them, 759 primary studies although this figure includes some which appeared in more than one review.

The results of our map of reviews enable us to identify a number of gaps in the existing review-level research evidence. Relatively little review-level evidence is available on the impact of social and environmental interventions on children and young people, particularly younger children (under age 11). Most evidence which is available for this population group concerns interventions in schools. All the reviews with a specific focus on the impact of social and environmental interventions on children and young people concentrated on school-based interventions. This is also true of reviews with a general-population focus, which frequently present data separately for interventions in school settings (Hider 2001, Kahn et al. 2002, Matson-Koffman et al. 2005), but rarely present data for the effectiveness for children and young people of non-school interventions.

Another large gap is the lack of evidence from robust prospective study designs relating to large-scale macro-level interventions such as policy change, taxation, or changes to the built environment. Many reviews which fell into the 'Physical activity environment' cluster (as defined by the Foresight report, see section 3.5), were aiming to impact on attitudes (the 'sociocultural valuation of activity') rather than measure the impact of large scale structural changes to the environment. No reviews focussed on macro-level interventions alone, and those which included macro-level interventions found a few primary studies. Although, certain components of large, multi-component interventions included in the reviews involved change at this level, such as the provision of facilities for physical activity, but these components were relatively small parts of interventions involving change at multiple levels. As a result, it is difficult to assess their effect independently from other intervention components.

Most of the systematic reviews covering multi-component community-based programmes had a primary focus on interventions to reduce the risk of cardiovascular disease. The systematic reviews in this group reported obesity-relevant outcomes in order to answer questions about reduction of cardiovascular risk or diabetes. Apart from these cardiovascular disease reviews, and the two reviews by Jackson et al. which included no primary studies, only one systematic review focussed exclusively on community-based interventions (Yancey et al. 2004) Two systematic reviews with a wider focus reported considerable amounts of data on community-based interventions (Kahn et al. 2002, Matson-Koffman et al. 2005).

Relatively few reviews looked at the impact of interventions on health inequalities. Limited review-level evidence is available on the potential impact of socio-demographic factors, such as ethnicity and socio-economic position, on the effectiveness of interventions.

Similarly few data are available from reviews on the cost-effectiveness of interventions, although there may be relevant data in correlation or modelling studies (Goodman and Anise 2006).

While we did not include studies looking at correlational data alone, we found several reviews which drew on data from correlation studies as well as effectiveness studies, in order to obtain a fuller picture of the evidence base. However, only one of these (Brug and van Lenthe 2005) attempted to review both intervention and correlation data across the whole range of determinants, and this review made no systematic attempt to integrate the two types of data. The review of the impact of food promotion on children integrated correlational studies with those with a prospective design, commenting on the relative merits of both (Hasting et al. 2003). Future reviews could adopt a similar approach across a wider range of relevant determinants.

The dearth of evidence on structural interventions using rigorous designs is a well-known issue in public health and health promotion research. It is clear from the reviews we have looked at that few such studies have been conducted. Undertaking prospective trials and randomised controlled trials of structural interventions is, therefore, a high priority.

Much valuable work has been conducted recently on developing theoretical frameworks to understand the determinants of obesity-related behaviours and the potential pathways of intervention effect. However, further work is required to establish the relevance of these frameworks. While we found that some reviews were theoretically sophisticated and explicit in their definitions of the 'social and environmental' field, it was not always clear how these definitions were operationalised in the conduct of the review. More detailed and pragmatic frameworks for describing interventions (and other research), on the basis of already existing models, would be valuable. Future research could profitably investigate whether the Foresight systems map could be used as a framework, at the level of the determinants, in order to describe interventions and research activity.

4.4 Research and policy implications

Reviews of all interventions, not only those based in schools, should assess the impact of interventions on children and young people. The needs of children and young people may be different from those of the general population, as may be the pathways through which social and environmental determinants impact on their obesity-related behaviours. There is therefore a need to evaluate how general-population interventions work, or do not work, for children and young people.

More reviews are needed of 'structural' or 'macro' interventions, such as policy interventions or changes to the built environment. The growing interest from policy-makers and researchers in structural interventions is at present not matched by reliable evidence from reviews.

As primary data on effectiveness of social and environmental interventions may be limited, **reviews could explore integrating data from studies about effectiveness and studies reporting correlational or qualitative data.**

Systematic reviews of community-based interventions for obesity, healthy eating, and physical activity should be conducted. There appears to be a substantial number of primary studies, but systematic reviews are limited, especially ones which are not primarily interested in heart-health and which are relevant to the UK.

Because of the uneven social distribution of obesity and overweight, **reviews should take into account the effectiveness of interventions in reducing health inequalities, and their impact on disadvantaged groups.**

Policies for addressing the problem of childhood obesity should take account of the considerable review-level evidence about the effectiveness of different social and environmental approaches. Policy-makers can use this report as a map to navigate this complex field and identify which reports from the considerable review-level evidence might be worth retrieving and reading in order to answer their particular questions.

CHAPTER FIVE

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Appendix 1: Search strategy for electronic databases

All databases were searched from 1987 to the search date. There was not any language restriction. The following search was used on PubMed. For details of the searches used on the other databases, please contact the authors.

String: ((A OR B OR C OR D) AND E AND F AND G)

A. Physical activity

("sports"[MeSH Terms] OR "sport"[TIAB] OR "sports" [TIAB] OR "exercise"[MeSH Terms] OR "exercise" [TIAB] OR "exertion"[MeSH Terms] OR "walk*"[TIAB] OR "active commuting" [TIAB] OR "active travel" [TIAB] OR "non-motorized" OR "non-motorised" [TIAB] OR "physical education and training"[MeSH Terms] OR "physical education" [TIAB] OR "leisure" OR "recreation" [TIAB] OR "recreational" [TIAB] OR "physical activity"[TIAB] OR "physical activities"[TIAB] OR "park" [TIAB] OR "parks" [TIAB] OR "gardening" [TIAB])

B. Sedentary behaviour

("television"[TIAB] OR "internet"[TIAB] OR "Media"[TIAB] OR "Driving"[TIAB] OR "car"[TIAB] OR "car-use"[TIAB] OR "sedentary"[TIAB] OR "inactivity"[TIAB] OR "hobbies"[TIAB] OR "gardening" [TIAB] OR "play"[TIAB])

C. Eating

("Diet"[Mesh:noexp] OR "diet"[TIAB] OR "nutrition"[TIAB] OR "eating"[TIAB] OR "energy intake"[TIAB] OR "energy-intake"[TIAB] OR "energy-dense"[TIAB] OR "energy dense"[TIAB] OR "calories"[TIAB] OR "calorie"[TIAB] OR "calorie-dense"[TIAB] OR "calorie dense"[TIAB] OR ("fat*" [TIAB] AND "food"[TIAB]) OR "fruit"[TIAB] OR "vegetables"[TIAB] OR "over-eating"[TIAB] OR "fast food"[TIAB] OR "food preferences"[TIAB] OR "healthy eating"[TIAB] OR "unhealthy eating"[TIAB])

D. obesity / overweight

("Body Weights and Measures"[Mesh] OR "BMI"[TIAB] OR "Body Mass Index"[TIAB] OR "Body Weight"[Mesh] OR "obesity"[TIAB] OR "obese"[TIAB] "overweight"[TIAB] OR "weight gain"[TIAB] OR "weight loss"[TIAB])

E. Social and environmental

("Urban Health"[Mesh:noexp] OR "Social Change"[Mesh] OR ("transport"[TIAB] AND ("cars"[TIAB] OR "roads"[TIAB] OR "streets"[TIAB])) OR "public health"[TIAB] OR "Health Promotion"[Mesh] OR "health promotion"[TIAB] OR "health behaviour"[TIAB] OR "health behavior"[TIAB] ("policy"[TIAB] AND ("social"[TIAB] OR "school"[TIAB] OR "food"[TIAB] OR "public"[TIAB] OR "urban"[TIAB] OR "environmental"[TIAB])) OR "urban planning"[TIAB] OR "city planning"[TIAB])

OR “built environment”[TIAB] OR “natural environment”[TIAB] OR “social environment”[TIAB] OR “physical environment”[TIAB] OR “cultural environment”[TIAB] OR “urban environment”[TIAB] OR “school environment”[TIAB] OR “roads”[TIAB] OR “streets”[TIAB] OR “neighbourhood”[TIAB] OR “community”[TIAB] OR “societal”[TIAB] OR “sustainable”[TIAB] OR “sustainability”[TIAB] OR “climate change”[TIAB] OR “social interventions”[TIAB] OR “community interventions”[TIAB] OR “obesogenic”[TIAB] OR “leptogenic” [TIAB])

F. Review

((“Review Literature”[Mesh] OR “Review “[Publication Type]) OR “meta-analysis”[All Fields] OR “systematic overview”[All Fields] OR “systematic synthesis”[All Fields] OR “meta-ethnography”[All Fields] OR “systematic narrative”[All Fields] OR “systematic review”[All Fields] OR “evidence review”[All Fields] OR “review of literature”[All Fields])

G. Date limit

Date limit set to: 01.01.1987 to 22.11.2007

Appendix 2: EPPI-Centre Keyword sheet

Section A: Bibliographic and administrative details

A.1 Reviewer name	A.1.1 Theo Lorenc A.1.2 Jenny Woodman
A.2 Coding date <i>date of coding</i>	A.2.1 Details
A.3 Author	A.3.1 Details
A.4 Title of study	A.4.1 Details
A.5 Are there linked studies?	A.5.1 Yes (details) A.5.2 No
A.6 Type of publication	A.6.1 Report A.6.2 Book chapter A.6.3 Journal article A.6.4 Other (give details)
A.7 Publication date	A.7.2 2007 A.7.3 2006 A.7.4 2005 A.7.5 2004 A.7.6 2003 A.7.7 2002 A.7.8 2001 A.7.9 2000 A.7.10 1999 A.7.11 1998 A.7.12 1997 A.7.13 1996
A.8 Where was the review carried out?	A.8.1 Details
A.9 Was the review funded?	A.9.1 Yes (give details) A.9.2 No (give details) A.9.3 Unclear / Not stated (specify)

Section B : Focus of the review

B.1 What is the broad focus of the review?	<p>B.1.1 The physical activity environment <i>Includes: active transport, walkability, access to facilities and opportunities for PA (including active play), safety and aesthetics of environment (e.g. traffic calming / bike lanes), building design</i></p> <p>B.1.2 Food Production (give details) <i>Includes price of food offerings e.g. in canteen / vending machines / supermarket</i></p> <p>B.1.3 Food consumption (give specific details) <i>Includes: nutritional content / energy density of food on offer; food exposure (e.g. removing vending machines or putting fruit and veg. in more prominent place); convenience of food available; portion size</i></p> <p>B.1.4 Social psychology (give specific details) <i>media (including all passive entertainment), including advertising; peer pressure / support; acculturation/ethnicity</i></p> <p>B.1.5 Other (give details) <i>e.g. healthy heart / reduce risk of cancer or other outcome</i></p>
B.2 what is the primary outcome of interest?	<p>B.2.1 Reduced weight / body fat (give details)</p> <p>B.2.2 Increased physical activity and/or reduced sedentary (give details)</p> <p>B.2.3 Healthy eating (give details)</p> <p>B.2.4 Reduce risk of other outcome (give details) <i>e.g. reduce risk of cancer</i></p> <p>B.2.5 Other (give details)</p>

Section C : Quality of review

C.1 was there a clear aim and research question?	<p>C.1.1 Stated (give details)</p> <p>C.1.2 Not stated / unclear (specify)</p>
C.2 Was the search adequately reported?	<p>C.2.1 Yes (give details)</p> <p>C.2.2 No / not stated (specify)</p>
C.3 Were the inclusion criteria clearly defined and reported?	<p>C.3.1 Stated</p> <p>C.3.2 Not stated or unclear (specify)</p>
C.4 Was there any quality assessment of studies?	<p>C.4.1 Stated (give details)</p> <p>C.4.2 Not stated / unclear (specify)</p>
C.5 Were there formal data extraction methods?	<p>C.5.1 Stated (give details)</p> <p>C.5.2 No / unclear (specify)</p>
C.6 Were there quality assurance measures? <i>e.g. double screening / data extraction</i>	<p>C.6.1 Not stated / unclear (specify)</p> <p>C.6.2 Yes (give details)</p>
C.7 What details were given about primary studies? <i>e.g. population, study design, intervention description (including duration, provider, components, settings etc), outcomes measured.</i>	C.7.1 Details
C.8 is there an evidence table (or other way of easy comparing included studies)?	<p>C.8.1 Yes (details)</p> <p>C.8.2 No</p>

C.9 What is the overall quality of the review?	C.9.1 Non-systematic review <i>answers no to any of first 3 questions in this section</i> C.9.2 Systematic review
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Section D: Detailed inclusion criteria (systematic reviews only)

D.1 Which dates are covered by the review? <i>inclusion criteria (rather than included studies)</i>	D.1.1 Details
D.2 Which ages are covered by the review?	D.2.1 4-11 (primary) D.2.2 4-16 (primary AND secondary) D.2.3 11-16 (secondary) D.2.4 Parents D.2.5 Whole population (undefined) D.2.6 Other / not clear (specify and give details)
D.3 What are the stated inclusion criteria? <i>e.g. population, country, language, study type, intervention, outcome</i>	D.3.1 Details <i>e.g. population, study type, intervention type, outcomes</i>
D.4 How many studies does the review include? <i>(for both review questions about social and environmental interventions and whole review if different)</i>	D.4.1 Details
D.5 Does the review search for and include economic evaluations?	D.5.1 Yes (give details) D.5.2 No (give details)
D.6 Does the review address the issue of inequalities or equity?	D.6.1 Yes (give details) D.6.2 No

Section E: Details of soc. environ interventions and review findings (systematic reviews only, except E. 1)

E.1 How does the author define 'social' or 'environmental' interventions?	E.1.1 Details E.1.2 Not defined by author
E.2 What type of data are extracted?	E.2.1 Views E.2.2 Quantitative E.2.3 Other (specify)
E.3 Does the author attempt any numerical meta-analysis? (give details)	E.3.1 Yes (give details) E.3.2 No
E.4 What are the review results?	E.4.1 Details
E.5 Are research priorities / knowledge gaps identified (give details)? <i>give details</i>	E.5.1 Details

APPENDIX 3 Details of systematic reviews included in the map and linked studies

Study reference and topic group	Inclusion Criteria							N of included studies ⁹
	Dates	Publication type / language	Population	Intervention type	Setting	Study design ¹⁰	Outcome	
Brug and van Lenthe (2005) Reviews containing programmes in more than one category	1990-2003	No restriction	Age: 3-18. Country: "established market economy"	Policy or environmental interventions to promote physical activity or nutrition OR where parents were an agent for change in cardiovascular disease reduction programme AND where effects of environmental change could be separated from effects of other components NOT media NOT individual-level (except where educational with main focus on social / environmental strategies)	No restriction	D	Behavioural, physiological, organizational change	49
Cavill and Bauman (2004) Mass media group	1970-2003	Peer-reviewed; English	No restriction	Any mass media with clear physical activity component	Mass media	P, C, R	Physical activity, knowledge, attitudes, intentions	15

⁹ N of included studies only includes studies using prospective evaluation designs; the total N for some studies was greater than this.

¹⁰ D = any design so long as study described the intervention and evaluation adequately

P = one-group pre-post

C = non-randomised controlled trials

R = randomised controlled trials

SR = systematic reviews

Note that some reviews also included studies using non-intervention designs; these are not included here.

Study reference and topic group	Inclusion Criteria							N of included studies
	Dates	Publication type / language	Population	Intervention type	Setting	Study design	Outcome	
Dobbins (1996) Community-based programme group	1985-1996	No restriction	No restriction	Community heart health projects (with community involvement)	Community	D	No restriction	33
Dobbins and Beyers (1999) Community-based programme group	1994-1998	No restriction	No restriction	Community heart health projects (with community involvement)	Community	C, R	No restriction	13
Faith et al. (2007) Reviews containing programmes in more than one category	No restriction -2004	No restriction	No restriction	Environmental intervention alone OR intervention where effects of environmental change could be separated from effects of other components NOT multi-component school interventions NOT information only	No restriction	P, C, R	Food acquisition or purchasing behaviour, food intake, body weight or composition	11
Finlay and Faulkner (2005) Mass media group	1998-2002 (also includes the details of a previous review of earlier date)	English	No restriction	Any mass media	Mass media	No restriction	No restriction	17

Study reference and topic group	Inclusion Criteria							N of included studies
	Dates	Publication type / language	Population	Intervention type	Setting	Study design	Outcome	
Fogelholm and Lahti-Koski (2002) Community-based programme group	1990-2002	No restriction	No restriction	Any community intervention with physical activity component	Community	No restriction	Body weight, BMI, obesity	5
French and Stables (2003) School-based environmental change group	No restriction	No restriction	No restriction	Any school-based environmental intervention	Schools	No restriction	Fruit and vegetable intake	13
Goodman and Anise (2006) Financial incentives and pricing strategies group	No restriction -2006	No restriction	No restriction	Economic instruments to reduce consumption of energy-dense foods	No restriction	P, C, R, SR	No restriction	20
Hastings et al. (2003) Mass media group	1970 - 2003	English	Age 2-15y	Any form of food / drink promotion (including alcoholic drinks) NOT vitamins or food supplements or infant formula	No restriction	P, C, R, SR	Nutritional knowledge, food preferences, food purchasing and purchasing-related behaviour, food consumption behaviour, 'other effects'	29

Study reference and topic group	Inclusion Criteria								N of included studies
	Dates	Publication type / language	Population	Intervention type	Setting	Study design	Outcome		
Hider (2001) Reviews containing programmes in more than one category	1980-2000	English	Country: "Western"	Any structural or environmental intervention intended to reduce calories consumed NOT education NOT behaviour change	No restriction	C, R	Primary: change in energy intake. Secondary: any dietary behaviour	13 This study also reports details of 63 excluded studies	
Holdsworth and Haslam (1998) Point-of-sale information and availability group	No restriction	No restriction	No restriction	Point-of-choice nutrition labelling	Workplaces, public eating places, universities	D	No restriction	20	
Jackson et al. (2005a) Community-based programme group	No restriction -2004	No restriction	No restriction	Any intervention implemented through sporting organisations to increase participation in sport	No restriction	C, R	Participation in sport	0	
Jackson et al. (2005b) Community-based programme group	No restriction -2004	No restriction	No restriction	Policy interventions implemented through sporting organisations intended to instigate and/ or sustain healthy behaviour change	No restriction	C, R	Behaviour change, intentions, attitudes, knowledge, changes in policy	0	

Study reference and topic group	Inclusion Criteria										N of included studies
	Dates	Publication type / language	Population	Intervention type	Setting	Study design	Outcome				
Jago and Baranowski (2004) School-based environmental change group	1970-2002	No restriction	Age: 5-18	Any "non-curricular" intervention to increase physical activity	School or school-related setting (e.g. journey to school)	P, C, R	Physical activity (objective or self-report measure)	9			
Jago et al. (2007) Point-of-sale information and availability group	No restriction -2005	No restriction	No restriction	Any intervention related to availability of fruit and vegetables	No restriction	No restriction	No restriction	7			
Jones et al. (2007) ¹¹ Reviews containing programmes in more than one category	No restriction	No restriction	No restriction	Any intervention using environmental change to influence physical activity	No restriction	P, C, R	Physical activity or physical fitness	6			
Kahn et al. (2002) ¹² Reviews containing programmes in more than one category	1980-2000	English	Country: Established market economy	Any behavioural intervention	No restriction	P, C, R	Physical activity or aerobic capacity	95			

¹¹Linked to Butland et al. (2007)¹²Linked to Zaza et al.(2005), Kahn et al.(2001), Heath et al. (2006) and Brownson et al. (2006)

Study reference and topic group	Inclusion Criteria								N of included studies
	Dates	Publication type / language	Population	Intervention type	Setting	Study design	Outcome		
Lister-Sharp et al (1999) School-based environmental change group	No restriction -1998	No restriction	Age 5-16y	(1st review) any using the "health promoting schools" approach (including: changes in ethos / environment; curriculum; family / community; and active participation by the school); (2nd review) any HP programme in schools using a population approach. NOT secondary or tertiary prevention or treatment NOT high-risk groups NOT medical examinations or screening NOT interventions "addressing health needs particular to developing countries"	Schools (including special schools)	(1st review) P, C, R; (2nd review) SR (quality assessed)	'Health related' outcomes, including behaviour	(1st review) 4; (2nd review) 8	
Marshall et al (2004) Mass media group	1997-2004	No restriction	No restriction	Any media campaign (mass media, print, telephone, internet)	No restriction	No restriction	Physical activity	34	
Matson-Koffman et al. (2005) Reviews containing programmes in more than one category	1970-2003	No restriction	No restriction	All policy or environmental interventions NOT built environment NOT media-only campaigns	No restriction	D	Behavioural, physiological or organizational change	129	

Study reference and topic group	Inclusion Criteria							N of included studies
	Dates	Publication type / language	Population	Intervention type	Setting	Study design	Outcome	
Mukoma and Flisher (2004) School-based environmental change group	No restriction -2002	No restriction	No restriction (but school settings)	Any using the "health promoting schools" approach (including: changes in ethos / environment; curriculum; family / community; and active participation by the school)	Schools (some interventions also included home- or community-based components)	D	Any health-related, but studies had to measure more than one	9
Murphy and Bauman (2007) Community-based programme group	No restriction -2005	No restriction	No restriction	Elite or mass sporting events; major population-level health promotion events	Community	No restriction	No restriction	30
NICE (2006) Active transport group	1996-2005	English	Country: not developing countries	All transport policies, systems and initiatives that promote patterns of walking and cycling and/or increase the safety of walking and cycling NOT interventions aimed at reducing road accidents, pollution NOT interventions improving access to public services, facilities and social networks NOT screening and clinical interventions NOT interventions reducing post-accident outcomes	No restriction	Review	Any health-related, including physical activity behaviour, knowledge, attitudes, beliefs	34

Study reference and topic group	Inclusion Criteria								N of included studies
	Dates	Publication type / language	Population	Intervention type	Setting	Study design	Outcome		
Ogilvie et al. (2004) Active transport group	No restriction -2002	No restriction	Country: OECD	Any policy or programme to promote walking and cycling implemented in an identifiable urban population or area NOT clinical settings NOT studies of single workplaces or schools	Any except clinical settings	P, C, R	Mode shift from cars to walking or cycling; any health-related measure	22	
Ogilvie et al. (2007) Active transport group	1990-2005	No restriction	All except athletes	Any intervention to promote walking	No restriction	C, R	Any measure of walking, incl. self-reported walking, mode share or time spent walking vs. other transport modes, pedometer data	48	
Rees et al. (2001) ¹³ Reviews containing programmes in more than one category	No restriction	No restriction	Age: 11-16. Healthy	Any intervention to promote physical activity	No restriction	C, R	Any physical activity related outcome	42	

¹³ Linked to Rees et al. (2006)

Study reference and topic group	Inclusion Criteria							N of included studies
	Dates	Publication type / language	Population	Intervention type	Setting	Study design	Outcome	
Sellers et al. (1997) Community-based programmes group	No restriction	No restriction	No restriction	Community-based heart health interventions	Community	C, R	At least one of: smoking; cholesterol; blood pressure; body weight	7
Shepherd et al. (2001) ¹⁴ Reviews containing programmes in more than one category	No restriction	No restriction	Age: 11-16. Healthy	Any intervention to promote healthy eating	No restriction	C, R	Any healthy eating-related outcome	75
Wall et al. (2006) Financial incentives and pricing strategies group	1966-2005	No restriction	No restriction	Incentives (including any reward scheme or opportunity to avoid disincentives such as taxes)	No restriction (exc. participants living in institutions / hospitalised)	R	Dietary behaviour	4
Yancey et al (2004) Community-based group	1970 - No restriction	No restriction	Ethnicity: "all under-served ethnic groups"	Any which "employed multiple health promotion approaches and communication channels"	Community	No restriction	Any dietary or PA behaviour. NOT studies only measuring knowledge, attitudes or intentions	23

¹⁴ Linked to Shepherd et al. (2006)

The results of this work are available in two formats:

SUMMARY

Explains the purpose of the review and the main messages from the research evidence

REPORT

Includes the background, methods and main findings

These can be downloaded or accessed at
<http://eppi.ioe.ac.uk/cms/Default.aspx?tabid=2395>

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