

The impact of findings from grey literature on the outcomes of systematic reviews on interventions to prevent obesity among children

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Abstract

Background

By 2025 obesity rates are predicted to rise in Australia by 65% despite the myriad substantial efforts of a multiplicity of interventions and strategies from the public health sector, particularly those at the community or small unit level.¹ Childhood obesity often persists into adulthood, and these strongly established links to adult obesity along with all the attendant risks, costs and consequences make childhood a natural starting point for a closer examination of prevention literature.²⁻⁴ Public health interventions are usually implemented directly by government agencies and so the impact of these interventions tends to be measured in observational, rather than experimental, evidence and may not be captured in traditional academic published sources. There is, therefore, a need to determine whether this non-traditional (grey, commercially unpublished) literature is being actively sought when evaluating the effectiveness of public health interventions; and also whether the inclusion of grey literature has an impact on the conclusions (outcomes) of these SRs.

Objectives

The objectives of this systematic review were to evaluate (i) use of grey literature in systematic reviews on the prevention of childhood obesity, as well as (ii) to determine the impact of grey literature on the findings of these systematic reviews.

Methods

Inclusion criteria

Types of studies

Systematic reviews of interventions to prevent obesity among children, where there was either a meta-analysis, narrative summary or tabular presentation of results.

Types of participants

Children aged two to 18 years without (at baseline) a diagnosis of obesity or eating disorders, or co-morbid conditions that pre-dispose to obesity.

Types of intervention(s)

Systematic reviews of public health interventions aimed at obesity prevention that may be applied at the population, community (including schools) or primary care level that searched one or more grey literature source and/or included one or more grey literature study. These were referred to as 'grey' systematic reviews.

Types of comparators

Systematic reviews of public health interventions aimed at prevention of obesity in children that (1) did not search one or more grey literature sources, and/or (2) did not include one or more grey literature studies. These were referred to as 'black' systematic reviews.

Types of outcomes

Primary: Obesity prevention measured according to body mass index (BMI, weight/height²) as calculated against a suitable growth reference. Outcomes were grouped according to the type of prevention intervention implemented, and by the presence or absence of grey studies included in the systematic review.

Secondary: Ratio of black to grey eligible systematic reviews; ratio of black to grey studies included in eligible systematic reviews; type of grey literature included in eligible systematic reviews and sources used in the systematic reviews to obtain literature.

Search strategy

The search strategy that was used sought to find both published and unpublished (grey) systematic reviews. A four-step search strategy was utilised in this review. An initial limited search of MEDLINE, EMBASE, CINAHL and the Cochrane Library was undertaken to "scope" the literature, followed by an analysis of the text words contained in the title and abstract, and of the index terms used to describe the resultant articles. A second search using all identified keywords and index terms was then undertaken across all included databases. Thirdly, the reference lists of all identified reviews, reports and articles were searched for additional systematic reviews. Systematic reviews published in English were considered for inclusion in this review, with no date limitation.

Assessment of methodological quality

Systematic reviews selected for retrieval were assessed by two independent reviewers for methodological validity using the Joanna Briggs Institute (JBI) Critical Appraisal Checklist for Systematic Reviews (Appendix I)

Data collection

Data were extracted using standardized author-designed topic-specific extraction forms and an assessment of the concordance of pooled (meta-analysed) BMI results between grey and black systematic reviews was to be undertaken. However, the number of grey systematic reviews proved to be extremely limited.

The body mass index results were grouped according to type of obesity prevention program and assessed as to whether the direction of the findings differed according to the amount of grey literature incorporated into the review. Data for each of the other pre-specified outcomes were extracted from the studies, tabulated or graphed and the results were discussed narratively.

Results

A total of 48 systematic reviews (SRs) met the inclusion criteria⁵⁻⁵². Results of the SRs were stratified by the type of intervention investigated to prevent childhood obesity. Seven SRs were inconclusive or unable to draw clear conclusions. Eleven showed that these interventions had no statistically significant impact on BMI, eight showed a small impact on BMI while the remaining 24 SRs reported on interventions that had considerable success at preventing childhood obesity. Health/lifestyle interventions registered the greatest success. The use of grey literature by some SRs did not appear to affect the direction of findings when compared to SRs that only used black literature.

Conclusion

Obesity prevention interventions with children or adolescent participants are largely unsuccessful and childhood obesity remains at the forefront of public health concerns for this population. The inclusion of grey literature did not appear to affect the direction of findings in SRs that evaluated the impact of public health interventions to prevent childhood obesity. Overall, on the basis of the information collated for this overview of SRs, the impact of GL on the direction of results appears equivocal.

Student Declaration

I, Jessica Dorothy Edith Tyndall, certify that this work contains no material which has been accepted for the award of any other degree or diploma in any university or other territory institution, and, to the best of my knowledge and belief, contains no material previously published or written by another person except where due reference has been made in the text. In addition I certify that no part of this work will, in future, be used in a submission for any other degree or diploma in any university or other tertiary institution, without the prior approval of the University of Adelaide and where applicable, any partner institution responsible for the joint award of this degree.

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Jessica Tyndall

Signature

Date: September 18 2015

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Chapter 1: Introduction

Structure of the Thesis

The thesis consists of four chapters.

Chapter 1 introduces the thesis, the subject of the study and presents the background and context of the study. It describes the systematic review process and places the process in the context of developing and building a body of knowledge.

Chapter 2 explains the background to the formulation of the systematic review question and details the systematic review protocol which was developed and followed.

Chapter 3 presents the results of the systematic review and includes the data categorisation and synthesis. The implications of the incorporation of grey literature are discussed and presented.

Chapter 4 discusses the results in the context of the existing evidence base and draws conclusions. Implications for research and practice are given. The thesis concludes with a list of References and Appendices.

Introduction

The Introductory chapter explains the structure of this thesis and outlines the content of each chapter. The context of the review is introduced and background information about the topic provided. The methodological basis for the thesis, including the use of a systematic review of systematic reviews is explained. The systematic review question is presented. Finally key terms used throughout the thesis are listed and defined.

Background and Context of the Review

Childhood obesity has been described variously as “pandemic”⁵³⁻⁵⁴, a “public health crisis”⁵⁵, one of the “most serious public health challenges of the 21st century”⁵⁶ and “a time bomb”⁵⁷. The statistics themselves are staggering: in 2013 “42 million infants and young children were overweight or obese” and by 2025 this number will have increased to “70 million if current trends continue”⁵⁸.

It is undeniably an issue of global significance, currently with huge social and economic consequences: if comprehensive responses are not found to meet the challenge, or at least slow the increase, the costs to future generations will be incalculable. In 2014 WHO established the high profile Commission on Ending Childhood Obesity (ECHO) to “review, build upon and address gaps in existing mandates and strategies, raise awareness and build momentum for action to address childhood obesity”⁵⁸.

Innumerable international, national, regional and local efforts are strongly focused on childhood obesity prevention and at the intervention level, many programs, projects and strategies have been, or are being, directed at the same outcome. And yet by any measure, they are largely unsuccessful and childhood obesity continues to rise. No country has yet succeeded in reversing obesity trends⁵⁹⁻⁶⁰.

Although Australia has no specific national obesity strategy it is reasonable to suggest we would be in alignment with the UK Dept. of Health which has a stated intention to achieve “a sustained downward trend in the level of excess weight in children” by 2020. Recent reports from their National Child Measurement Programme (NCMP) which examine the changes in children’s body mass index (BMI) have demonstrated a clear upward trend in 10/11 year olds from 2006/07 to 2012/2013⁶¹. The report also found evidence of the influence of social inequalities on health: children from low socioeconomic environments were almost twice as likely to be obese as those from affluent areas. Disappointingly, in its 2015 Interim Report ECHO listed 20 Research Gaps with little emphasis on social or economic contributors, concentrating its approach on biomedical and biophysical factors⁶².

Childhood obesity was chosen as the focus for this research because the author was interested in close examination of a public health issue where prevention attempts were proving largely ineffective, with the particular purpose of examining whether the inclusion or otherwise of grey literature in the evidence which informed the interventions, could be argued to have any bearing on outcomes of interventions.

If the interventions proved unsuccessful was there a move to go back to the literature to re-examine its completeness? Focusing on the prevention intervention literature led this researcher to an abundant body of literature, where thousands of studies had been completed. For this reason a decision was made that systematic reviews would be the studies of choice. Systematic reviews bring together the evidence (studies) on a

clearly formulated question. They identify, select and critically appraise relevant primary research, and proceed to extract and analyse data from the studies that are included in the review. Further analysis and synthesis, appropriate to the types of studies involved, produce a systematic review of evidence that is stronger than the sum of its parts. This is clearly illustrated by the Joanna Briggs Institute “New JBI Levels of Evidence”⁶³.

Such is the awareness and the imperative surrounding childhood obesity prevention that proliferation of published and unpublished material in the field continues unabated. Thus the decision to focus on systematic reviews of the literature merely meant moving from a knowledge base of thousands of individual studies to one consisting of hundreds of systematic reviews. Consequently it was decided to conduct a “systematic review of systematic reviews” in order to get the “big picture” of the research in this space and further limit the number of eligible studies to a more manageable number. Concentrating on the effectiveness of different interventions further narrowed the field, and clearly defined inclusion criteria kept the literature searching on track. In the final cut 48 systematic reviews were determined to fit the protocol.

The inclusion of grey literature⁶⁴ (unpublished in a commercial sense, or non-traditional literature) was considered key to this research. It is widely acknowledged that large trials or studies with positive results are published more often than small or negative ones⁶⁵. This could explain the proliferation of childhood obesity prevention intervention studies which continue to expound the scientific and biomedical approach to weight loss or management, and which ECHO appears to emphasise as a major part of the “solution”⁵⁸.

This is where we may find the disconnect: the difference between success and failure of interventions. Somehow the uptake of interventions is not working well and “knowledge transfer” is not taking place. Knowledge transfer has been defined by the Canadian Social Sciences and Humanities Research Council as “Moving research knowledge actively into the realms of policy, practice, products, and public understanding”⁶⁶. How can we do this? Science can only take us so far, and evidence-based practice (EBP) which relies primarily on the science can only tell us so much. This “science to service” model often sees a simplification or generalisation of outcome interpretation for groups or populations which were not indicated in the research.

In the real world of practice there are a multiplicity of influences and “evidence from our study of interventions and programs can reflect that complex reality rather than mask it”⁶⁷. This is what is referred to as practice-based evidence, “a complementary paradigm”⁶⁸ to EBP which can provide a “bridge between research and practice”⁶⁸. By giving ownership and recognition to practitioners and those involved in the actual service delivery of programs and interventions a much stronger case can be made. Contributions can be part of a collaborative, two-way process within a community of practice.

In fact this can be taken further to include consumers of the services, those taking part in the interventions. A community of practice is usually defined as a group of people who share a strong interest in an activity, a set of ideas or philosophies. Often in healthcare the community would be made up of interested and involved practitioners but in public health there are sometimes deliberate attempts to engage with the wider community and involve consumer participation. This is strengthened by the requirement by some funding bodies⁶⁹ and grant proposals to include consumers in research.

Public health is about people and is often about changing behaviour. “People change if they believe there is both value in change and that it is achievable”⁷⁰. But it is a complex area, where practice-based evidence deserves greater recognition because essentially this literature can provide valuable insights. Grey literature is often “reflective of knowledge sharing as a collaborative activity among researchers, policy makers and providers”⁷¹.

In reality, effectiveness in childhood obesity prevention very probably lies in community consensus. Flynn¹⁹ has a “Community prevention of obesity” figure which includes a “Sensitivity check”. Essentially this sensitivity check can usefully be applied to all ideas, strategies and interventions to assess if “they empower overweight children and their families to take positive action, are culturally aligned, as well as validate community/population readiness”.

This thesis explores the role of grey literature in obesity childhood prevention interventions: its contribution, recognition, the part it currently plays and the part it could potentially play. Would greater input from the unpublished literature mean that interventions were more closely aligned with previous successes as identified by the

communities with which the interventions sought to engage? For the message to have value and meaning the audience must be known and understood. It needs to be “delivered by a messenger they can trust, in language they are comfortable with”¹⁷ Town meetings, virtual or otherwise, citizen participation and input, practice-based evidence, opinion polls and community surveys can provide invaluable evidence to inform future interventions. Small, locally-run obesity prevention programs can help guide them as well. Change champions who are respected and connected with the community can feed information both ways between the community and those designing the latest intervention strategies and policies. Grey literature can be an integral part of the bottom up information coming from the target community and it can be part of the ensuing unpublished studies and interventions which can balance the evidence.

The objectives of this systematic review question were therefore (i) to evaluate the use of grey literature in systematic reviews on the prevention of childhood obesity and (ii) to determine the impact of grey literature on the findings of these systematic reviews.

Public health interventions are usually implemented directly by government agencies and so the impact of these interventions tends to be measured in observational, rather than experimental, evidence and may not be captured in traditional academic published sources. There is, therefore, a need to determine whether this non-traditional (grey) literature is being actively sought when evaluating the effectiveness of public health interventions through systematic literature reviews (SRs); and also whether the inclusion of grey literature has an impact on the conclusions (outcomes) of these SRs.

This is particularly important as the findings of SRs are increasingly used to inform public health policy decisions. As the prevention of childhood obesity is a major public health issue in developed countries, and has been the subject of numerous systematic reviews, it has been chosen as the topic for this methodological systematic review.

This systematic review was undertaken with the intention of identifying systematic reviews on childhood obesity prevention interventions and with the objective to evaluate (i) their use of grey literature as well as (ii) to determine the impact of grey literature on the findings of these systematic reviews.

Statement of the systematic review question

The systematic review question is: What is the impact of findings from grey literature on the outcomes of systematic reviews on interventions to prevent obesity among children? The objectives of this systematic review question were therefore (i) to evaluate the use of grey literature in systematic reviews on the prevention of childhood obesity and (ii) to determine the impact of grey literature on the findings of these systematic reviews.

Overview of the science of evidence synthesis

In healthcare, information is generated by research and practice, and it becomes evidence when it is validated by a recognised evaluation system or meets agreed upon standards. Evidence synthesis is “the evaluation or analysis of research evidence and opinion on a specific topic to aid in decision making in healthcare”⁷². Evidence can be synthesised in a number of different ways but the process must begin by identification and examination of the existing evidence base. It is crucial when designing a new study to properly identify existing relevant research and yet adherence to this fundamental principle is not a given. In 2011 Robinson examined reports of RCTs published over four decades and discovered less than 25% of preceding trials of prior research were cited⁷³. This absence of citation of previous studies asking the same research question is disturbing on a number of levels. The authors “could not ascertain” why these studies were not included and cited potential implications as “ethically unjustifiable trials, wasted resources, incorrect conclusions and unnecessary risks for trial participants”. This author considers there are several questions that need to be considered: Were the studies found and consulted, but not given citation and recognition? Were the studies not discovered due to a lack of rigour in literature searching? Was the search for studies not undertaken? None of these possibilities are remotely acceptable: previous studies form the bottom line of evidence synthesis science.

Starting with a well-designed question with clearly articulated inclusion and exclusion criteria, and designing and executing a well-constructed search across appropriate databases and resources, researchers should end up with a body of relevant evidence. After assessment using recognised critical appraisal tools a final set of studies are then available for data extraction. For rigour it is recommended that at least two people are involved in the appraisal and extraction process as a check and balance.

How the evidence is synthesised depends of the constituent studies. If they are all RCTs then a meta-analysis is performed and this is a standard approach for quantitative research. Other approaches are designed to manage qualitative research or mixed methods.

Qualitative research evidence is often synthesised as “thematic synthesis, metanarrative synthesis, realist synthesis and critical interpretive synthesis”⁷⁴ and mixed method⁷⁵ synthesis combines one or more approaches to best suit the original studies.

Evidence synthesis is a well-established science, but one that is continually evolving. Pluye⁷⁶ describes the following: “realist synthesis (to provide theory-driven evaluation of public health interventions and programs), critical interpretive synthesis (to build a new theory), meta-narrative synthesis (to establish concepts), and multiple case synthesis (to find patterns across case studies)” – he also discusses “sequential exploratory synthesis” and “sequential explanatory synthesis”⁷⁶ New mixed methods approaches are being developed and documented⁷⁵ in ever more specific and creative forms contributing a rich diversity to the continuing vigorous growth in synthesis science.

Discussion of the methodological basis of the chosen approach

The decision was made to conduct a systematic review of systematic reviews for this topic. Just as a systematic review aims to compile evidence from all relevant studies, a systematic review of systematic reviews (SR of SRs) aims to locate all relevant SRs, matching the author’s intention of inclusivity. Whereas overview and umbrella reviews are to some degree selective of content⁹⁷, the SR of SRs employs an exhaustive and comprehensive search methodology and aims to find and include all SRs that meet the stated inclusion criteria.

In addition, although overviews and umbrella reviews summarise existing evidence from more than one systematic review into a single document, generally little attempt is made to synthesise data on a detailed level. Although their listing of reviews⁷⁷ is necessarily comprehensive, the strength of these review types lies in what the Cochrane Library describes “as a ‘friendly front end’, allowing the reader a quick overview (and an exhaustive list) of Cochrane Intervention reviews relevant to a specific decision”⁶⁵. There are thousands of studies in the area of childhood obesity

prevention intervention and subsequently hundreds of systematic reviews, making this topic an ideal candidate for a SR of SRs.

The literature searches to identify eligible SRs were undertaken across a wide range of databases and resources (see **2.5 Search strategy**) with the aim of capturing studies from the grey literature as well as the published. However, despite extensive efforts, only one of the ensuing 48 SRs which met all the inclusion criteria and survived the final cull, was grey ²⁶. Of these 48 SRs, 13 included a meta-analysis and 35 did not.

For the purposes of this systematic review a mixed methods approach was taken to achieve a degree of meta-synthesis of results from the aggregated SRs. A mixed methods systematic review is conducted using a process whereby “(1) comprehensive syntheses of two or more types of data (e.g. quantitative and qualitative) are conducted or (2) qualitative and quantitative data are combined and synthesised in a single primary synthesis”⁷⁵. In this systematic review the studies were not as clearly defined into two types. They all included explicit BMI and this data was used by every study. The 35 SRs which did not perform a meta-analysis due to what they considered to be significant heterogeneity of constituent studies described their methodologies variously as: narrative synthesis; integrative (research) review; review and critical analysis; “multi-method narrative approach to systematically synthesise complex evidence”; synthesis research study; (critical) narrative review and narrative summary. The authors of these SRs interpreted their BMI data and used it to inform their results, but without numerical analysis.

The data from the 35 SRs without a meta-analysis was tabulated in **Tables 2a-8a** to make it possible to categorise what each one concluded regarding the effectiveness of the interventions they examined. The data from the 13 SRs which included a meta-analysis was tabulated in **Tables 2b-8b**.

Tables 2a-8a. The SRs were arranged within each table by publication year and then by descending number of constituent studies. Those SRs which included some grey studies were shaded to indicate such. These tables provide the SR findings associated with the individual intervention types that were examined, according to the reported strength of the effect of the intervention on preventing obesity (i.e. reducing BMI). This conservative approach with non-meta-analysed studies required all studies included in the SR to evaluate the intervention type and show a statistically significant

impact for it to qualify as effective. The last two columns indicate **Effect** and **Impact**. The **Effect column** provided an abbreviated narrative description of the resultant outcomes of reduced BMI. The **Impact column** states: Statistically significant impact; Inconsistent findings or No impact.

Tables 2b-8b. The SRs that included meta-analyses were arranged within each table by publication year and then by descending number of constituent studies. Those SRs which included some grey studies were shaded to indicate such. The same intervention types are tabulated, and the SR findings for the 13 SRs that included a meta-analysis are also categorised, albeit on the basis of quantitative data. As for Tables 2a-8a, the last two columns for Tables 2b-8b indicated **Effect** and **Impact**. Categorisation used the pooled estimates, with effect sizes interpreted with reference to Ellis⁷⁸. In the **Effect column** standard mean differences (d) and correlational effects (r) were tabulated and conclusions grouped in regard to the size of the effect.

The **Impact column** for both sets of tables uses the **same** terminology: Statistically significant impact; Inconsistent findings or No impact.

Results for the same intervention type have been grouped together. Both a) and b) tables include an Impact/BMI column which has been designed to show the general direction and magnitude of the intervention's effect. **Both** a) and b) tables have an **Impact column** which enables a simplified view of the overall effectiveness of the intervention types and allows for a degree of meta-synthesis of results across all sets of tables (**a-b**)

Grey shading across all Tables also shows grey content at a glance and allows an easy comparison of whether grey findings differed from black (published). For example it requires only a quick glance at **Table 3a Family-based interventions** to note that the grey SRs did not identify qualitatively different findings from the black SRs. It is also a simple matter to remove the grey SRs from a table, eg. **Table 4a Increased physical activity/reduced sedentary behaviour interventions**, to compare the results of an intervention when grey literature is excluded, and in this case to conclude that removal had close to no effect.

A mixed method approach was taken by grouping the same intervention types together. One of chief reasons for using mixed method research is to provide a more complete understanding of the research issue than a single approach would allow.

For further detail of categorisation see: **Data categorisation and synthesis** (Chapter 3)

Key concepts and definitions of terms

Black literature: Literature published in academic journals (in print or electronic form)⁷⁷

BMI (Body Mass Index): Body mass index (BMI) is a measure used to determine childhood overweight and obesity. It is calculated using a child's weight and height¹⁰⁰⁻¹⁰¹.

Childhood obesity: BMI at or above the 95th percentile for children of the same age and sex¹⁰⁰⁻¹⁰¹.

Community of Practice: (CoP) is a group of people who share a professional interest⁷¹

Evidence-based Practice: the thoughtful integration of the best available evidence coupled with clinical expertise: “Evidence-based healthcare is a process that identifies policy or clinical questions and addresses these questions by generating knowledge and evidence to effectively and appropriately deliver healthcare in ways that are effective, feasible, and meaningful to specific populations, cultures, and settings”.⁷²

Grey literature: literature produced outside the commercially published field including dissertations, conference papers, patents, statistics, working papers, government reports^{64,77,88},

Knowledge transfer: the process of moving knowledge from research to practice, the know-do gap^{66,72}

Mixed methods research: commonly mixes quantitative and qualitative research methods⁷⁵

Practice-based evidence: evidence that comes from the field and complements research evidence⁶⁷⁻⁶⁸

Search filters: “evidence based literature search strategies, developed using an explicit methodology and tested using a gold standard test comparison study design”¹⁰⁸

Systematic review: summarises the results of available carefully designed healthcare studies (controlled trials) and provides a high level of evidence on the effectiveness of healthcare interventions. It may or may not include a meta-analysis^{77, 97}.

Chapter 2: The systematic review protocol

Introduction

The chapter outlines the systematic review methods, including an overview of the eligibility criteria, search strategy and description of the processes utilised for critical appraisal, data categorisation and synthesis. The *a priori* protocol for this systematic review is not reproduced here but can be accessed in the JBI Library of Systematic Reviews⁷⁹.

Review question and objectives

The systematic review question is: What is the impact of findings from grey literature on the outcomes of systematic reviews on interventions to prevent obesity among children? The objectives of this systematic review question were (i) to evaluate the use of grey literature in systematic reviews on the prevention of childhood obesity and (ii) to determine the impact of grey literature on the findings of these systematic reviews.

Background

By 2025 obesity rates are predicted to rise in Australia by 65% despite the myriad substantial efforts of a multiplicity of interventions and strategies from the public health sector, particularly those at the community or small unit level.¹ Childhood obesity often persists into adulthood, and these strongly established links to adult obesity along with all the attendant risks, costs and consequences make childhood a natural starting point or a closer examination of prevention literature.²⁻⁴ It also provides a logical focus for early intervention and predictably, an abundance of literature exists in the field.

Obesity is recognised as being a very complex issue⁶⁹, with causes and contributors ranged between “personal choices” and “external forces”⁸⁰ and influenced by “biological, behavioural, social, environmental and economic factors”⁸¹. Recent literature increasingly supports the argument that high level policy, regulation and legislation is required to prevent childhood obesity, and that whole-of-population, whole-of-environment approaches need to be developed and implemented⁸²⁻⁸³ along with multiple and comprehensive interventions. However, while policy: “a set of plans to establish and achieve the desired performance goals of a group or organisation”⁸⁴

abounds, and often confounds⁸⁵ in practice, long-term⁸⁶ successes remain generally elusive.

To be genuinely evidence-informed, policy needs to access systematic reviews which provide summary conclusions derived from their critical assessments and syntheses of the relevant evidence base⁸⁷. There are two types of literature which form this base in systematic reviews, known colloquially as black and grey. Black literature is that which is published in academic, scholarly journals. Grey literature, which is usually defined as "Information produced on all levels of government, academia, business and industry in electronic and print formats not controlled by commercial publishing i.e. *where publishing is not the primary activity of the producing body*"⁶⁴, takes many different forms.⁸⁸ It is essentially documents that have not been formally published, and often have not been peer-reviewed⁸⁹ although many types of grey literature, dissertations and theses for example, undergo review that is at least as rigorous. Research institutes produce working papers, technical and consensus reports, issues papers and policy briefs, all of which constitute grey literature and potentially have valuable content to impart (Appendix II). To be comprehensive and representative a systematic review should include, or at least consider, grey literature and unpublished studies.

Grey studies can be found in publicly available resources like the Cochrane Central Register of Controlled Trials, ClinicalTrial.gov and the ISRCTN registry which include proposed, ongoing and completed studies. Information on unsuccessful interventions and studies with negative outcomes are more commonly unpublished and these are extremely valuable sources for locating trials that have not yet or never been published. In a 2013 BMJ article C.W. Jones⁹⁰ stated that his research had identified 585 registered trials in ClinicalTrial.gov and "171 (29%) remained unpublished". These 171 unpublished trials had an estimated total enrolment of around 300,000 study participants and there is an additional ethical imperative for "timely public dissemination of trial data"⁹⁰

Some of this looks set to change. In the same spirit of accountability and visibility of trials and trial results, the AllTrials campaign was launched at the beginning of 2013 with "calls for all past and present clinical trials to be registered and their full methods and summary results reported"⁹¹. The movement is supported by some of the big publishers like BMJ and PLOS and calls for open access to research data and availability

to all trials. It has enjoyed reporting and coverage in journals like Nature and the Lancet and has gained substantial visibility in mainstream media.

Meanwhile, information about unpublished childhood obesity prevention studies, including the studies themselves, can also be found in a range of other resources. Public policy is driven and informed by “a complex network of knowledge exchange”⁹² including a significant grey literature contribution, originating from a variety of stakeholders. This literature is produced by local, state and national governments and their agencies and authorities. Reports from these sources on projects and programs featuring various interventions proliferate, alongside those from business and academia. Conference papers, presentations and posters remain a largely untapped source in the field: for a variety of reasons it is not uncommon that the only knowledge that a program has been run, is gleaned from information shared at a conference. Many conference presentations never achieve wider dissemination or publication. Dissertations and theses, themselves grey literature, produce rich content that can easily be interrogated for relevant studies due to increasing open access to their electronic full-text via PQDT Open, NTDLD (Networked Digital Library of Theses and Dissertations), Theses Canada, EThOS and DART-Europe.

Even in a climate of increasing open access, researchers are still faced with significant challenges in identifying and accessing grey literature in their field: the efforts do so, in particular if weighed up against the substantial increase in workload, have been summarised by the AHRQ presentation “Is the effort worth the yield?”⁹³ In 1996 Benzie raised the same issue “whether the advantages outweigh the challenges”⁹⁴ and in 2014 Saleh researched “time taken to search grey literature in support of health sciences systematic reviews”⁹⁵. The need for a more structured interrogation process and the development of standards for grey literature searching has gained momentum. Various worthwhile though limited attempts have been made^{28, 96} but the challenge of designing an ordered approach to comprehensively searching such a diverse and diffused body of literature remains.

In the face of a seemingly onerous and often unrewarding task the motivation for the researcher to engage with grey literature needs to be strongly directed and the value of the effort clearly articulated and officially endorsed.

Significantly, recognised international evidence-based health care research collaborations like the Joanna Briggs Institute, the Cochrane Collaboration and the Campbell Collaboration, provide exactly this. In essence they stipulate that, in addition to black literature, searches for grey and unpublished literature must be conducted by their systematic reviewers in order to avoid publication bias.⁹⁷ In addition ERA (Excellence in Research for Australia), administered by the ARC (Australian Research Council) which aims to identify and promote excellence across the full spectrum of research activity in Australia’s higher education institutions, has stated that research reports (GL) will in future be recognised as “research activity”, something which was not previously the case⁹⁸. This is particularly significant as much of childhood obesity research is university-based.

While systematic reviews sum up the best available research on a specific question by “synthesizing the results of several studies,”⁹⁷ decision makers are now often faced with numerous systematic reviews on the same health issue. The next logical and appropriate step is an overview of systematic reviews, to synthesise and summarise the findings⁹⁹; and if the overview is *itself* a systematic review, then the end result should provide stronger and even more comprehensive evidence: the premise on which this thesis is built.

Criteria for considering studies for this review

Types of studies

Systematic reviews of interventions to prevent obesity among children, where there was either a meta-analysis, narrative summary or tabular presentation of results.

Types of participants

The reviews of interest included studies on children aged two to 18 years without (at baseline) a diagnosis of obesity or eating disorders, or co-morbid conditions that predispose to obesity.

Types of interventions

Systematic reviews of public health interventions aimed at obesity prevention that may be applied at the population, community (including schools) or primary care level that searched one or more grey literature source and/or included one or more grey literature studies.

Types of comparators

Systematic reviews of public health interventions aimed at prevention of obesity in children that (1) did not search one or more grey literature sources, and/or (2) did not include one or more grey literature studies.

Types of outcomes

Primary: Obesity prevention measured according to body mass index (BMI, weight/height²) as calculated against a suitable growth reference e.g. BMI range for children or classification per weight category, or relevant age and sex growth classification standards, with classification into underweight, healthy weight, overweight, and obese categories.¹⁰⁰⁻¹⁰¹ Outcomes were grouped according to the type of prevention program implemented and by the presence or absence of grey studies included in the systematic reviews.

Secondary: Ratio of black to grey eligible systematic reviews; ratio of black to grey studies included in eligible systematic reviews; type of grey literature included in eligible systematic reviews; and sources used in the systematic reviews to obtain literature.

Review methods

Databases and information resources searched

The databases searched included: ARIF (Aggressive Research Intelligence Facility): Reviews database & Methodology database; Biological Abstracts; Campbell Library; CINAHL; Cochrane Library; EMBASE; ERIC; Google Scholar; INFORMIT: Education, Health and Social Science databases; Medline/PubMed; PAIS; Proquest; PsycInfo; Scopus; Sociological Abstracts and TRIP (Turning Research into Practice) database. The majority of these databases also index some grey, unpublished literature.

DARE (Database of Reviews of Effects) was searched as part of the Cochrane Library (see above), but additional expert guidance was obtained from their July 2013 listing "What evidence do we have on the treatment and prevention of childhood obesity?" in which they referred to almost 200 relevant systematic reviews on DARE¹⁰². Similarly the "Review of Existing Reviews on Obesity Prevention", Appendix C of the U.S. Institute of Medicine's 2010 publication "Bridging the evidence gap in obesity prevention: a framework to inform decision-making"¹⁰³ was also scrutinised. The

lengthy and comprehensive 2013 report by the Agency for Healthcare Research Quality (AHRQ) "Childhood obesity prevention programs: comparative effectiveness review and meta-analysis"⁸¹ was similarly consulted.

Additional databases searched specifically for unpublished systematic reviews included: EPPI Centre (particularly Obesity and Sedentary Behaviour Database); Google Advanced Search; Google Books; GreyNet; Mednar; Scirus; Social Care Online (SCIE); TROVE (for Australian theses and books) and WHOLIS. A search for theses that included systematic reviews on interventions to prevent obesity among children was conducted in PQDT Open; NTDLD (Networked Digital Library of Theses and Dissertations); Theses Canada and EThOS (Electronic Theses Online Service). Major international institutional repositories were also searched including the Institutional Research Repository (U.K.). Journals that were hand searched included Childhood Obesity, International Journal of Pediatric Obesity, Obesity, and Obesity Reviews.

A number of organisational and government websites were also searched and these are listed in Appendix III.

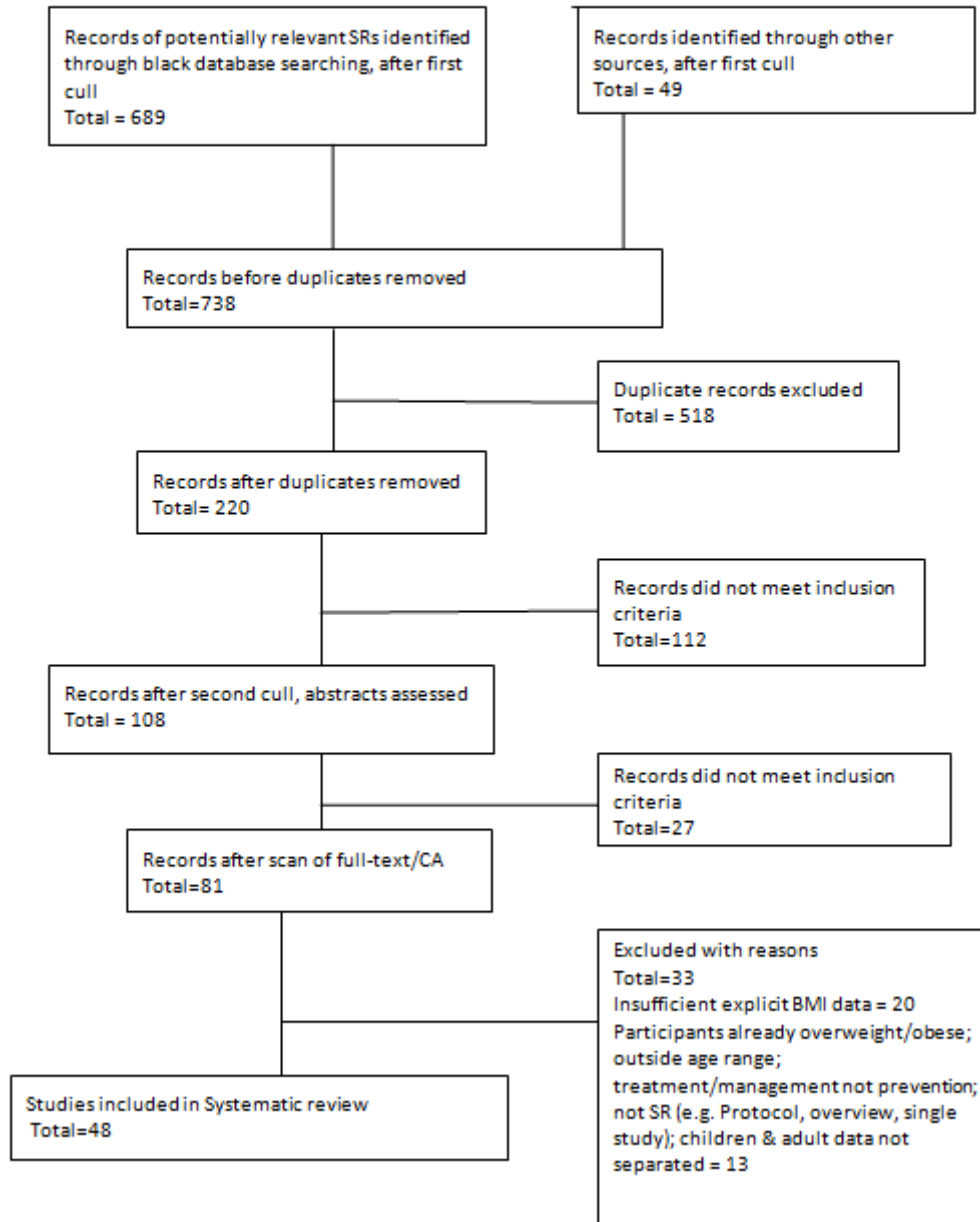
Search strategy

Initial search keywords used were: (Obesity or obese) AND (Child or paediatric or pediatric or adolescent or youth or infant) AND (prevent* or intervent*) AND (systematic review or meta-analys* or meta analys*). Where a thesaurus of descriptors or index terms existed, or the ability to "explode" headings, or limit to years of publication and/or document type, full advantage was taken of these database-specific features. Searches comprised of a combination of keywords and other available options designed to maximize the chances of retrieval of eligible studies. An example of a completed reproducible search strategy executed in Medline is appended to the systematic review report. (Appendix IV)

The searches for this systematic review had an end date of December 2012, although two expert sources were referred to after this date for confirmation and clarification. The authority of the resources (DARE, AHRQ) was such that, although they appeared after the cut-off date, the need to be aware of their findings was felt to be incontestable.

Search retrieval

Figure1: Search results flow diagram



Study selection

All study titles and abstracts were imported into reference management software (EndNote), duplicates removed and each title/abstract reviewed according to the pre-specified inclusion criteria ('first cull'). The full-text of each potentially relevant systematic review was then retrieved and again reviewed for eligibility according to the inclusion criteria. Reasons for exclusion were documented. In cases where eligibility was uncertain a consensus was reached with secondary reviewer (LH). A final database of included systematic reviews was produced. A PRISMA flowchart was constructed to depict the study selection process to facilitate transparency (Figure 1).

Reasons for study exclusion: Participants were already overweight or obese at baseline; participants had a co-morbid condition which predisposed obesity; studies where obesity "prevention" was actually treatment, management or control; the study was not a SR; not in English; participants ages were outside those stated; outcomes for children and adults were unable to be separated in studies on both; outcomes for prevention of diabetes and obesity unable to be separated in studies on both; interventions were medical, surgical or pharmacological. Out-dated versions of SRs were excluded as ineligible, with only the most recent version selected; a small number of previously undetected duplicates were removed. In the final selection a number of studies required close examination of the primary text to determine whether there was explicit reporting of BMI (or similar measures) as required for inclusion.

Of the 48 selected SRs only two were not published in journals. These were a Cochrane publication and the only grey SR, produced by APHCRI (Australian Primary Healthcare Research Institute). Appendix V lists the journals which published the selected SRs, in descending numerical order, and is used to illustrate that apart from the clear dominance of Obesity Reviews (a specialist journal) there is considerable variety in research areas and subspecialties, country of publication and language. Forty six of the systematic reviews were published in 31 different journals.

This is supported by the selection of obesity as a key "multidisciplinary domain" to illustrate and exemplify a recently published framework exploring the knowledge structure of research fields. The authors¹³² noted an "increasing trend of interdisciplinary research conducted within the obesity domain". They stated that over the

last 20 years authors from over 130 countries have produced journal articles, papers and studies in this area of research, which have appeared in a diverse range of journals and other sources, across a wide range of disciplines. This underlines the need for researchers to conduct literature searches across multiple databases from numerous disciplines in their endeavours to capture published (and unpublished) output.

Critical appraisal

Initial appraisal and selection of systematic reviews was performed as described and recorded in the PRISMA flowchart (Figure 1). Systematic reviews selected for retrieval were assessed by two independent reviewers for methodological validity using the Joanna Briggs Institute (JBI) Critical Appraisal Checklist for Systematic Reviews (Appendix I). Consensus was reached with LH and each systematic review was allocated an averaged appraisal rating. All eligible systematic reviews were appraised and none excluded on the strength or otherwise of their rated score.

Data extraction

Data were extracted using author-designed topic-specific extraction forms. For each systematic review the following was extracted: author, title, publication year, total number of studies, setting, study population, effectiveness (using BMI as outcome measure) and type of interventions, sources searched (grey or black) and date range of searches. This data was tabulated in Table 1 Characteristics of included systematic reviews.

Language or publication limitations, study type, search strategy and other searching information (including acknowledged involvement of librarians in search teams) were collated in the author-designed forms. In addition, for the systematic reviews which did not include meta-analyses, statements were extracted regarding impact and effectiveness of interventions in reducing BMI, in addition to general comments on their perceived success or otherwise of the interventions. This information was used in Tables 2a-8a to add depth and context in relation to Effect and at times to clarify Impact.

Sources searched (from Table 1) were listed in Appendix VI with a detailed description of their stated aim and content, and an asterisk indicates whether they included grey literature. If possible the type of grey literature was described. This Appendix adds to

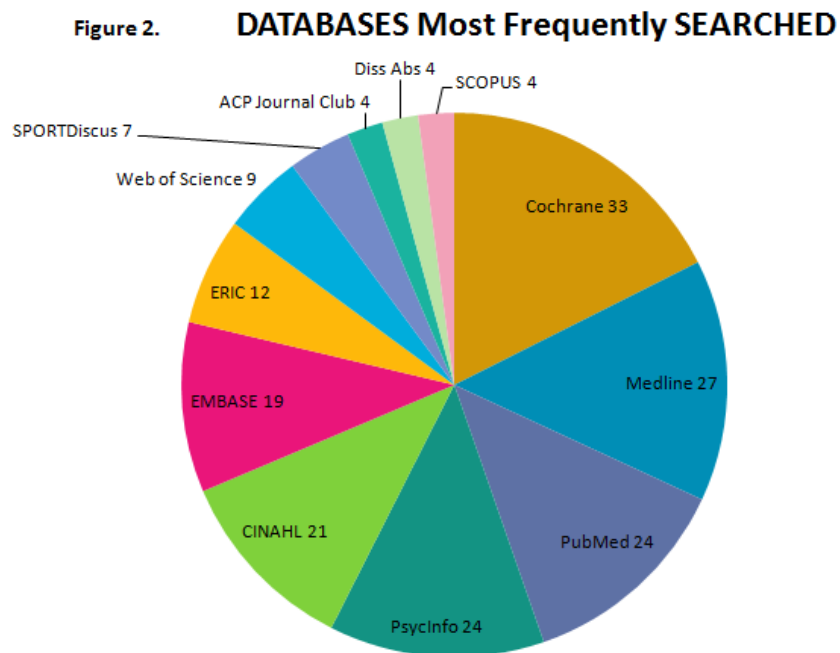
the body of knowledge around obesity research and the multiplicity of relevant sources which provide access to published and unpublished evidence. It could usefully serve as a core list of databases for interested researchers as it provides comprehensiveness gleaned from the field.

Descriptive data related to the interventions were often poorly articulated or vague making it difficult at times to attribute them to the seven categories based on activities and settings selected for this research and reported in Tables 2 a-b to Tables 8a-b. Often a number of the categories: health/lifestyle education; family- involved; increased physical activity/decreased sedentary behaviour; school-based; community-based; nutrition/dietary and multi-component, applied. It was sometimes necessary to go back to a systematic review time and again, and to make notes to support decision making. For example, for the purposes of this report it was decided that after-school programs, if directly following the school day and on the school premises would be classified as School-based. If they were held outside the school, particularly if other stake-holders were involved, they would be classified as Community-based. If parents came along and helped they would be classified as Family-involved, and so on.

One systematic review included a number of studies which related to obesity prevention and others that related to obesity treatment. In this case the data was tabulated separately and able to be extracted but other systematic reviews were excluded from this research due to a lack of demarcation in presentation of results.

There were also expected challenges in the area of extraction of outcome data as it was represented and reported in a wide variety of formats and required considerable effort to extract what was relevant to this research. Statistical data relating to outcome was often difficult to extricate from the surrounding documentation and a recommendation of this reviewer includes a plea for future researchers to present this data in a more standardised, accessible format. A second reviewer (TM) with statistical expertise played an invaluable part in ensuring the accuracy of the data extracted during this process.

Wherever possible during the extraction process the grey literature element was considered. Databases and sources were classified as grey or black (Appendix VI) and the most frequently searched databases, as identified by the systematic review authors, are indicated in Figure2.



Search strategies were also scrutinised and comments directly related to grey literature were extracted.

In a further effort to quantify the grey influence all 674 constituent studies from the 48 systematic reviews were extracted and tabulated in Appendix VII. This document also records whether the studies are black or grey and how many times (and by which systematic reviewers) they have been included. This information allows the degree of duplication to be generally observed as well as the overall ratio of grey to black within the total constituent studies. The proportion of grey to black within each systematic review was also calculated. A detailed breakdown (Figure3) and discussion can be found in Chapter 3 Results: Incorporation of grey literature.

Data synthesis

The objective of this systematic review was to determine the impact of grey literature on review results. For each type of childhood obesity prevention program an assessment of the concordance of pooled (meta-analysed) BMI results between grey and black systematic reviews was undertaken (i.e. overlapping confidence intervals of the pooled results, and evaluating the agreement of findings/discrepancy in findings). However, the number of grey systematic reviews proved to be extremely limited, therefore for the purposes of this research it was decided that the 10 SRs^{6-7,17,19,26,28,34,40,46-47} which included some grey studies in their reviews would represent the grey element. Figure 3. "GL incorporated into SRs" shows the grey studies as a percentage of each SR's total studies: these range from Hearn's²⁶ 77.7% to Flynn's¹⁹ 1.6% evidence-based

The body mass index results (whether presented as a mean difference in BMI or difference in proportions of underweight, healthy, overweight or obese), from systematic reviews that did or did not present a meta-analysis, were grouped according to type of obesity prevention program implemented. All systematic reviews were required to have used BMI as a measure even if, in the case of those which did not perform a meta-analysis, the final results were not specified in those exact terms. Those systematic reviews without explicit BMI were excluded from the final 48 were selected. Patterns or trends in pooled results according to the increasing levels/ratios of grey literature in the included systematic review were investigated. Where pooled results were not presented in the systematic reviews, it was assessed whether the direction of the reported findings differed according to the amount of grey literature incorporated into the systematic review. This was achieved by calculating the effect of removing the grey studies from the meta view graphs and comparing the direction with that where both grey and black studies were included.

For example: **Tables 6a-6b** Community-based interventions were found in 21 SRs and represented a total of 84 studies. Their overall impact as described in the 19 narrative SRs can be expressed as: five SRs reporting consistent statistically significant decreases in BMI, six SRs describing inconsistent findings and eight SRs reporting no impact on BMI from community-based interventions. 26% of the SRs overall found that community-based interventions were effective at reducing BMI (**Table 6a**).

When the five SRs which include grey literature (GL) were removed from the table, four SRs with statistically significant results (decreased BMI) remained in a total of 14, i.e. 29%. The Table shows each Intervention in a different row and grey shaded columns indicate inclusion of grey literature. Comparisons within an intervention can be made by reading across the table row by row, or down each column to compare interventions with excluded GL, included GL (narrative or meta-analysed) and with each other.

As the eligible systematic reviews were likely to include studies presented in the other SRs in the evidence base (i.e. duplicated data) the author extracted and compiled **“All included studies in the systematic reviews”** from all SRs (k=674) and classified them according to whether they were black or grey, their publication type, and which review/author (s) had included them. In this way it was possible to determine that there was a degree of overlap with the studies used by the SRs: one study¹⁰⁴ framework was included in 16 of the 48 SRs and four others were included in 13 SRs. Although the majority of constituent studies were unique, with 518 (77%) contributing to only one systematic review and a further 75 studies (11%) selected by two systematic reviews, all 47 systematic reviews drew their studies from the same set of studies. Appendix VII is an abridged version of “All included studies in the systematic reviews” with citing authors names replaced with the number of citing authors, for brevity. The more complete table is available from the researcher, on request.

Calculating the degree of duplication beyond the limits of the information documented in Appendix VII is outside the scope of this research, although the relationship between shared studies in selected SRs is further examined in the Results section to illustrate other points for discussion. It was not appropriate to meta-analyse the pooled body mass index results for the same interventions reported in these systematic reviews as it would result in double-counting. Data for each of the other pre-specified outcomes were extracted from the studies, tabulated or graphed, and the results were discussed narratively.

Where possible, the sources used to obtain the grey (and the black) literature in the included SRs were categorised (Table 1: Characteristics of included Systematic reviews, column 6)

Most systematic reviews listed the databases and other resources they had searched or consulted, and some stated that they consulted reference lists, government sources,

conference publications, experts and organisations. These are all noted in Table 1. This categorisation enables a visual check to ascertain whether searching was undertaken in attempts to locate unpublished evidence, and what sources were accessed. Appendix VI documents all of the information sources identified in Table 1 and details the content of each source, including a full description of grey and black component evidence.

No systematic reviews were identified that compared findings obtained from grey and black literature. However the ratio or proportion of grey to black studies included in each systematic review was calculated as a percentage of the whole (Figure 3).

Chapter 3: Results

Introduction

This chapter contains detailed descriptions of the studies included in this systematic review, an overview of the studies and methodological issues of included and excluded studies. In Results are presented Outcomes of interest (types of outcome), Data categorisation and synthesis, Interventions by focus and setting, Incorporation of grey literature and Table 1: Characteristics of Included Systematic Reviews.

Description of studies

Two hundred and twenty systematic reviews were identified as potentially eligible for inclusion in this review and on final assessment 48 systematic reviews⁵⁻⁵² met the inclusion criteria (Figure 1). These are detailed in eight columns in Table 1: Characteristics of Included Systematic Reviews. Studies are arranged alphabetically by author (with year) with additional columns for number of studies, study type/comparisons (setting), population, sources searched (black), sources searched (grey), search dates and quality assessment (based on JBI Critical Appraisal checklist for Systematic reviews, Appendix I).

The 13 systematic reviews that included a meta-analysis are indicated with a parenthetical note in column 1 of Table 1. The one systematic review by Hearn, which is grey, is indicated with a superscript 'G' by the author's name.

Overview of studies

The search strategy for retrieving eligible systematic reviews had no date limitation with an end searching date of December 2012: the original 220 studies ranged from 2012 to as early as 1985. The final 48 included systematic reviews ranging in date from 2002-2013, the 2013 studies^{8,24} being the final published versions of 2012 pre-prints. Although the original 220 systematic reviews included 19 (8.64%) from the grey literature (book chapters, dissertations, reports, conference papers) only one of these made the final cut.

The Characteristics of Included Systematic Reviews (Table 1) indicates which SR²⁷ is 'grey' (i.e. searched and/or included grey literature) and how many studies were included in each SR (ranging from ¹⁰Bond's seven to ¹⁹Flynn's 158). The reviewer went

on to extract and compile a Table of all Included Studies from all SRs (674 in total) and classified them according to whether they were black or grey, their publication type, and which review/author (s) had included them. This analysis demonstrated that 58 of the contributing 674 studies, or 8.6%, were grey literature.

Table 1 also indicates which types of prevention interventions were evaluated in each SR. A closer examination of interventions was made during data extraction to allow further categorisation. The recent 800+ page comprehensive AHRQ systematic review⁸¹ clearly illustrates the challenge of categorizing obesity prevention interventions as they often involve multiple components and overlapping, inter-connected settings. For this reason a simplified approach was taken to identify the core setting and intervention type.

Thirteen of the included SRs included at least one meta-analysis and the other 35 did not. Types of interventions are listed where possible. The most common interventions were increased physical activity (PA) of various types, reduced sedentary behaviour (SB), dietary change and/or nutritional information/health education, with many interventions aimed at behavioural, environmental or policy change. Other interventions included electronic media/games, counselling, reminders and reward/recognition. Parents, peers and families were often part of the total approach and many interventions were multi-component.

Table 1 also includes two columns relating to black and grey sources searched by each SR. A grey source was defined as any resource or database that included some grey literature (unpublished component). Appendix VI lists and defines the content of these information sources and indicates grey content (asterisked).

Table 1: Characteristics of Included Systematic Reviews

(Study no.) Author date	Studies	Study type/ comparisons (Setting)	Population	Sources searched (Black)	Sources searched (Grey /some Grey content)	Search dates	Quality Assessment
(1) Al Marzooqi 2011	k=22	k=10 focused on individual behaviour change; k=12 incorporated nutrition policy changes (S)	6 - 12 yrs International	Google Scholar, PubMed	Google Scholar	2004-2009	Moderate
(2) Annesi 2010 (meta-analysis)	k=16 YMCA Associations (U.S.)	k=16 increased voluntary PA, nutrition information, with self-management training to promote behavioural change (C)	5 - 12 yrs U. S.	Published Youth For Life (YFL) studies	Unpublished YFL studies	2005-2008	Strong
(3) Barr-Anderson 2012	k=27	27 studies with some degree of family involvement & data specific to Afro-American girls (S,C)	27 studies with some degree of family involvement & data specific to Afro-American girls (S,C)	AGRICOLA, AMED, BA, BIOSIS Previews, CINAHL, Cochrane Library, EMBASE, ERIC, Health Source: Nursing Academic, MEDLINE, Population Index, PsycArticles, PsycInfo, PubMed, ScienceDirect, SCOPUS, SPORTDiscus, TRIP, Web of Science, Bibliographies.	AGRICOLA, BIOSIS Previews, CINAHL, Cochrane Library, DAI, ERIC, Population Index, PQDT, PsycInfo, ScienceDirect, SCOPUS, SPORTDiscus TRIP, TRIS, Web of Science	No limit (i.e. to 2012)	Moderate

(4) Bautista-Castano 2004	k=14 Mainly U.S	k=12 school-based, k=2 community-based. k=7 included interventions with parental participation; control groups. (S)	0-18 yrs	ACP Journal Club, Bandolier, Clinical Evidence, EBMR, MEDLINE, specialist journals available to authors	Not stated	1993-2003	Moderate
(5) Bluford 2007	k=7	k=2 (treatment). k=5 (prevention) interventions used multi-component strategies and variety of settings freq. including parents as change agents (C)	2-6 yrs	Chronic Disease Prevention File (U.S. Govt.), CINAHL, Current Contents, EMBASE, MEDLINE, PsycInfo, Soc Abs	Chronic Disease Prevention File (U.S. Govt.), CINAHL, Current Contents, PsycInfo, Soc Abs	1966-2005	Strong
(6) Bond 2010	k=7	k=7 studies on 4 RCTs; 3 included PA components. Comparators were usual care, general health education, home-based parenting skills course and 1 hour Physical Education session.(C)	Under 5 yrs (UK, USA, Thailand)	CAB, Cochrane Library, EMBASE, HMIC (Ovid), MEDLINE, MEDLINE In Process, NIHR CRN database, PsycInfo, Science Citation Index,	CAB, Clinical Trials.gov, Cochrane Library, Conference Proceedings Citation Index , Controlled Trials.com, NIHR CRN database, PsycInfo	1990-2009	Strong
(7) Branscum 2011	k=9	k=9 health education and promotion interventions. k= 5 RCTs, k= 4 pilot or quasi-experimental studies (S)	Hispanic children	CINAHL, ERIC, PubMed	CINAHL, ERIC	2000-2010	Moderate

(8) Branscum, 2012	k=25	25 school-based studies, (20 after-school interventions) Most included PA & dietary behaviours. (S)	Middle school, mainly 4 th -5 th graders.	Academic Search Premier, Health Source: Consumer Edition, Health Source: Nursing Academic Edition, MEDLINE, SPORTDiscus	Academic Search Premier, Health Source: Consumer Edition, SPORTDiscus	2006-Sept 2011	Strong
(9) Brown, 2008	k=38 (23 studies from previous study + additional 15)	Life-style interventions (incl. healthy eating, increased PA, reduction in SB, behav. therapy, social support and education) and comparators usual care or another active intervention (S)	5-18 years (US, UK, Australia, Germany et al.)	EMBASE, MEDLINE	(updates and includes previous NICE guideline which states "A range of UK government, government agency and non- governmental organisation websites were also searched")	2006-Sept 2007 (updating 1990-2005)	Moderate
(10) Cook- Cottone, 2009 (meta-analysis)	k=40	66 comparisons from 40 school-based studies (S)	Pre-school – Grade 12	Academic Search Premier, CINAHL, CDSR, MEDLINE, PsycInfo. Reference lists	Academic Search Premier, CINAHL, PsycInfo	1997-2008	Moderate
(11) De Bourdeaudhuji 2010	k=27	11 interventions (reported in 27 studies) combining nutrition and PA approaches (S)	6-18 years Europe	CINAHL, Cochrane Library, MDConsult, PubMed, Web of Science, Reference lists	BNBRL, CINAHL, Cochrane Library, SIGLE, Social Care Online	1990-Dec. 2007	Strong
(12) De Mattia, 2006	k=12	k=6 clinic-based k=6 population-based. Interventions to reduce SB & control adolescent weight (C)	Children & adolescents	CDSR, CINAHL, HealthStar, MEDLINE, PsycInfo	CINAHL, HealthStar, PsycInfo	1966-June 2004	Strong

(13) Doak, 2006	k=25	School-based studies intervening on either diet or activity-related behaviour. Control usual care (S)	6-19 years	MEDLINE, personal contact with authors, manual searching of bibliographies	Internet searches, personal contact with authors, manual searching of bibliographies	To June 2003 then updated to Aug 2005 (+.Alexandrov study 1992)	Moderate
(14) Flodmark, 2006	k=39	Interventions (24 + 15 from previous study) using 1 or more of: education (health, nutrition, lifestyle); counselling. Changes in: diet, PA, reminders, contact or follow-up. Compared with usual care or education (S,C)	5-14 years (International)	Cochrane Library, PubMed. Journals (unspecified); reference lists.	Cochrane Library (NHSEED)	2001-May 2004 (search then combined with results from other SRs -includes Puska study 1982)	Strong
(15) Flynn, 2006	k=158	158 studies (147 interventions). (S,C,H)	Majority of participants in each intervention <17 years.	ACP Journal Club, AGRICOLA, CDSR, CINAHL, DARE, CCRCT, EMBASE, ERIC, HealthStar, MEDLINE, Pre-MEDLINE, PAIS, Population Index, PsycInfo, Soc Abs, SPORTDiscus. Hand-search of International Journal of Obesity; reference lists	AGRICOLA , CCRCT, CINAHL, ERIC, PAIS, Proceedings First, Population Index, PQDT, PsycInfo, Soc Abs. Internet searches of 22 relevant domestic & foreign organizations websites; Google Advanced search; expert opinion	1982-2003	Strong
(16) Friedrich, 2012 (meta-analysis)	k=23	k=16 evaluated effort of PA, NE or both as intervention. k=5 PA only, k=2 NE only (S,C)	Students 4-19 years.	Cochrane Library, EMBASE, LILACS, PubMed, SCOPUS, Web of Science	Cochrane Library, LILACS, SCOPUS	1998-August 2010	Strong

(17) Gao, 2007	k=20	k=14 children & adolescents (of these 8 focused on overweight or obese children). Indicated in results reported separately. k=6 adults.(C)	Community-based, 2 years- adults, Chinese	ACP Journal Club, AMED, British Nursing Index, CBM, CINAHL, CJFD, CMCC, Cochrane Library, EMBASE, INSPEC, MEDLINE, PsycInfo,	CBM, CDC, CINAHL , Cochrane Library, INSPEC, national & local govt. websites, published conference reports, PsycInfo	1994-June 2006	Moderate
(18) Gonzalez-Suarez, 2009 (meta-analysis)	k=19	19 studies of interventions to increase PA improve dietary behaviours, modify poor exercise and dietary behaviour or combination of above. Control: usual treatment.(S)	School-based (children & adolescents)	AMED, Austhealth, BioMedCentral, CINAHL, Cochrane Library, Current Contents, EBMR, EMBASE, HealthSource: Nursing Academic, MEDLINE, PsycInfo, PubMed, ScienceDirect, SCOPUS, TRIP, Academic Search Elite. Reference lists & bibliographies	Austhealth, CINAHL, Cochrane Library, Current Contents, PsycInfo, SCOPUS	1995 -2007	Strong
(19) Hamel, 2012	k=15	Studies were directed towards improving some type of eating behaviour i.e. fruit & vegetable consumption as against usual behaviour. 10 web-based, 5 computer-based (S,C)	6-18 years	CINAHL, Cochrane Library, ERIC, PsycInfo, PubMed, Proquest 5000.	CINAHL, Cochrane Library, ERIC, Proquest 5000, PsycInfo	1998-2011	Strong

(20) Harris, 2009 (meta-analysis)	k=18	RCTs, CCTs that evaluated school-based exercise or PA in regular class time and lasted min. of 6 months. Control groups must have not rec'd intervention & continued with existing PE curriculum (S)	School-based, 5-18 years	CCRCT, CINAHL, EMBASE, MEDLINE, reference lists, hand-searched Pediatrics, Journal of Paediatrics & Archives of Pediatric & Adolescent Medicine 2003-Sept 2008	CCRCT, CINAHL	to Sept 2008	Strong
(21) Haynos, 2012	k=29	Clinical trials with universal/primary approach (with a wide variety of intervention targets) and use of control condition (no intervention or alternative treatment group)(S,C)	to 18 years International	MEDLINE, PsycInfo	PsycInfo	Not stated [1993 – 2010, study range]	Weak
¶(22) Hearn 2006	k=45	45 interventions (emphasis on 11 most promising) with a range of options for use in clinical, child-care, home & community settings (S,C,H)	2-6 years, Australian & International	CDSR, CINAHL, ERIC, Expanded Academic ASAP, Highwire Press, InfoTrac, Ingenta, MEDLINE , Proquest 5000, Proquest Education Complete, PubMed, Science Direct, Swetwise, Wiley InterScience	Australian Collaboration for Health Equity Impact Assessment, Catalogue of UNESCO Publications, CHRC, CINAHL, CISTI, ERIC, Expanded Academic ASAP, GrayLit Network, GreyNet , InfoTrac, Ingenta, PHP, SIGLE , University Libraries. WHOLIS	1990 to February 2006	Strong

(23) Hendrie, 2012	k=15	15 studies of interventions delivered to both home & school/community setting, targeting obesity and weight-related nutrition and PA, and including a behaviour component.(S,C,H)	1-18 years	Cochrane Library, (as per Golley, 2011), PubMed, Web of Science, PsycInfo. Reference lists of relevant publications.	Cochrane Library, DAI, PsycInfo, Web of Science.	1998-2010	Strong
(24) Hudson 2008	k=28	28 studies of innovative, culturally-specific interventions, targeting children's lifestyle behaviours.(S,C,H)	2-18 years, African-Americans	CINAHL, MEDLINE, PsycInfo	CINAHL, PsycInfo	1997-2007	Moderate
(25) Ickes 2011	k=18	18 interventions of social, behavioural and environmental approaches (S,C)	To age 18, African-Americans	CINAHL, ERIC, PubMed,	CINAHL, ERIC	2005-2010	Moderate
(26) Kamath 2008 (meta-analysis)	k=34	k=34 RCTs of changing lifestyle behaviours (increased PA, decreased SB, increased healthy dietary habits, decreased unhealthy dietary habits). Control groups (S,H)	2-18 years	CCRCT , CINAHL, EMBASE, ERIC, MEDLINE, PsycInfo, Science Citation Index, Social Science Citation Index, reference lists, expert suggestions	CCRCT, CINAHL, DAI, ERIC, PsycInfo, CCRCT	To Feb 2006	Strong

(27) Kanekar 2008 (meta-analysis)	k=5	k=5, school-based diverse interventions, including education, PA, playground marks, provision of fruit, filtered water, diet, reduced intake of soft drinks. All studies included a no-intervention control group (S)	Students to 18 years, U.S. or U.K.	CINAHL, MEDLINE	CINAHL	2000-2007	Moderate
(28) Katz 2008 (meta-analysis)	k=19	19 studies (21 papers) with 8 included in meta-analysis. Control is usual care. Interventions related to nutrition, PA, reduction in TV viewing or combinations thereof. Parental involvement considered (S)	3-18 years in school setting	CINAHL, Cochrane Library, EMBASE, HealthStar, MEDLINE, PsycInfo, reference follow-up and prominent authors	CINAHL, HealthStar, PsycInfo	1966-Feb 2000 (then to October 2004)	Strong
(29) Kesten 2011	k=30	30 studies designed to modify a combination of diet, PA, knowledge, attitudes or health-related behaviours associated with obesity. (S,C)	Girls 7-11 years, any country or ethnic background	Biological Sciences, MEDLINE, Physical Education Index, PsycInfo, SPORTDiscus, Web of Science,	Biological Sciences, Physical Education Index, PsycInfo, SPORTDiscus, Web of Science,	1990-17 Feb 2010	Strong

(30) Kreichauf 2012	k=19	Studies of educational strategies used by teachers to promote PA. Some gave more opportunity for PA some altered environment. Control group is normal activity (C)	Children in pre-school setting	ERIC, FIS Bildung, PsycInfo, PSYINDEX, PubMed,	ERIC, FIS Bildung, PsycInfo, PSYINDEX	To August 2010	Moderate
(31) Kropski 2008	k=14	k=14 school-based interventions: 1 nutrition only, 4 PA promotion and 11 combining nutrition and PA components (S)	Children aged 4-14 years in school setting	Biological Abstracts, Education Abstracts, PubMed, references, personal communication with researchers	Biological Abstracts, Education Abstracts	Jan 1990-Dec 2005	Strong
(32) Lavelle 2012 (meta-analysis)	k=43	43 studies on school-based interventions aiming to reduce BMI; including a control group with no intervention or normal activities (S)	Children ≤ 18 years International	MEDLINE, EMBASE	None stated	To Feb 2011	Weak
(33) Lee 2008	k=32	32 studies of which 25 addressed active commuting (walking, cycling) and PA, 18 active commuting & weight, & some both (C)	Children 5-18 years International	Google Scholar, PubMed, SPORTDiscus, TRIS. Journal hand-searching, reference lists	Google (Scholar), SPORTDiscus, TRIS, and Internet sources	To Dec 2007	Moderate

(34) Leung 2011	k=12	3 studies focused on SB, 1 on PA, 6 combined SB and PA, 2 SB, PA and diet (S,C,H)	6 to 19 years, School or community settings	Cochrane Library, MEDLINE, PsycInfo, PubMed, references	Cochrane Library, PsycInfo	1980-April 2011	Moderate
(35) Lissau 2007	k=14	Studies had focus on increased or decreased PA, nutrition, diet SB or combination. All had control group (S)	School children (not pre-school) International	EMBASE, ERIC, NHSEED, PsycInfo, PubMed,	ERIC, NHSEED, PsycInfo	1995-2005	Moderate
(36) Monasta 2010	k=17 studies (7 RCTs)	4 trials in pre-school setting, (one with educational component, 2 with PA component, 1 both). 2 trials were family-based with educ./ counselling for children & parents, 1 in maternity hospital (S,C,H)	Under 5 years	CCRCT, CINAHL, DARE, EMBASE, MEDLINE, PsycInfo, Web of Science, references.	CCRCT, CINAHL, DARE, PsycInfo, Web of Science, experts	To August 2008	Strong
(37) Nelson 2006	k=19	Studies compared sport participants on weight status, physical activity and diet (S)	6-18 years	PubMed, Google Scholar, cross-checked citations in Web of Knowledge.	Google Scholar, Web of Knowledge	To Feb 2011	Strong

(38) Nguyen 2011	k=24	24 studies compared interactive electronic media interventions for obesity prevention or treatment (15 prevention, 9 on treatment, results presented sep.) studies with inclusion of comparison group noted (C,H)	Children and adolescents	A= Education, ACP Journal Club, APAIS, CBCA Education, Cochrane Library, EBMR, EMBASE, ERIC, LLBA, MEDLINE, Proquest 5000, PsycInfo, SCOPUS, Web of Science, references lists	A= Education, APAIS, Cochrane Library, ERIC, PsycInfo, SCOPUS, Web of Science, SPORTDiscus, national health websites, book chapters, dissertations	To March 2010	Strong
(39) Perez-Morales 2012	k=10	10 studies (7 RCTs) on obesity prevention interventions among Hispanic children in U.S. (S,C,H)	Low-income Hispanic children	CINAHL, EBSCO databases, PubMed	CINAHL	Jan 2001-Jan 2012	Strong
(40) Seo 2010 (meta-analysis)	k=40	40 trials with 1-4 components of energy consumption or expenditure, SB reduction, counselling, medication. (S,C,H)	6-19 years, U.S minority children. Clinic, school, family or community-based	Academic Search Premier, CINAHL, ERIC, Health Source: Nursing Academic, MEDLINE, PsycArticles, SPORTDiscus, reference lists, manual searches for eligible reports	Academic Search Premier, CINAHL, ERIC, SPORTDiscus, manual searches for eligible reports	Jan 1980- July 2007	Strong
(41) Silveira 2011	k=24	RCTs conducted in schools- BMI and fruit and vegetable intake primary and secondary outcome measures. Intervention and control groups were contemporaneous (S,H)	School-based, 5-18 years, international	ASSIA, CCRCT, CINAHL, EMBASE, ERIC, LILACS, Physical Education Index, PsycInfo, PubMed, Social Care Online, Social Services Abstracts, Soc Abs, SPORTDiscus, Web of Knowledge	ASSIA, CCRCT, CINAHL, ERIC, LILACS, Physical Education Index, PsycInfo, Social Care Online, Social Services Abstracts, Soc. Abs, SPORTDiscus, Web of Knowledge	To May 2010	Moderate

(42) Stice 2006 (meta-analysis)	k=64	RCTs evaluating obesity prevention programs/trials; with relevant comparison group, logistic regression or survival model (S,H)	Up to 22 years to capture college-based programs	MEDLINE, CINAHL. Hand-searching specialist journals, reference lists of relevant reviews, unpublished articles	CINAHL, DAI, PsycInfo, unpublished articles	1980-Dec 2005	Strong
(43) Van Cauwenberghe 2010	k=42	Included studies evaluated educational programmes, environmental modifications or combination. Most classroom-based with some family involvement.(S)	6-18 years, school setting, European	CINAHL, Cochrane Library, MDConsult, PubMed, Web of Science, reference lists, hand-searching specialist journals	BNBRL, CINAHL, Cochrane Library, SIGLE, Social Care Online, Web of Science, BNBRL, websites of research groups	Jan 1990-Dec 2007	Strong
(44) Van Grieken 2012 (meta-analysis)	k=34	Studies of single or multiple health behaviour interventions, centred on decreasing SB, with control or non-intervention group.(S)	0-18 years	CDSR , EMBASE, PsycInfo, PubMed,	PsycInfo	Dec 1989-March 2011	Strong
(45) Verstraeten 2012	k=25	25 school-based studies targeting PA, diet or both, with control group (S)	6-18 years, low-middle-income countries	Cochrane Library, EMBASE, PubMed, Web of Science	Cochrane Library, Web of Science	Jan 1990-July 2011	Strong

(46) Waters 2011 (meta-analysis)	k=55	55 studies of educational, health promotion (including community-based) psychology, behavioural, therapy, counselling or management strategies with non-intervention control group with usual care (S,C)	<18 years	CCRCT, CINAHL, EMBASE, MEDLINE, PsycInfo, experts contacted	CCRCT, CINAHL, PsycInfo, websites searched, experts contacted	2005-March 2010	Strong
(47) Wilks 2010	k=14	14 studies on children and adolescents (4 intervention studies, 10 observational studies). SR includes adult studies dealt with separately (S,C,H)	Children, adolescents, adults	PubMed, hand-searching reference lists	None stated	Jan 2000-October 2009 (updating 2 previous reviews)	Moderate
(48) Zenzen 2009	k=16	16 studies of interventions: dietary, PA, healthy lifestyle education and/or had parental involvement, or were guided by theoretical framework. Control groups usual care.	4-18 years, school-based	CINAHL, MEDLINE, PsycInfo, references	CINAHL, PsycInfo, references	2000-2007	Strong

Table Notes: (C), (H) and (S) denote intervention location as Community, Home or School.

NE= Nutrition Education, PA= Physical Activity, SB = Sedentary Behaviour, CCT= controlled clinical trial, RCT=randomized controlled trial.

Methodological issues of included and excluded studies

Studies were included if they met the previously stated inclusion criteria. The main methodological issues of concern centred on the lack of heterogeneity. Just as the individual authors^{9,14} of the eligible systematic reviews noted this challenge, their methods of handling data and combining results of constituent primary studies differed considerably and were not always transparent. A rigorously executed systematic review provides a summary of all of the available evidence in an attempt to answer a focused research question. Insufficient information or explanation accompanying data was sometimes frustrating. This added a layer of difficulty to the reviewer's task of data extraction and a layer of complexity to the task of data synthesis. For some of the included studies, although crucial criteria were met, more detail would have been welcome in the following areas: a precise research question, specific and documented search strategies, documented information sources, risk of bias and limitations.

In my program of research, studies were excluded primarily if they incorrectly stated they were systematic reviews. Secondary excluders were: no explicit reporting of BMI, study not in English, participants outside those stated, child and adult data not separated, participants already obese/overweight or had a co-morbidity, studies where obesity "prevention" was stated but closer examination determined the study focused on treatment, management or control.

Results

Outcomes of interest: types of outcomes

Primary: Interventions were examined with focus on activities or settings. Outcomes were grouped according to the type of prevention program implemented and by the presence or absence of grey studies included in the systematic reviews.

Secondary: Incorporation of grey literature. Ratio of black to grey eligible systematic reviews; ratio of black to grey studies included in eligible systematic reviews; type of grey literature included in eligible systematic reviews; and sources used in the systematic reviews to obtain literature.

Data categorisation and synthesis

For the purposes of this systematic review, information was extracted from each of the 35SRs which did not include a meta-analysis to make it possible to categorise what each one concluded regarding the effectiveness of the interventions they examined (Tables 2a-8a).

Conclusions were grouped into three categories with regard to resultant outcomes of reduced BMI: **Statistically significant impact; Inconsistent findings; No impact.**

Statistically significant impact: all studies in the SR reported that the intervention type had a positive impact on reducing BMI, i.e. “improved weight indices ... consistent positive pattern”¹⁶, “Associated with significant BMI improvements”³⁶.

Inconsistent findings: mixed results i.e. “unable to draw clear inferences”⁷; “clear evaluation ... almost impossible”⁸; “final results are pending”²⁸; “interventions may contribute”⁴⁸.

No impact: none of the studies in the SR reported that the intervention type was effective in reducing BMI. i.e. “not effective in decreasing BMI”²², direct measure (BMI) did not indicate significant changes”⁴⁵, “none achieved an outcome of significantly lowering BMI.”⁵²

This approach to categorisation is conservative for the SRs with non-meta-analysed studies because in order to qualify as an effective intervention, all studies included in the SR to evaluate the intervention type had to show a statistically significant impact. This was irrespective of whether all individual studies included in the SR would be statistically powered to find a statistically significant difference.

In contrast, the approach to categorisation in the SRs with meta-analyses used the pooled estimates. This allowed for a single answer to the question of an intervention’s effectiveness when examined in the SR. Results were extracted from each of the 13 SRs which included meta-analyses in order to categorise what each one concluded regarding the effectiveness of the interventions they examined (Tables 2b-8b). Effect sizes were interpreted with reference to Ellis’ “Thresholds for interpreting effect size.”⁷⁸ Standard mean differences (**d**) and correlational effects (**r**) were tabulated and conclusions were grouped into categories with regard to the *size* of the effect (impact on BMI), i.e.:

For '**d**' the Effect size thresholds used were 0.20 (small), 0.50 (medium), 0.80 (large) and 1.30 (very large). In addition it was decided to describe 0.10 to 0.20 as very small and less than 0.10 as No impact.

For '**r**' the Effect size thresholds used were 0.10 (small), 0.30 (medium), 0.50 (large) and 0.70 (very large). In addition it was decided to describe 0.05 to 0.10 as very small and less than 0.05 as No correlation.

The direction of the standardised mean differences (**d**) was described as:

- **No impact:** where the statistic might indicate a small impact on BMI but the confidence interval (CI) includes zero, therefore the results indicate no statistically significant difference and are consistent with chance.
- **Decrease** in BMI: where **d** is clinicaltrials.gov
- **Increase** in BMI: where **d** is positive

The direction of correlational effects (**r**) was described as:

- **No correlation:** where the CI includes both positive and negative effects.
- **Negative correlation** with BMI, where **r** is negative
- **Positive correlation** with BMI, where **r** is positive

Interventions by focus on activities and settings

Tables 2a-8a. The SRs were arranged within each table by publication year and then by descending number of constituent studies. These tables provide the SR findings associated with the individual intervention types that were examined, categorised as: Statistically significant impact, Inconsistent findings or No impact according to the reported strength of the effect of the intervention on preventing obesity (i.e. reducing BMI).

Tables 2b-8b. The SRs that included meta-analyses were arranged within each table by publication year and then by descending number of constituent studies. The same intervention types are tabulated, and the SR findings for the 13 SRs that included a

meta-analysis are also categorised, albeit on the basis of quantitative data.

Results for the same intervention type have been grouped together. Both a) and b) tables include an Impact/BMI column which has been designed to show the general direction and magnitude of the intervention's effect. This enables a simplified view of the overall effectiveness of the intervention types and allows for a degree of meta-synthesis of results across tables.

The success of different interventions was simply calculated as a percentage based on the number of studies showing a statistically significant impact of the intervention divided by the total number of SRs (across both tables). It should, however, be noted that this measure should only be considered as indicative as it ignores other factors that may impact on the consistency of SR findings, namely:

- different study selection criteria across the SRs
- heterogeneity of study populations and interventions (e.g. differences in intervention components, intensity and delivery)
- possible lack of statistical power to find an effect in the SRs
- quality of the SRs, duplication of studies between SRs, and
- the differing quality of studies included in the SRs.

Grey shading has been used to differentiate those SRs which included GL, from those that did not.

Health and lifestyle education interventions

Health and lifestyle education interventions feature in 22 SRs (combined total of **Table 2a and 2b** below) representing a total number of 195 studies.

The overall impact of these interventions on BMI as examined in the SRs with narrative syntheses (k=20) can be expressed as: eight SRs reporting a consistent statistically significant improvement (decrease in BMI), nine SRs describing inconsistent findings, and three reporting no impact (Table 2a). Therefore 40% of the SRs reporting on interventions with a health education component indicated a statistically significant impact at reducing BMI, making this type of intervention the most successful of the

seven categories of public health interventions.

If the SRs that include grey literature (GL) are excluded (k=5), the general conclusions are the same. Six of the 15 black SRs (40%) found that interventions containing a health education component resulted in a statistically significant reduction in BMI.

The results of the four recent SRs (published in 2012) were very similar, despite there being minimal duplication of included studies across the SRs: Perez-Morales⁴³ (k=10) shares none, Barr-Anderson⁷ (k=27) and Hamel²³ (k=15) share three, Barr-Anderson⁷ and Branscum¹¹ (k=9) share two. Results of these SRs indicated that the majority of included studies found health education interventions were effective in reducing BMI (**Table 2a**). Barr-Anderson⁷'s SR had a total of 27 studies, presumably due to comprehensive searching across 26 databases. This author included some grey sources, but reached the same conclusions as the other three.

Although it appears from the narrative SRs that public health interventions containing a health education component are commonly found to be effective in reducing BMI, the meta-analysed results (**Table 2b**) indicate that, on average, the size of this reduction in BMI is fairly small.

Table 2a Health/lifestyle education interventions

Year	Author	GL included	GL excluded	No. of studies	Effect	Impact
2012	Branscum		*	k=5	3 successful, 2 not successful	Inconsistent findings
	Barr-Anderson	*		k=4	All 4 studies showed significant +ve outcomes	Statistically significant impact
	Perez-Morales		*	k=4	4 interventions were effective	Statistically significant impact
	Hamel		*	k=4	3 had +ve effect on BMI, 1 no effect	Inconsistent findings
2011	Silveira		*	k=9	1 effective, 8 non-effective	Inconsistent findings
	Al Marzooqi		*	k=5	All 5 studies measuring BMI "showed significant outcomes"	Statistically significant impact
	Ickes		*	k=5	All 5 interventions were effective	Statistically significant impact
	Branscum		*	k=1	Intervention was successful	Statistically significant impact
	Leung		*	k=1	Intervention was effective	Statistically significant impact
2010	Bond		*	k=3	No studies were effective	No impact
2009	Zenzen		*	k=4	None achieved an outcome of significantly lowering BMI	No impact
2008	Hudson	*		k=1	The intervention was effective	Statistically significant impact
2007	Gao		*	k=6	5 interventions "effective" 1 "non-effective"	Inconsistent findings
	Lissau		*	k=1	No change	No impact

2006	Flynn	*		k=34	20 interventions showed +ve change, 14 no change	Inconsistent findings
	Doak	*		k=17	13 “effective”, 4 “non-effective”	Inconsistent findings
	Flodmark		*	k=8	2 positive change, 8 no effect	Inconsistent findings
	Hearn	*		k=2	1 effective, 1 non-effective	Inconsistent findings
	De Mattia		*	k=1	1 intervention, small +ve significance	Statistically significant impact
2004	Bautista-Castano		*	k=9	Only 3 of the 9 was effective in reducing BMI	Inconsistent findings

Shading represents SRs that included grey literature.

Table 2b Health/lifestyle education interventions (meta-analyses)

Year	Author	GL included	GL excluded	No. of studies	Effect	BMI
2010	Seo		*	k=14	d =0.34, (90% CI=.00, .68)	Small-medium decrease in BMI
2009	Cook-Cottone		*	k=57	r=0.05, (95% CI 0.04,0 .06), p<.<.001	Very small positive correlation with BMI

Family-involved interventions

Family-involved interventions feature in 24 SRs (combined total of **Table 3a and 3b** below) that included a total number of 139 studies.

The overall impact of this type of intervention, as reported in the narrative SRs (k=21), can be expressed as: one SR reporting a statistically significant decrease in BMI, 13 SRs reporting inconsistent findings and seven indicating there was no impact of the intervention on BMI (**Table 3a**). With 5% of the SRs that evaluated interventions with a family-involved component

showing that BMI was reduced significantly, this type of intervention appears to be the least successful of the seven intervention categories.

Most of the SRs which included grey literature reported inconsistent findings from the evidence base that was collated. There was no suggestion that the grey SRs identified qualitatively different findings than the black SRs.

The most recent meta-analysis (Seo⁴⁴), which included the greatest number of studies, indicated that family-involved interventions are unlikely to be helpful in reducing childhood obesity (**Table 3b**).

Table 3a Family-involved interventions

Year	Author	GL included	GL excluded	No. of studies	Effect	Impact
2012	Barr-Anderson	*		k=6	5 studies showed significant positive outcomes; 1 study significant negative outcome (weight gain)	Inconsistent findings
	Hendrie		*	k=2	1 effective, 1 non-effective	Inconsistent findings
2011	Branscum		*	k=6	4 were effective, 2 were not	Inconsistent findings
	Ickes		*	k=6	5 effective, one no change	Inconsistent findings
	Nguyen		*	k=4	3 effective, 1 no change	Inconsistent findings
	Kesten		*	k=3	2 effective, 1 non-effective	Inconsistent findings
	Leung		*	k=3	All effective	Statistically significant impact
2010	Monasta	*		k=6	"None ... had an effect"	No impact
	Bond ^a		*	k=3	No studies were effective	No impact
	Wilks		*	k=3	None were effective	No impact

2009	Zenzen		*	k=5	None achieved an outcome of significantly lowering BMI	No impact
2008	Hudson	*		k=4	3 effective, 1 non-effective	Inconsistent findings
2007	Gao		*	k=6	3 “effective”, 3 “non-effective”	Inconsistent findings
	Bluford		*	k=3	None were effective	No impact
	Lissau		*	k=2	Neither intervention effected change	No impact
2006	Flynn	*		k=28	12 improved BMI, 16 no change	Inconsistent findings
	Flodmark		*	k=4	1 positive effect, 3 no change	Inconsistent findings
	Doak	*		k=3	1 “effective”, 2 “non-effective”	Inconsistent findings
	Hearn	*		k=2	1 effective, 1 non-effective	Inconsistent findings
	De Mattia		*	k=1	Intervention was not effective	No impact
2004	Bautista-Castano		*	k=7	3 studies effective, 4 no effect	Inconsistent findings

^a All of the studies included in Bond (to evaluate this intervention) were also included in Monasta.

Table 3b. Family-involved interventions (meta-analyses)

Year	Author	GL included	GL excluded	No. of studies	Effect	Impact
2010	Seo		*	k=22	d =0.21 (90% CI, -0.05, 0.65)	No impact
2009	Cook-Cottone		*	k=2	r=0.14 (95% CI 0.07, 0.21) p<.001	Small positive correlation with BMI
2008	Katz		*	k=8	SMD =-0.020 (95% CI - 0.041, 0.00), p<0.05	No impact

Increased physical activity/reduced sedentary behaviour interventions

Increased physical activity/reduced sedentary behaviour interventions feature in 36 SRs (=37 interventions: the SR from Cook-Cottone¹⁴ includes a meta-analysis of increased physical activity and a meta-analysis of decreased sedentary behaviour) (combined total of **Table 4a and 4b** below) representing a total of 423 studies.

The overall impact of increased physical activity or reduced sedentary behaviour on BMI, as reported in the narrative SRs (k=30), can be expressed as: three reporting a statistically significant decrease in BMI, 23 describing inconsistent findings and four SRs finding there was no impact on BMI of programs to increase physical activity (**Table 4a**).

10% of the SRs found that there was an overall statistically significant improvement in BMI as a result of an intervention that increased physical activity/reduced sedentary behaviour. If the seven SRs which include grey literature (GL) are excluded, two statistically significant SRs remain amongst a total of 23. There is a very similar result of 9%, demonstrating the removal had close to no effect.

The seven SRs with a GL component were made up of five that reported studies with inconsistent findings regarding the impact of physical activity interventions, one SR that reported there was no effect and one SR (Hudson²⁸) where all the included studies showed this intervention was effective. The SR authored by Hudson²⁸ was not reliable as the findings were only based on four studies.

Duplication of studies for this intervention was explored by examination of five studies from table 4a published in 2011: Al Marzooqi⁵, Branscum¹¹, Ickes²⁹, Leung³⁹ and Kesten³³.

Despite the broad topic of the SRs being similar, the selection criteria will have differed as there was very little duplication across the evidence base. Branscum¹¹ and Kesten³³ shared one study and Al Marzooqi⁵, Leung³⁹ and Kesten³³ shared a second study. Ickes²⁹ 18 studies were not duplicated, possibly due to an emphasis on African-American children as participants.

The most recent meta-analysis authored by Van Grieken⁴⁸ in 2012 included the second largest number of studies, indicated that physical activity interventions were associated with a very small reduction in BMI. An older meta-analysis by Cook-Cottone¹⁴ from 2009 which included the largest number of studies, found that reduced sedentary behaviour

interventions were associated with a small positive correlation with BMI and that physical activity interventions had no impact. It is therefore apparent that the impact of physical activity interventions on BMI is limited. The one grey SR by Annesi⁶ from 2010, with a meta-analysis, had results that were consistent with the meta-analyses reported in the black SRs (Table 4b).

Table 4a Increased physical activity/reduced sedentary behaviour interventions

Year	Author	GL included	GL excluded	No. of studies	Effect	Impact
2012	Haynos		*	k=28	11 had +ve effect, 17 non-effective	Inconsistent findings
	Branscum		*	k=13	7 studies had improved BMI, 6 no change	Inconsistent findings
	Hendrie		*	k=7	3 effective, 4 non-effective	Inconsistent findings
	Barr-Anderson	*		k=6	5 studies significant +ve outcomes; 1 study significant -ve outcome (weight gain)	Inconsistent findings
	Kreichauf	*		k=6	2 effective, 4 non-effective	Inconsistent findings
	Verstraeten		*	k=5	1 effective, 4 no effect	Inconsistent findings
	Perez-Morales		*	k=2	1 intervention effective, 1 non-effective	Inconsistent findings
2011	Al Marzooqi		*	k=7	All 7 studies measuring BMI "showed significant outcomes"	Statistically significant impact
	Branscum		*	k=7	3 were effective, 4 were not	Inconsistent findings
	Ickes		*	k=5	4 effective, 1 non-effective	Inconsistent findings
	Leung		*	k=5	All interventions	Statistically significant

					were effective	impact
	Kesten		*	k=4	3 effective, 1 non-effective	Inconsistent findings
2010	Monasta	*		k=4	“None ... had an effect”	No impact
	Bond		*	k=3	None of the 3 were effective	No impact
	Wilks		*	k=3	None were effective	No impact
2009	Zenzen		*	k=6	None achieved an outcome of significantly lowering BMI	No impact
2008	Brown		*	k=15	5 studies demonstrated positive significant difference, 10 did not.	Inconsistent findings
	Lee		*	k=15	4 had positive effect on BMI, 10 had no effect, 1 had –ve effect	Inconsistent findings
	Hudson	*		k=4	All interventions were effective	Statistically significant impact
	Kropski		*	k=2	1 effective, 1 non-effective	Inconsistent findings
2007	Lissau		*	k=12	6 interventions were effective, 6 no change.	Inconsistent findings
	Gao		*	k=6	2 “effective”, 4 “non-effective”	Inconsistent findings
	Bluford		*	k=3	2 interventions effective, 1 no change	Inconsistent findings
2006	Flynn	*		k=38	22 improved, 15 stayed the same, 1 -ve outcome (gained weight)	Inconsistent findings
	Nelson		*	k=19	12 effective, 7 non-effective	Inconsistent findings

	Flodmark		*	k=5	1 positive effect, 4 no change	Inconsistent findings
	De Mattia		*	k=4	1 intervention, small positive significance, 3 negative)	Inconsistent findings
	Doak	*		k=4	3 “effective”, 1 “non-effective”	Inconsistent findings
	Hearn	*		k=3	2 effective, 1 non-effective	Inconsistent findings
2004	Bautista-Castano		*	k=13	5 studies effective, 8 no effect	Inconsistent findings

Table 4b Increased physical activity/reduced sedentary behaviour interventions (meta-analyses)

Year	Author	GL included	GL excluded	No. of studies	Effect	Impact
2012	Van Grieken		*	k=34	d=-0.025 (95%CI -0.40, -0.09)	Small decrease in BMI
	Lavelle		*	k=11	d=-0.13 (95% CI -0.22, -0.04), p=0.001	Very small decrease in BMI
	Friedrich		*	k=5	d=-0.02 (95% CI -0.08, 0.04)	No impact
2010	Annesi	*		k=16	r=0.07 (95% CI 0.02, 0.12), p <.001	Very small positive correlation with BMI
2009	Cook-Cottone		*	k=49 k=17	PA: r=0.04 (95% CI 0.03, 0.06), p <.001 SB: r=0.15 (95% CI 0.13,0.17), p<.001	No impact Small positive correlation with BMI
	Harris		*	k=15	WMD -0.05 kg/m ² , (95%CI -0.19 to 0.10)	No impact

School-based interventions

School-based interventions featured in 30 SRs (combined total of **Table 5a and 5b** below) that reported on a total of 431 studies.

The overall impact of school-based interventions on BMI as reported in the 25 narrative SRs was: four SRs found consistent statistically significant decreases in BMI, 18 SRs reported inconsistent findings while 3 found that school-based interventions had no impact on BMI (**Table 5a**).

16% of the SRs with school-based interventions showed a statistically significant improvement in BMI. With the grey SRs (k=6) excluded from the total, the number of SRs reporting overall statistically significant decreases in BMI reduced to two out of 19 SRs (11%).

All four of the SRs with statistically significant (decreased BMI) effects had a very small number of studies. Only two of the SRs which included grey literature (Hudson, Hearn) indicated effectiveness but only accounted for four studies, a tiny sample of the total studies tabled for this intervention.

The meta-analyses (**Table 5b**) were consistent in that, on average, school-based interventions were unlikely to be helpful in reducing childhood obesity. These black SRs with meta-analyses either found that there was no impact of school based interventions on BMI, a very small increase in BMI or a very small positive correlation with BMI i.e. slight increase in BMI with the intervention.

Table 5a School-based interventions

Year	Author	GL included	GL excluded	No. of studies	Effect	Impact
2012	Haynos		*	k=28	11 effective, 17 non-effective	Inconsistent findings
	Branscum		*	k=17	11 studies had improved BMI, 6 no change	Inconsistent findings
	Verstraeten		*	k=12	5 effective, 7 no change	Inconsistent findings

	Hamel		*	k=1	Intervention was effective	Statistically significant impact
2011	Kesten		*	k=13	7 effective, 6 non-effective	Inconsistent findings
	Silveira		*	k=9	1 effective, 8 non-effective	Inconsistent findings
	Branscum		*	k=8	4 worked, 4 did not	Inconsistent findings
	Ickes		*	k=6	5 effective, 1 non-effective	Inconsistent findings
	Nguyen		*	k=2	Both interventions effective	Statistically significant impact
2010	De Bourdeaud huji		*	k=8	6 interventions no effect, 2 interventions smaller weight increases in Intervention group	Inconsistent findings
	Monasta	*		k=5	"None ... had an effect"	No impact
	Van Cauwenber ghe	*		k=5	1 +ve change, 2 no effect, 2 -ve change	Inconsistent findings
	Wilks		*	k=3	None effective	No impact
2009	Zenzen		*	k=8	None achieved an outcome of significantly lowering BMI	No impact
2008	Brown		*	k=38	15 showed +ve significant difference, 23 did not.	Inconsistent findings
	Kropski		*	k=11	5 effective, 6 non-effective	Inconsistent findings
	Hudson	*		k=2	Both effective	Statistically significant impact
2007	Lissau		*	k=14	6 effective, 8 no change	Inconsistent findings

	Gao		*	k=5	4 were "effective", 1 "non-effective"	Inconsistent findings
2006	Flynn	*		k=37	27 +ve change, 9 the same, 1 -ve change	Inconsistent findings
	Doak	*		k=25	17 "effective", 8 "non-effective"	Inconsistent findings
	Flodmark		*	k=9	3 positive effect, 6 no change	Inconsistent findings
	De Mattia		*	k=3	1 intervention, small +ve significance, 2 no effect	Inconsistent findings
	Hearn	*		k=2	Both effective	Statistically significant impact
2004	Bautista-Castano		*	k=12	6 studies showed intervention effective, 6 no effect	Inconsistent findings

Table 5b School-based interventions (meta-analyses)

Year	Author	GL included	GL excluded	No. of studies	Effect	Impact
2012	Lavelle		*	k=43	d=0.16 (95% CI, 0.06, 0.25), p<.005	Very small increase in BMI
2009	Cook-Cottone		*	k=66	r=0.05 (95% CI 0.04, 0.06), p< .001	Very small positive correlation with BMI
	Gonzalez-Suarez		*	k=19	WMD =-0.62 (95% CI, -1.39, 0.14),	No impact
	Harris		*	k=15	WMD -0.05 kg/m ² , (95%CI -0.19 to 0.10)	No impact
2008	Kanekar		*	k=5	WMD: fixed effect model: estimate 0.065 (95% CI, -0.29, 0.16) random effect model: estimate 0.18 (95% CI, -0.38, 0.72)	No impact

Community-based interventions

Community-based interventions feature in 21 SRs (combined total **Table 6a and 6b**) representing a total of 84 studies.

Their overall impact as described in the 19 narrative SRs can be expressed as: five SRs reporting consistent statistically significant decreases in BMI, 6 SRs describing inconsistent findings and eight SRs reporting no impact on BMI from community-based interventions. 26% of the SRs overall found that community-based interventions were effective at reducing BMI (**Table 6a**).

When the five SRs which include grey literature (GL) were removed from the table, four SRs with statistically significant results (decreased BMI) remained in a total of 14, which is 29%.

The five SRs with some GL included only one with a statistically significant (decreased BMI) effect: 20%.

The strongest evidence was provided by the meta-analyses (**Table 6b**). They were consistent in finding that, on average, community-based interventions had a very small positive correlation with BMI i.e. slight increases in BMI. Community-based interventions would appear to be unhelpful in preventing obesity. The results were consistent between grey and black SRs with meta-analyses.

Table 6a Community-based interventions

Year	Author	GL included	GL excluded	No. of studies	Effect	Impact
2012	Hamel		*	k=3	2 were effective, 1 no difference	Inconsistent findings
	Kreichauf	*		k=2	Both were effective	Statistically significant impact
	Perez-Morales		*	k=1	Intervention was effective	Statistically significant impact
2011	Kesten		*	k=4	None were effective	No impact

	Nguyen		*	k=3	1 effective, 1 non-effective, 1 BMI increased (-ve impact)	Inconsistent findings
	Al Marzooqi		*	k=2	Both studies measuring BMI "showed significant outcomes"	Statistically significant impact
	Ickes		*	k=1	Intervention was effective	Statistically significant impact
	Leung		*	k=1	Intervention was effective	Statistically significant impact
2010	Bond		*	k=3	None of the 3 were effective	No impact
	Monasta	*		k=1	"None ... had an effect"	No impact
	Wilks		*	k=1	Intervention was ineffective	No impact
2009	Zenzen		*	k=1	Did not achieve an outcome of significantly lowering BMI	No impact
2008	Lee		*	k=15	4 had positive effect on BMI, 10 had no effect, 1 had -ve effect (showed higher	Inconsistent findings
	Hudson	*		k=2	1 effective, 1 non-effective	Inconsistent findings
2007	Bluford		*	k=5	2 effective, 3 not effective	Inconsistent findings
2006	Flynn	*		k=10	2 +ve change, 8 no change	Inconsistent findings
	De Mattia		*	k=1	Intervention not effective	No impact
	Doak	*		k=1	Intervention was "non-effective"	No impact

2004	Bautista-Castano		*	k=2	Neither study effective	No impact
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Table 6b. Community-based interventions (meta-analyses)

Year	Author	GL included	GL excluded	No. of studies	Effect	Impact
2010	Annesi	*		k=16	r=0.07 (95% CI 0.02, 0.12), p <0.001	Very small positive correlation with BMI
2009	Cook-Cottone		*	k=9	r=0.05 (95% CI 0.01, 0.08), p<0.01	Very small positive correlation with BMI

Nutrition/dietary interventions

Nutrition/dietary interventions feature in 25 SRs (combined total **Table 7a and 7b**) representing a total of 157 studies.

The overall impact of nutrition/dietary interventions as reported in the narrative SRs (k=23) can be expressed as: three SRs reporting consistent statistically significant decreases in BMI, 16 inconsistent findings and four no impact (**Table 7a**).13% of the SRs with nutrition/dietary interventions showed overall statistical significance (decreased BMI).

If the six SRs which include grey literature (GL) are removed from the table, one statistically significant SR remains in a total of 17, which is 5.88%. The grey SRs appeared more likely to report that the intervention was effective. However, when the evidence base is appraised it appears that the two grey SRs with statistically significant findings were basing their conclusions on two studies apiece. As the evidence base increased in the other SRs, the probability of concluding that there were inconsistent findings also increased. Two SRs with a GL component worth comparing for potential duplication in the evidence base are Monasta⁴⁰ and Van Cauwenberghe⁴⁷, both published in 2010 with five studies each with a nutrition/dietary intervention. Monasta⁴⁰ showed no impact and Van Cauwenberghe⁴⁷ had inconsistent findings. They had a total number of studies of 17 and 42 respectively. There was no duplication of constituent studies.

The meta-analyses (**Table 7b**) were consistent in that, on average, nutrition/dietary interventions alone were unlikely to be helpful in reducing childhood obesity. These black SRs with meta-analyses either found that there was no impact of nutrition/dietary interventions on BMI or – as reported in the largest meta-analysis - that there was a very small positive correlation with BMI i.e. a slight increase in BMI with the intervention.

Table 7a Nutrition/dietary interventions

Year	Author	GL included	GL excluded	No. of studies	Effect	Impact
2012	Haynos		*	k=17	5 “effective”, 13 no effect	Inconsistent findings
	Branscum		*	k=7	4 studies had improved BMI, 3 no change	Inconsistent findings
	Hendrie		*	k=6	3 effective,3 non-effective	Inconsistent findings
	Barr-Anderson	*		k=4	3 studies showed significant +ve outcomes; 1 study significant -ve outcome (weight gain)	Inconsistent findings
	Perez-Morales		*	k=2	1 effective, 1 non-effective	Inconsistent findings
	Verstraeten		*	k=2	Neither were effective	No impact
2011	Silveira		*	k=9	1 effective, 8 non-effective	Inconsistent findings
	Branscum		*	k=5	4 interventions were effective,1 had no effect	Inconsistent findings
	Ickes		*	k=5	4 effective,1 non-effective	Inconsistent findings
	Al Marzooqi		*	k=4	All 4 studies “showed significant outcomes”	Statistically significant impact

	Kesten		*	k=4	2 effective, 2 non-effective	Inconsistent findings
2010	Monasta	*		k=5	“None ... had an effect”	No impact
	Van Cauwenbergh	*		k=5	1+ve change, 2 no effect, 2–ve change	Inconsistent findings
	Bond		*	k=1	Intervention no effect	No impact
2009	Zenzen		*	k=7	None achieved an outcome of significantly lowering BMI	No impact
2008	Hudson	*		k=2	Both interventions effective	Statistically significant impact
2007	Lissau		*	k=9	4 effective, 5 no change	Inconsistent findings
	Gao		*	k=6	2 “effective” 4 “non-effective”	Inconsistent findings
	Bluford		*	k=4	1 effective, 3 no effect	Inconsistent findings
2006	Flynn	*		k=9	6 improved, 3 no change	Inconsistent findings
	Flodmark		*	k=7	2 positive effect, 5 no change	Inconsistent findings
	Doak	*		k=2	Both interventions were effective	Statistically significant impact
2004	Bautista-Castano		*	k=5	1 intervention effective, 4 were not	Inconsistent findings

Table 7b. Nutrition/dietary interventions (meta-analyses)

Year	Author	GL included	GL excluded	No. of studies	Effect	Impact
2012	Friedrich		*	k=2	d=-0.03 (95% CI, -0.10, 0.04)	No impact
2009	Cook-Cottone		*	k=28	r=0.13 (95% CI 0.11,0 .14), p<0.001	Small positive correlation with BMI

Multi-component interventions

Multi-component interventions feature in 20 SRs (combined total **Table 8a and 8b**) representing 319 studies.

The overall impact of multi-component interventions as reported in the narrative SRs (k=11) can be expressed as: two SRs reporting consistent statistically significant decreases in BMI, seven SRs describing inconsistent findings and two SRs reporting no impact from the intervention (**Table 8a**). 18% of the SRs with multi-component interventions showed statistical significance (decreased BMI) when synthesised narratively. If the three SRs which include grey literature (GL) are removed from the table, the two statistically significant SRs remain in a total of eight, which is 25%. However, when the results were averaged quantitatively using meta-analysis, the findings were more definitive. Decreases in BMI were observed in several of the meta-analyses measuring the impact of multi-component interventions, with the effects being larger as the number of components included in the intervention increased (**Table 8b**).

The two grey SRs with the smallest evidence base included one study apiece and so the finding of 'no impact' is unlikely to be credible when considered in the context of the number of studies reporting on multi-component interventions. Of the other two grey SRs Doak¹⁷ found inconsistent findings and Stice⁴⁶ showed a very small positive correlation with BMI. The meta-analysis from Stice⁴⁶ included the largest number of studies. Although the size of the positive correlation observed by Stice was so small that it could be considered trivial, the inclusion of these extra studies appears to have reversed the clear trend observed in the other meta-analyses. It is uncertain whether this was due to the incorporation of poorer quality evidence or just due to having more evidence.

In general, multi-component interventions appear to be the most successful overall.

Table 8a Multi-component interventions

Year	Author	GL included	GL excluded	No. of studies	Effect	Impact
2012	Verstraeten		*	k=6	5 effective, 5 no effect	Inconsistent findings
2011	Kesten		*	k=14	4 interventions were effective, 10 non-effective	Inconsistent findings
	Nguyen		*	k=6	1 effective, 1 non-effective, 1 BMI increased (-ve impact)	Inconsistent findings
	Leung		*	k=2	2 effective	Statistically significant impact
	Ickes		*	k=1	Intervention was effective	Statistically significant impact
2010	De Bourdeaud huji		*	k=8	6 interventions no effect, 2 smaller weight increases in Intervention group	Inconsistent findings
	Van Cauwenber ghe	*		k=1	1 intervention, no effect	No impact
2008	Brown		*	k=20	9 studies demonstrated +ve significant difference, 11 did not.	Inconsistent findings
	Kropski		*	k=9	4 effective, 5 non-effective	Inconsistent findings
	Hudson	*		k=1	Intervention non-effective	No impact
2006	Doak	*		k=19	12 "effective" 9 "non-effective"	Inconsistent findings

Table 8b Multi-component interventions (meta-analyses)

Year	Author	GL included	GL excluded	No. of studies	Effect	Impact
2012	Lavelle		*	k=29	d=-0.17 (95% CI, -0.29,-0.06), p<0.001	Very small decrease in BMI
	Friedrich		*	k=16	d=-0.37 (95% CI, -0.63, -0.12)	Small-medium decrease in BMI
	Van Grieken		*	k=8	d=-.024 (95%CI, -0.47, -0.01)	No impact
2011	Waters		*	k=37	d (SMD)= -0.15 (95% CI, -0.21 to -0.09]	Very small decrease in BMI
2010	Seo		*	k=15 k=10 k=1	(2 components) d = .08 (90% CI, -0.08 to .55) (3 components) d= 0.33 (90% CI, -0.02 to 0.67) (4 components) d=0.71 (90% CI, 0.58 to 0.85)	No impact No impact Medium to large positive impact on BMI
2009	Gonzalez-Suarez		*	k=19	WMD =-0.62 kg/m ² (95% CI -1.39, 0.14)	No impact
2008	Kamath			k=43	d=-0.02; (95% CI = -0.06-0.02); I (2) = 17%)	No impact
	Katz		*	k=8	SMD =-0.029, (95% CI -0.045, -.014), p<0.05	No impact
2007	Stice	*		k=46	r=0.04 (95% CI,0.01, 0.06)	Very small positive

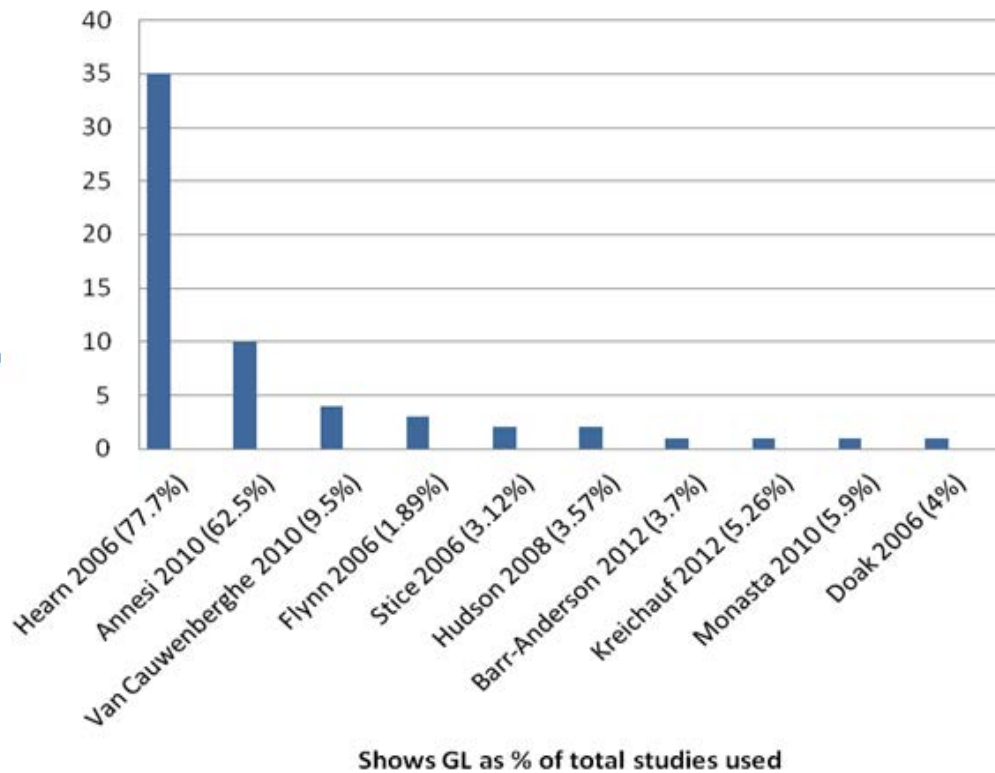
					p<0.01	correlation with BMI
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Incorporation of grey literature

Of the original 220 systematic reviews 19 were from the grey literature (book chapters, dissertations, reports, conference papers), making up 8.64% of the total. Several of the 19 were book chapters which on close inspection discussed various systematic reviews by others but were not themselves systematic reviews; one Hong Kong dissertation was ruled out when it became clear that the literature search had been restricted to full text readily available in the author’s institutional library. In all, one of these grey literature SRs made it into the final tally of 48 systematic reviews, constituting around 2%. The most frequently searched databases across the included SRs are indicated in Figure 2.

Ten of the 48 (20.8%) SRs included a total of 58 grey studies, and 38 did not include any grey literature at all. It is important to note that Hearn’s APHCRI review²³ is responsible for a very significant proportion of these (35 studies, 53.9%). Hearn²³ included 14 black and 10 grey literature databases and demonstrated a clear objective to search as widely and comprehensively as possible across diverse sources. Nine of the remaining SRs “own” the remaining 23 studies. All of the grey studies are shown below as a percentage of the total number of studies each SR has included (Figure3). The proportion of grey studies included in those SRs that incorporated grey literature varied substantively – from as little as 1.89% (Flynn¹⁴ had 3 grey studies out of a total 158) to as high as 77.7% (Hearn²³ had 35 grey studies out of a total of 45).

Figure 3. **GL incorporated into SRs**



Characteristics of incorporated grey literature

The author extracted and compiled a list of all included studies from all SRs (674 studies in total) and indicated whether they were black or grey, what type of publication they were and which SR had included them. This analysis indicated that 58 of the contributing 674 studies, or 8.6%, were from the grey literature. The 58 included grey resources were categorised as:

- 35 reports, including project, program activity and final reports, working papers
- 9 dissertations
- 2 x1 conference paper
- 2 books/book chapters
- 10 unpublished studies (Annesi⁶)

In contrast, the remaining 616 studies from the black literature were published journal articles, many cited by more than one SR. There was a marked degree of overlap with the studies used by the SRs: one study¹⁰⁴ was included in 16 of the 48 SRs and four others were included in 13 SRs. This overlap is not unexpected given that each SR was appraising the same topic and each is meant to include a comprehensive search of the literature, albeit with slightly different study selection criteria and search dates.

Appendix VIII lists the 201 journals from which the 616 black, published studies were selected. Childhood obesity has many contributing factors: biological, social, economic, environmental, and behavioural, and the breadth of research being carried out in all these areas, is reflected in the wide variety of different journals.

Of the 58 grey studies only the conference paper was cited by two different authors, but the studies also originated from a variety of sources: national, state and community institutes, associations and organisations, universities, hospitals and health departments and individual researchers from a number of fields.

Chapter 4: Discussion and Conclusions

Discussion

This review focused on SRs (grey or black) of interventions to prevent obesity among children, where there was either a meta-analysis or narrative summary or tabular presentation of results. Obesity prevention had to be measured according to body mass index (weight/height²) as calculated against a suitable growth reference standard and participants were aged two to 18 years without (at baseline) a diagnosis of obesity or eating disorders, or co-morbid conditions that pre-dispose to obesity. The objectives were to i) evaluate the use of grey literature in systematic reviews assessing the effectiveness of different interventions to prevent childhood obesity and ii) to determine the impact of grey literature on the findings of the systematic reviews.

Interventions that worked best

Although there was insufficient evidence to state that any particular intervention could definitively prevent obesity in children, nevertheless the interventions were rated in terms of success by considering the quantitative results in the reported meta-analyses in the first instance, as these results provided the most robust measure of impact. In some cases the results of the meta-analyses conflicted with the general view obtained when looking at the results of SRs with narrative syntheses. The two interventions with the most definitive impact in terms of reducing BMI were:

- Health/lifestyle education, followed by
- Multi-component

The other types of intervention either had meta-analyses reporting that there was no impact from the program's introduction, or very small increases or decreases in BMI. There was insufficient certainty regarding the magnitude of the effect sizes of these meta-analyses to be able to rank the remaining interventions in terms of their likely success at prevent childhood obesity.

Overall, interventions based around broad health/lifestyle education registered the greatest success.

Impact on intervention outcome with inclusion of Grey literature

The Table below indicates the impact of inclusion and exclusion of GL from results of each Intervention, by comparing the results of grey and black SRs that reported meta-analyses or calculating the change in % of Statistically Significant Impact findings from the total findings in the narrative SRs (from **Tables 2a-8b**)

Table 9. Impact of inclusion and exclusion of GL

Intervention, total no. of studies	Meta-analysis impact – If the meta-analysis includes GL the intervention is shown to be:	Intervention Success rate in narrative SRs (GL included)	Intervention Success rate in narrative SRs (GL excluded)	Narrative synthesis impact - If the SR includes GL the intervention is shown to be:
Multi-component 319 studies	Less effective	18%	25%	Less effective
Health/lifestyle education 195 studies	n/a	40%	40%	No different
Community-based 84 studies	No different	26%	20%	More effective
School-based 431 studies	n/a	16%	11%	More effective
Increased PA/reduced SB 423 studies	No different	10%	9%	More effective

Nutrition/dietary 157 studies	n/a	13%	5.9%	More effective
Family –involved 139 studies	n/a	5%	n/a	n/a

With regard to the meta-analyses, there was insufficient evidence regarding the impact that inclusion or exclusion of grey literature affects outcome. Differences between grey and black SRs with narrative syntheses suggested, superficially, that grey SRs may have more positive results in terms of the impact of interventions on childhood obesity. However, upon closer inspection it is apparent that this trend in direction of effect may not be solely due to the inclusion of GL. For example, the two grey narrative SRs with statistically significant findings concerning nutrition/dietary interventions were basing their conclusions on only two studies apiece. It was evident from the black narrative SRs assessing the same interventions that as the number of included studies increased the probability of concluding that there were inconsistent findings also increased. Overall, on the basis of the information collated for this overview of SRs, the impact of GL on the direction of results appears equivocal. There could be many reasons for this, including the quality of included studies.

Overview of the research identified by this systematic review

Quality of included studies

Of the 48 SRs, 13 (all black) included a meta-analysis or meta-analyses^{6,14,20,22,24,30-32,36,44,46,48,50} but many reviewers were in accord with Silveira⁴¹ who stated that “due to heterogeneity ... it would not be appropriate to conduct a meta-analysis”.

Many of the SRs decried the overall poor quality of the studies at their disposal^{14,43} and in particular noted that often studies measured only short term changes in diet or exercise, with a lack of follow-up on intervention continuance and assessment of any long term impact. A further challenge lay in the lack of homogeneity of studies making comparisons difficult¹⁰. A number of authors stated the difficulty in ascertaining how transferable interventions might be to other populations, summed up by Brown¹⁴ who lamented “studies were heterogeneous in terms of design, participants, interventions and outcomes” making it hard to generalize about what interventions are effective in

preventing obesity. Often the included systematic reviews demonstrated a wide range of interventions, with resultant small numbers of studies of each “type”, making it difficult to draw any conclusions.

Databases and information sources searched by researchers

Almost all reviewers stated their search sources and these are collated in Appendix VI. While over 90 different sources were indicated, 12 were most frequently used (Figure 2), the highest rated being the Cochrane Library (or its constituent databases) searched by 33 reviewers. Cochrane is followed by Medline (27), PubMed and PsycInfo (both 24), CINAHL (21) and Embase (19). There is a significant drop to ERIC (12), Web of Science (9), SportDiscus (7) and ACP Journal Club, SCOPUS and Dissertation Abstracts all on four. The remaining sources were searched by between one and three reviewers.

While the most heavily searched databases were those clearly mandated by Cochrane⁹⁷ some observations can be made regarding the selection of sources.

While 30 of the SRs had a significant interest in school based interventions only 12 reviews recorded that they had searched ERIC “the largest education citation database in the world” (Appendix VI). ERIC indexes health-related resources with a school or educational relevance, including significant child obesity prevention publications. Is there a lack of awareness of this database? It is known that database coverage overlaps considerably, although hard statistics are not available, and this would support the general consensus to search multiple resources and then de-duplicate the results. It follows that all databases also have some unique content therefore a failure to search the ERIC database could very possibly mean missing relevant studies.

Specific searching for grey literature: of the 48 SRs only three ^{8, 36, 51} did *not* indicate searching any grey literature sources as listed in Appendix II. It is evident that reviewers are aware searching (or intention to search) grey literature is now a requirement for rigour, but it is important to note that the majority of traditional academic sources now have a grey literature component and this may have somewhat inflated this result. We have little way of knowing the intent of the searcher unless they state, as Seo⁴⁴ does “the studies must be published in a peer-reviewed English language journal”. Seo goes on in a seeming contradiction, to describe searching four databases which have grey content and mentions “manual searches for eligible reports”. Similarly Hudson²⁸

searched two databases with grey content but the author stated her inclusion criteria to be “peer-reviewed journals”. Neither Hudson nor Seo included grey studies in their SRs. Others like Van Cauwenbergh⁴⁷ and Stice⁴⁶ made comprehensive, deliberate attempts to discover relevant grey literature including hand-searching and contacting subject experts in the pursuit of unpublished material. Analysis of publication dates of included SRs showed that no GL was being included before 2006.

Literature searching

The search strategy for any research decides the quantity and quality of the studies considered for inclusion. The researcher’s choice of information sources and the design of their search strategy together make up the “where” and the “what” of their approach to the literature and provide the foundation of their research. A well-designed search in the “wrong” databases or a poorly-designed search in the “right” databases will both culminate in inadequate results.

Documenting searches

Ideally the search strategies of all studies and systematic reviews should be well-documented so as to be reproducible. A PRISMA flowchart or similar should be included in every SR. The approach to search strategies varies widely amongst the 48 SRs in this review. Waters⁵⁰, as a Cochrane review, has an exemplary 10 page Appendix detailing literature searches undertaken in several different databases, ensuring their search terms and search strategy are explicit. The AHRQ⁸¹ comparative effectiveness review provides a 13 page Appendix of detailed search strategies in PubMed, EMBASE, Cochrane and CINAHL, and in ClinicalTrials.gov, for unpublished (grey) studies.

Librarians as part of the research team

Gao²¹ describes their search strategy as Cochrane designed/approved and a number of others^{24-25, 27-28, 31, 33, 48, 53} state that a librarian or information specialist designed or executed the searches. Lasserre¹⁰⁵ describes expert searching as “a core area of professional practice” [for health science librarians] and contributes to the growing argument that even strong subject knowledge of the researcher is not enough to guarantee a high quality literature search. As early as 1999, in their publication “How to review the evidence” the NHMRC suggested that including an experienced medical librarian to identify published primary studies was a “standard tactic”. Today, inclusion

of librarians in research teams has become recognised to the extent that the U.S. National Institute of Health provides for grant seekers to apply for an informationist supplement¹⁰⁶ (librarians are increasingly known as informationists in the U.S. when they are involved in research teams) in order to “integrate an information specialist into the research team”. Recent research showed that “SRs with librarian or information specialist co-authors are correlated with significantly higher quality reported search strategies”¹⁰⁷. Increased librarian engagement in SRs is acknowledged to potentially increase the quality and documentation of the literature search and protect against publication bias by more thorough discovery and interrogation of the relevant evidence base.

Search terms and database selection

The majority of the SRs in our study list databases and search terms, without any further detail. If the sources were reasonable and the search terms (usually keywords) were logical then the assumption was made that the search was adequate. In some cases however the search terms were clearly not well defined and the results would have been affected. For example, Bluford⁹ had an eclectic approach through searching with keywords like *gordo*, *bambino* and *corpulent* but not *paediatric/pediatric*, *child*, or *obese*. Perez-Morales⁴³ searched the word *childhood* but not *child*, *children* or *adolescent*, and Wilks⁵¹ searched *weight* AND (*gain* OR *change*) but made no mention of the words *obese* or *obesity* despite conducting a systematic review on “obesity prevention in children and adolescents”. A number of searches used one variation of spelling but omitted another, most commonly paediatric or pediatric. Few authors truncated search terms to allow for the retrieval of literature using multiple word endings.

Search filters

For a consistent, systematic, comprehensive approach to literature searching the use of a recognised, appropriate search filter, when available, is recommended. Search filters are designed to retrieve research by study design or focus. They are “evidence based literature search strategies, developed using an explicit methodology and tested using a gold standard test comparison study design. They provide a standardised, systematic subject-based search with a known level of performance¹⁰⁸.” The UK-based InterTASC Information Specialists' Sub-Group produces a Search Filter Resource¹⁰⁹ which aims to make it easy to identify and access search filters. The Sub-Group encourage those who

use the Resource to be part of their collaborative venture and to appraise, assess, test and appraise the filters. Search filters can be published or unpublished.

Evaluating searches

Ideally, a critical appraisal checklist such as the CADTH (Canadian Agency for Drugs and Technologies in Health) Peer Review Checklist for Search Strategies¹¹⁰ can be used to evaluate the quality of a search strategy.

Limitations

There was a difficulty in comparing across SRs for assessment of impact on BMI as there was some duplication of studies: at best the comparison is indicative. There was a likelihood of publication bias as SRs were required to be in English (including translations into English).

BMI was chosen as part of the inclusion criteria for this SR as it is the most commonly used obesity measure, however it should be acknowledged that BMI might not be the best measure of childhood obesity¹¹¹ and that other measures are sometimes used (adiposity, skinfolds etc.). BMI remains controversial regarding what measures and what cut-points are appropriate. This SR was limited to those recording explicit BMI, thus excluding otherwise relevant studies.

Conclusions

Implications for practice

A recent dialogue of Australian public health professionals and dietitians emphasised the advocacy approach to obesity prevention, settling on the tripartite strategy of “political commitment, multi-sectoral support and community engagement.”¹¹² It is this complexity of approach that may benefit from an examination of the grey literature (GL). Simkhada’s view¹¹³ that GL is needed to fill the information gap as “an essential part of the evidence base for practice in complex interventions, which may have multi-stakeholders, have multi-variables, have a lack of predictability and robust data and require a broad literature approach”, is held by many others¹¹⁴⁻¹¹⁷. Currently the Australian government is investing in research into the access and preservation of GL in light of its relevance to the development of health policy¹¹⁸. Similarly in 2006 the U.S. National Library of Medicine, aware that policymakers, more than any other research group, found GL especially relevant for context, and for its ability to reflect and map

“how debate changes over time on a particular topic”¹¹⁹ commissioned AcademyHealth¹²⁰ to conduct a research project into the scope and status of this literature.

Often the strength of GL lies in the way it can reflect the lay voice, the voice from the field, public opinion: what people think. How can policy succeed when individuals’ beliefs and behaviours are at odds with the underlying principles and truths of achieving healthy weight? Baum and others¹²¹⁻¹²³ suggest that we need to look below the surface, focusing on the underlying social determinants of health rather than “immediate and visible causes” and that the role of public policy should be to shape the social environment so that it is more conducive to good health^{86,123}. A substantial body of research in the area of social determinants of health can be found in the grey publications of policies and programs that address the socio-economic factors influencing population health.

As Australian obesity prevalence continues to rise (in fact no country has managed to reverse obesity trends)⁵⁹⁻⁶⁰, it is reasonable to suggest that policy associated with obesity prevention is at best flawed or limited and possibly under- or ill-informed. As Badger et al argue “it is irresponsible to interfere in the lives of other people on the basis of theories unsupported by reliable empirical evidence”.⁸⁷ Community engagement is a challenging but well-supported aspect of behavioural change in public health. Community receptiveness needs to be gauged and substantiated in creative ways so that it can feed into the information that underpins our policies and supports implementation.¹²⁴⁻¹²⁵ To achieve a greater degree of success in regard to childhood obesity prevention, there is a need to tap into evidence from the widest variety of sources, so as to reflect the complexities of the issue and the perceptions of end-users.¹²⁶ Just as Thomas¹²⁷ states “Previous studies of public perceptions of obesity interventions have been quantitative and based on general population surveys” suggesting the involvement of obese people in the discussion around policy and intervention design and research is urgently needed, so Rees¹²⁸ addresses the other half of the childhood obesity question, the children themselves.

She examines UK research “where young people aged from 12 to 18 provide views about their own body sizes or about the body sizes of others. It is hoped that this can help inform the development of practice and policy-based initiatives and the commissioning of further research in ways that put young people’s experiences in the

forefront.” In her implications for practice she describes specific components of interventions which young overweight people identified considered to be helpful. These included “not drawing attention to a participant’s size, especially in front of their peers, as they wanted to be free from further exposure to abuse or ridicule.” Many childhood obesity prevention (or management) initiatives are based in a school environment and therefore there is a clear need to improve on the way participants are identified and the programs are managed. Rees¹²⁸’ research also discusses the participant-identified value of peer support, the value of social involvement in a group of others with similar concerns to relieve social isolation and emotional and mental support to reinforce resilience and motivation.

Rees¹²⁸ stresses that for any degree of success, future initiatives need to “take particular care not to expose young people of a high weight to further abuse” and Thomas draws a parallel between those with obesity and other stigmatised groups such as those with mental illness, who are recognised as crucial contributors to the policy debate. What they are both underlining is the need to clearly identify the needs of the “community” when designing and planning a public health intervention which aims at changing behaviour. A needs analysis to identify and evaluate issues, values, beliefs and attitudes of those the intervention aims to engage, has a greater chance of success.

Measuring success of childhood obesity interventions in terms of outcome such as lowered BMI provide a fairly discouraging picture: it is clear that such initiatives are largely unsuccessful and childhood obesity remains at the forefront of public health concerns for this population. In terms of whether participants lost weight the success is minimal and short-lived and yet we know the science of weight loss is sound. Therefore it should be considered that the “fault” lies elsewhere, perhaps in terms of engagement which the literature indicates is not strong or sustained: that “buy in” or uptake in terms of engagement is not strong.

Another real issue lies with knowledge translation: ideally leading to community adherence, adoption, acceptance, and absorption⁷⁰. Translating and transferring knowledge/research into practice requires strategy and Armstrong¹²⁹ lists five mechanisms to achieve this: Dissemination, Interaction, Social Influence, Facilitation and Incentives and reinforcement. Matching dissemination so the research “speaks” to the audience, developing strong links with the community and using “word-of mouth” recommendation and before everything else assessing “community readiness”: this is

what we need to add to the debate and we may find it in the innovative grey literature of opinion polls, online surveys and crowd sourcing.

The recent “Australian Dietary Guidelines: providing the scientific evidence for healthier Australian diets”⁶⁹ consulted over 200 references from the grey literature, making up 20% of their evidence base. This evidence included summary, research and technical reports, evidence reviews, guidelines, opinion papers, background papers, working papers, conference papers, standards and policy briefs. Their terms of reference stipulated “comments provided by the broader community through public consultation” be sought out and considered and such open engagement with the public is heartening. Although it is very rare that the information obtained through public consultation will change the evidence base used for the SR the process can be very helpful in translating the evidence into practice.

It endorses the view that grey literature is where societal attitudes, beliefs, values and opinions might be reasonably expected to be found, and also where pilot programs and case studies assessing the feasibility of public health interventions will have been reported. The degree to which this literature has been accessed and incorporated into the evidence that informs policy may have an impact on the ultimate success or sustained “take-up” of an intervention.

Implications for research

Childhood obesity prevention interventions

There is little doubt that increased physical activity/decreased sedentary behaviour combined with dietary intervention produces an outcome of reduced BMI if the person complies with the behavioural change over the long term. This is the science of weight loss and is not in dispute. Artificially controlled research does not fit the realities of public health practice. Research is needed which examines and evaluates the application of the science and the transfer of this knowledge into practice. More research is also needed which provides information on unsuccessful interventions, and these studies with negative outcomes need to be accessible.

Ideally SRs on interventions for the prevention of childhood obesity should draw on sufficient good quality studies, with rigorous methodologies and transferable results. SRs should concentrate on a narrower range of inclusion criteria with a higher level of

homogeneity and larger sample sizes with subsequent strength of effect size and direction. These SRs should look at short and long term effects of comparable interventions. James¹³⁰ followed up, after three years, a group of children who had been participants in a year-long intervention and found “the difference in prevalence of overweight in children seen at 12 months was not sustained at three years”. Therefore future research could be more usefully focused on following cohorts of children through a number of years and a number of different interventions. Worthwhile results could be gleaned by looking at what works, for whom, for how long and *why*. One author writing on the contribution of “intervention mapping” suggests that often interventions are not well-designed, evaluated or reported “forcing researchers and practitioners to ‘guess’ how interventions have been developed”¹³¹ and which elements were successful and which were not. The participants themselves may well hold the key: they need to be asked why they dropped out, why they preferred one intervention over another. What was easier, fitted into their lifestyle, was cheaper, more enjoyable, less effort, more socially acceptable, needed no extra equipment or a partner to work with: these are the things that this area of research needs to know more about for sustained success and they need to be reported accurately and transparently. Flynn¹⁹ supports this here: “involving stakeholders in programme design, implementation and evaluation could be crucial to the success of interventions, helping to ensure that needs are met

The grey literature element

The majority of SRs in this review either explicitly stated that they would search for GL as part of their search strategy or cited specific resources which included some GL content. In this review Google Scholar and Cochrane Library fall into the second category. At baseline only three SRs^{8,36,51} did not comply with this requirement which is designed to reduce publication bias by including unpublished studies. Bautista-Castano⁸ for example, did not attempt to address publication bias and GL does not appear to have been sought. However a number of authors, in a seeming contradiction, saw no conflict of interest in stating a decision to rely on published studies^{16,22,29,36} whilst acknowledging the significance of GL elsewhere in their reviews.

As a matter of best practice, future researchers should not only make greater efforts to include relevant GL in their studies and reviews, but should clearly state which databases and resources were searched, with a clear delineation of black and grey.

Cochrane systematic reviews do this very well, making it much easier for follow-up researchers by affording them a transparent search methodology. Those who produce grey literature, particularly reporting on local small-scale projects, should attempt to make their research rigorous and their results accessible, regardless of whether the results are positive or negative. The innovative nature of such projects, often developed in partnership with communities, reflect local need and can inform the evidence on supporting people and communities to make positive behavioural changes.

Conflict of interest

There are no conflicts of interest.

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Appendix I: Appraisal instrument

JBI Critical Appraisal Checklist for Systematic Reviews

Reviewer _____ Date _____
Author _____ Year _____ Record Number _____

	Yes	No	Unclear
1. Is the review question clearly and explicitly stated?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Was the search strategy appropriate?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Were the sources of studies adequate?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Were the inclusion criteria appropriate for the review question?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Were the criteria for appraising studies appropriate?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Was critical appraisal conducted by two or more reviewers independently?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Were there methods used to minimise error in data extraction?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Were the methods used to combine studies appropriate?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Were the recommendations supported by the reported data?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Were the specific directives for new research appropriate?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Overall appraisal: Include Exclude Seek further info.

Comments (including reasons for exclusion)

Appendix II: Types of Grey Literature

Announcements	Fact Sheets	Posters	Technical Documentation & Notes
Annuals	Feasibility Studies	Précis Articles	Tenders
Bibliographies	Flyers	Preprints	Theses
Blogs	Folders	Press Releases	Timelines
Booklets	Glossaries	Proceedings	Trade Directories
Brochures	Government Documents	Product Data, Warranties	Trade Manuals
Bulletin Boards	Grant Proposals	Programs	Translations
Bulletins	Green Papers	Project proposals, reports	Treatises
Call for Papers	Guidebooks	Questionnaires	Website Reviews
Case Studies	Handbooks	Registers	Webpages & Websites
Catalogues	House Journal	Reports	White Books
Chronicles	Image Directories	Reprints	White Papers
Codebooks	Indexes	Research Memoranda & Notes	Working Documents
Conference Papers	Internet Reviews	Research Proposals	Working Papers
Conference Posters	Interviews	Research Registers	Work Packages & Programs
Conference Proceedings	Leaflets	Reviews	Yearbooks
Country Profiles	Lectures	Risk Analyses	
Course Materials	Legal documents	Satellite Data	
Curriculum Materials	Legislation	Scientific Protocols	
Databases	Manuals	Scientific Visualizations	
Datasets	Memoranda	Show cards	
Datasheets	Newsgroups	Software	
Diaries	Newsletters	Specifications	
Directories	Notebooks	Speeches	
Discussion Papers	Off-prints	Standards	
Dissertations	Orations	Statistics	
E-Prints	Pamphlets	Supplements	
E-texts	Patents	Surveys	
Essays	Policy Documents & Statements	Syllabi	
Exchange Agreements			

(Adapted from GreyNet International: Document types in grey literature⁶³)

Appendix III. Organisations/websites searched

Australian New Zealand Obesity Society

<https://anzos.com/>

Australian Policy Online

<http://apo.org.au/>

Australasian Child and Adolescent Obesity Research Network

<http://www.acaorn.org.au/>

Baker IDI: Heart and Diabetes Institute

<http://www.bakeridi.edu.au/>

Centre for Obesity Management and Prevention Research Excellence in Primary Health Care (COMPARE-PHC)

<http://compare-phc.unsw.edu.au/>

Centres for Disease Control and Prevention. Division of Nutrition, Physical Activity and Obesity

<http://www.cdc.gov/nccdphp/dnpao/index.html>

Child Health Prevention Research Centre, Edith Cowan University

<http://chpru.ecu.edu.au/research/index.php>

Collaboration of Community-based Obesity Prevention sites (CO-OPS Collaboration)

<http://www.co-ops.net.au>

Epode European Network

<http://www.epode-european-network.com/>

European Association for the Study of Obesity (EASO)

<http://easo.org/>

European Childhood Obesity Group

[www.ecog-obesity.eu /](http://www.ecog-obesity.eu/)

Fight the Obesity Epidemic (FOE)

<http://www.foe.org.nz/>

Institute of Medicine. Food and Nutrition Board (U.S.)

<http://www.iom.edu/About-IOM/Leadership-Staff/Boards/Food-and-Nutrition-Board/ObesityReports.aspx>

International Association for the Study of Obesity
<http://www.iaso.org/>

National Collaborative on Childhood Obesity Research (NCCOR)
www.nccor.org/

National Health & Medical Research Council (NHMRC)
<http://www.nhmrc.gov.au/>

National Institute of Health
<http://www.obesityresearch.nih.gov/>

National Obesity Observatory (UK)
<http://www.noo.org.uk/>

New York Academy of Medicine. Center for Evaluation and Applied Research:
Initiatives to Promote Nutrition and Physical Activity to Combat Obesity
<http://www.nyam.org/urban-health/prevention/evaluation-obesity.html>

New York Academy of Sciences (NYAS) Public Health & Epidemiology
<http://www.nyas.org/Topic.aspx?tid=e4a3b3ff-50db-47d9-9cd0-47b190870fdb>

Obesity Policy Coalition
<http://www.opc.org.au/>

Obesity Prevention Source
<http://www.hsph.harvard.edu/obesity-prevention-source/>

Obesity Society (U.S.)
<http://www.obesity.org/>

OPAL (Obesity Prevention and Lifestyle)
<http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/healthy+living/healthy+places/where+we+live+and+play/opal>

PANORAMA: the Physical Activity and Nutrition Observatory: Research and Monitoring
Alliance
<http://www.flinders.edu.au/medicine/sites/panorama/>

PANORG (Physical Activity Nutrition Obesity Research Group)
<http://sydney.edu.au/medicine/public-health/panorg/index.php>

Prevention Information and Evidence eLibrary (U.K.)
<http://www.ukhealthforum.org.uk/prevention/pie/>

Public Health England. Data and Knowledge Gateway
http://datagateway.phe.org.uk/?lk_sr=govphe

The Robert Wood Johnson Foundation Center to Prevent Childhood Obesity
<http://www.rwjf.org/childhoodobesity/index.jsp>

The Rudd Center for Food Policy & Obesity
<http://www.valeruddcenter.org/>

WHO Collaborating Centre for Obesity Prevention and Related Research, Deakin University;
www.deakin.edu.au/health/who-obesity/

WHO Commission on Ending Childhood Obesity
<http://www.who.int/end-childhood-obesity/en/>

WHO European Database on Nutrition, Obesity and Physical Activity (NOPA)
<http://data.euro.who.int/nopa/>

World Obesity Foundation
<http://www.worldobesity.org/>

Appendix IV: Search Strategy (OVID Medline)

1. Obesity/
2. *Overweight/
3. (obes* or overweight).mp.
4. 1 or 2 or 3
5. exp Child/
6. exp Infant/
7. exp Adolescent/
8. (child* or infant* or adolesc* or school* or preschool* or student* or youth*).mp.
9. 5 or 6 or 7 or 8
10. 4 and 9
11. (intervention* or program* or project* or strateg*).mp.
12. prevent*.mp.
13. 10 and 11 and 12
14. limit 13 to English language
15. limit 14 to systematic reviews
16. ((systematic* adj3 review*) or meta-analysis).mp.
17. 14 and 16
18. 15 or 17

Explanatory note:

Command line 15 (limit 14 to systematic reviews) restricts retrieval to citations in the area of systematic reviews. This strategy was based on PubMed's Systematic Reviews subset limit. See: OVID database guide, Subject limits: <http://site.ovid.com/products/ovidguide/medline.htm>

Appendix V: Journals that published the included systematic reviews (descending order)

	Journal name	Number of SRs
1.	Obesity reviews	13
2.	International Journal of Obesity	2
3.	Journal of Public Health	2
4.	Obesity	2
5.	Acta Paediatrica Supplement	1
6.	American Journal of Clinical Nutrition	1
7.	American Journal of Preventive Medicine	1
8.	British Journal of Nutrition	1
9.	Clinical Psychology Review	1
10.	CMAJ	1
11.	Comprehensive Pediatric Nursing	1
12.	Current Sports Medicine Reports	1
13.	European Journal of Epidemiology	1
14.	Health Education and Behavior	1
15.	Health Psychology Review	1
16.	International Journal of Behavioral Nutrition and Physical Activity	1
17.	International Journal of Environmental Research and Public Health	1
18.	International Quarterly of Community Health Education	1
19.	Jornal de Pediatria	1
20.	Journal of Adolescent Health	1
21.	Journal of Advanced Nursing	1
22.	Journal of Clinical Endocrinology and Metabolism	1

23.	Journal of Obesity	1
24.	Journal of Pediatric Health Care	1
25.	Journal of Physical Activity & Health	1
26.	Life Science Journal	1
27.	Nutrición Hospitalaria	1
28.	Psychological Bulletin	1
29.	Psychology in the Schools	1
30.	Revista de Saude Publica	1
31.	Vulnerable Children and Youth Studies	1
	TOTAL	46

Appendix VI: Databases searched by Systematic Review authors

Note: **Black** databases are defined here as those which index commercially published journal articles and **Grey** databases are those which include some unpublished content e.g. reports, dissertations, conference papers, legislation etc. Grey databases are designated with an asterisk (*)

***A=Education:** citation and full text education research database designed for the teaching and research professional. Source documents include journal articles, monographs, research reports, theses, conference papers, legislation, parliamentary debates, newspaper articles, tests and web. Content by Australian authors or about Australian education published in overseas sources included.

Academic Search Elite: multidisciplinary full-text collection of journal articles and database of journal abstracts.

***Academic Search Premier:** multidisciplinary full-text collection of journal articles, some books, conference proceedings.

***ACHEIA** (Australasian Collaboration for Health Equity Impact Assessment)

ACP Journal Club: (American College of Physicians) selects published articles according to explicit criteria, then abstracts and reviews them. Articles are summarized in "value-added" abstracts and commented on by clinical experts.

***AGRICOLA:** National [U.S.] Agricultural Library catalogue is the primary public database for world-wide access to agricultural information. The database covers materials in all formats and periods, including printed works from as far back as the 15th century: theses, pamphlets, conference proceedings, research reports, government documents, monographs and patents.

AMED: an alternative medicine citation database of articles from over 500 journals, with the scope of coverage being mainly European.

***APAIS:** database of scholarly articles in the social sciences and humanities published in Australia, and selected periodical articles, conference papers and newspaper articles on Australian economic, social, political and cultural affairs.

***ASSIA** (Applied Social Sciences Index and Abstracts): a database indexing and abstracting journal articles, dissertations, reports, conferences, book chapters and more in the area of health, social services, psychology, sociology, economics, politics, race relations and education.

***AustHealth** contains nine databases, including the Australasian Medical Index, Australian Public Affairs Information Service – Health, Aboriginal and Torres Strait Islander Health Bibliography, AusportMed, CINCH, Health & Society Database, HIV/AIDS Database and Rural and Remote Health. This compilation complements Medline. Indexes journal articles, conference papers, government reports and working papers.

***BA (Biological Abstracts):** citation database monitors more than 6,500 serials from the life sciences and the world's published biological and biomedical research. The database also includes short communications such as technical notes and letters.

Bandolier: an independent journal about evidence-based healthcare, written by Oxford scientists. Information comes from systematic reviews, meta-analyses, randomised trials, and from high quality observational studies.

***Biological Sciences:** interdisciplinary database of abstracts and citations to a wide range of research in biomedicine, biotechnology, zoology and ecology. Provides access to literature from over 8,000 serials, as well as conference proceedings, technical reports, monographs and selected books and patents

BioMedCentral: is an STM (Science, Technology and Medicine) publisher of 257 peer-reviewed open access journals.

***BIOSIS Previews:** a key citation biological and life sciences database covering 1926 to present journal articles, plus books and book chapters, selected U.S. patents, and conference literature. BIOSIS provides coverage of many conference "abstract books" issued with journals.

***BNBRL (British National Bibliography for Report Literature)** produced by the British Library, indexes dissertations and technical reports.

British Nursing Index: UK nursing and midwifery database, covering over 270 UK journals and other English language titles, including international nursing and midwifery journals, as well as selective content from medical, allied health and management titles.

***CAB Abstracts (Commonwealth Agricultural Bureaux)** is the largest professionally-produced database covering international issues in agriculture, forestry, and allied disciplines in the life sciences. The database contains over 6.3 million records (with 300,000 abstracts added each year) from over 7,500 journals, books and conference proceedings. CAB is a not-for-profit organization with scientific research, publishing and international development at its core..

***CBCA Education (Canadian Business & Current Affairs Education)** focuses on Canadian information in the field of teaching, educational research, and educational administration in Canada. Academic, administrative, professional, and topical journals are all included, as are newsletters.

***CBM (Chinese Biomedical Literature Database):** a comprehensive Chinese medical literature database produced by the Medical Information Institute of Chinese Academy of Medical Sciences indexing Chinese biomedical journals and also conference papers.

***CCRCT (Cochrane Central Register of Controlled Trials)** includes details of published articles taken from bibliographic databases (notably MEDLINE and EMBASE), and other published and unpublished sources. Part of the **Cochrane Library**

CDSR (Cochrane Database of Systematic Reviews) includes all Cochrane Reviews (and protocols) prepared by Cochrane Review Groups in The Cochrane Collaboration. Each Cochrane Review is a peer-reviewed systematic review that has been prepared and supervised by a Cochrane Review Group. Part of the **Cochrane Library**

***CHRC** (Canadian Health Research Collection database): provides access to primary research from Canadian research institutes, government agencies and university centres working in the area of health and medical research. Mainly grey research literature including technical and policy reports and documents from research bodies, varying from university research institutes to think tanks such as the Fraser Institute

***Chronic Disease Prevention File**: (U.S. govt.) consists of 6 databases: health promotion and education, AIDS, school health education, cancer prevention and control, chronic disease prevention directory, and a State profile. The databases include abstracts of information from a variety of published and unpublished documents; information on Federal, State, and local government programs and key contacts.

***CINAHL** (Cumulative Index of Nursing and Allied Health Literature): major nursing journal citation database, also includes references to health care books, nursing dissertations, selected conference proceedings, standards of practice, audiovisuals and book chapters

***CISTI** (Canadian Institute for Scientific and Technical Information): Canada's National Science/Research Council Library catalogue. Indexes a wide range of resources including books, conference proceedings and technical reports

CJFD (The China Journals Full-text Database) is licensed for use by authorized users of the Hong Kong Public Libraries (HKPL).

Clinical Evidence: comprises an international database of high-quality, rigorously developed systematic overviews assessing the benefits and harms of treatments.

***ClinicalTrials.gov**: a registry and results database of publicly and privately supported clinical studies of human participants conducted around the world.

CMCC (Chinese Medical Current Contents): produced by the Medical Library of the Chinese People's Liberation Army, this database indexes over 1,200 biomedical journals published in Mainland China since 1994.

***Cochrane Library** consists of 6 databases: **CDSR, DARE, CCRCT, CMR, HTA, NHSEED**

***Conference Proceedings Citation Index**: ISI database, part of Web of Science, this database includes the published literature of the most significant conferences, symposia, seminars, colloquia, workshops, and conventions in a wide range of disciplines.

***Current Contents**: multidisciplinary database updated weekly abstracting articles from the journals and books from 1998 onwards. The database also includes over 7,000 high-quality websites that have been assessed and commented by experts.

***Current Controlled Trials:** Provides access to major registers making it one of the largest controlled trials resources in the world. Although its primary aim is to include information about ongoing controlled trials, the metaRegister does include information about some completed trials.

***DAI (Dissertation Abstracts International):** Virtually all accredited institutions in North America that award doctoral degrees submit their dissertations for publication or listing in DAI. The listings provide bibliographic citations that include title, author name, degree-granting university, year awarded and number of pages.

DARE (The Database of Abstracts of Reviews of Effects) contains abstracts of systematic reviews that have been quality-assessed. Each abstract includes a summary of the review together with a critical commentary about the overall quality. Part of the **Cochrane Library**

EBMR (Evidence-Based Medicine Reviews) combines the six databases in the Cochrane Library and ACP Journal Club into a single, fully-searchable database.

Education Abstracts: Indexes and abstracts hundreds of periodicals, books and yearbooks, this database covers a broad range of subjects pertaining to education.

EMBASE: Major biomedical and pharmaceutical citation database indexing more than 3,500 international journals. It has an emphasis on journals published in Europe.

***ERIC: (Educational Resources Information Center)** is the largest education citation database in the world containing over one million records of journal articles, research reports, curriculum and teaching guides, conference papers, and books.

***Expanded Academic ASAP:** a multidisciplinary full-text database of academic journal literature and extensive range of other document types including reports, working papers, standards, blogs and conference notes.

***FIS Bildung {FIS Bildung Literaturdatenbank}:** German Education includes journal content, book chapters, reports and other grey literature covering all aspects of education policy, practice and principle. These are primarily in German but include some important English language publications.

***Global Health:** definitive international public health database which indexes and abstracts over 5,000 journals, plus reports, books, patents, theses and conferences, and contains over 1.2 million records. Includes publications from over 158 countries in 50 languages and all relevant non-English language papers are translated to give access to research not available through any other database. Global Health's open serials policy and coverage of international and grey literature means that 60% of material contained in Global Health is unique to the database.

***Google Scholar:** provides a simple way to broadly search for scholarly literature. Enables a search across many disciplines and sources: articles, theses, books, abstracts and court opinions, from academic publishers, professional societies, online repositories, universities and other web sites

***GrayLit Network:** the world's most comprehensive portal to U.S. Federal grey literature, the GrayLIT Network is a portal for technical report information generated through federally funded research and development projects. It provides a full-text search across the gray literature of multiple government agencies.

***GreyNet:** is dedicated to research, publication, open access, and education in the field of grey literature. The goal of GreyNet is to facilitate dialog, research, and communication between persons and organisations in the field of grey literature. GreyNet further seeks to identify and distribute information on and about grey literature in networked environments

Health Source: Nursing Academic: full-text database of peer reviewed scholarly journals, focusing on nursing and allied health.

***Health Source: Consumer Edition:** full text access to nearly 80 consumer health magazines and almost 130 health reference books, plus current, health-related pamphlets and 9,900 Clinical Reference Systems.

***HealthStar:** focuses on both the clinical and non-clinical aspects of health care delivery: health services, technology, administration, and research. It contains citations and abstracts to journal articles, monographs, technical reports, meeting abstracts and papers, book chapters, government documents, and newspaper articles from 1975 to the present.

***Highwire Press:** partners with independent scholarly publishers, societies, associations, and university presses to facilitate the digital dissemination of 1752 journals, reference works, books, and proceedings.

***HMIC** (Health Management Information Consortium) database combines the bibliographic databases of 2 UK health and social care management organizations: the Department of Health's Library and Information Services (DH-Data) and King's Fund Information and Library Service. Both databases include abstracts of journal articles and index a range of grey literature including books, pamphlets and government reports.

***HTA** (Health Technology Assessment database) brings together details of completed and ongoing health technology assessments (studies of the medical, social, ethical, and economic implications of healthcare interventions) from around the world. The aim of the HTA Database is to improve the quality and cost-effectiveness of health care. Part of the **Cochrane Library**

***InfoTrac:** Provides access to periodicals and news content, from general interest magazines, academic journals, business and technology publications, law journals, health care periodicals, newspapers and newswire services.

***Ingenta:** multidisciplinary full-text database with comprehensive collections of academic and professional research articles online; includes reports.

***INSPEC:** this database contains over 11 million bibliographic abstracts and indexing to journal articles, conference proceedings, technical reports and other literature in the fields of science and technology.

***LILACS** (Latin-American and Caribbean Health Sciences Literature): comprehensive index of scientific and technical literature of Latin America and the Caribbean providing increased visibility, access to health information in the region. Indexes journal articles, books, book chapters, theses on public health, government documents and technical reports.

LLBA (Linguistics and Language Behavioral Abstracts): abstracts and indexes the international journal literature in linguistics and related disciplines in the language sciences. The database covers all aspects of the study of language including phonetics, phonology, morphology, syntax and semantic.

***MDConsult:** database designed to meet the clinical content needs of physicians and other health care professionals: includes full-text journals, ebooks, patient handouts and guidelines.

MEDLINE: the National Library of Medicine journal citation database. Started in the 1960s, it now provides over 20 million references [Jan 2013] to biomedical and life sciences journal articles back to 1946

***NHSEED** (Economic Evaluation Database) is produced by Centre for Reviews and Dissemination (CRD) at the University of York, UK and assists decision-makers by systematically identifying economic evaluations from around the world, appraising their quality, and highlighting their relative strengths and weaknesses. Part of the **Cochrane Library**

***NIHR CRN** (The National Institute for Health Research Clinical Research Network) Portfolio is a database of high-quality clinical research studies and reports that are eligible for support from the NIHR Clinical Research Network in England. It is part of the UK Clinical Research Network Portfolio.

***PAIS** (Public Affairs Information Service): comprehensive source of information on public policy and issues of relevance across the social sciences, including health. Contains citations to journal articles, books, government documents, statistical directories, grey literature, research reports, conference reports, publications of international agencies, microfiche, Internet material, and more from over 120 countries

***PHP** (Partners in Information Access for the Public Health Workforce) is a collaboration of U.S. government agencies, public health organizations, and health sciences libraries which provides access to selected public health resources on the Internet.

***Physical Education Index:** database for researchers and professionals in the field, with coverage ranging from physical education curricula, to sports medicine, to dance. Includes peer-reviewed journals, report literature, conference proceedings, trade magazines, patents and articles from the popular press

***Population Index:** an annotated bibliography of books, journal articles, working papers, and other materials on population topics and produced by Princeton University until 2000.

***PQDT (ProQuest Dissertations and Theses):** the official digital dissertations archive for the Library of Congress and the database of record for graduate research. Includes nearly 3 million searchable citations to dissertation and theses from around the world from 1743 to present day together with over 1 million full-text dissertations that are available for download

***ProceedingsFirst:** Searchable database of worldwide conference proceedings with citations of every congress, symposium, conference, exposition, workshop and meeting received at The British Library, 1993-present.

***Proquest 5000:** a comprehensive multidisciplinary database with access to over 10,200 publications; 60% of those in full text: includes journals, newspapers, newsletters and conference papers.

***Proquest Education Complete:** comprises two databases, ProQuest Career & Technical Education and ProQuest Education Journals. The first database has over 545 vocational and technical education titles; the second has over 760 top educational publications. Majority are available in full text.

PsycArticles: is a full-text database of articles from journals published by the American Psychological Association, the APA Educational Publishing Foundation and the Canadian Psychological Association.

***PsycInfo:** citation database from APA (American Psychological Association) indexes & abstracts peer-reviewed articles, chapters, books, dissertations & technical reports. Covers psychology & psychological aspects of related disciplines

***PSYINDEX:** the most comprehensive citation database of psychological literature, audiovisual media, intervention programs, and tests from the German-speaking countries.

PubMed: the database has been available since 1996. It's over 22 million references [Jan 2013] include the complete MEDLINE database PLUS other material including preprints, in-process citations, journals/manuscripts deposited in PMC (PubMed Central) and resources in the NCBI Bookshelf.

Science Citation Index: provides access to bibliographic and citation information to find research data, analyze trends, journals and other researchers. It focuses on essential data from 6,000 of the world's leading science journals across 50 disciplines: part of **Web of Science**.

***ScienceDirect:** full-text scientific database offering journal articles and book chapters from more than 2,500 journals and almost 20,000 books published by Elsevier.

***SCOPUS:** the largest multidisciplinary abstract and citation database of peer-reviewed literature also includes trade publications, book series and over 5.5 million conference papers.

***SIGLE** (System for Information on Grey Literature in Europe): open access database of 700,000 bibliographical references to European grey literature Coverage includes technical or research reports, doctoral dissertations, some conference papers, some official publications, and other types of grey literature.

***Soc Abs** (Sociological Abstracts) abstracts and indexes the international literature in sociology and related disciplines in the social and behavioural sciences. The database provides abstracts of journal articles and citations to book reviews drawn from over 1,800+ serials publications, and also provides abstracts of books, book chapters, dissertations, and conference papers.

***Social Care Online:** the UK's largest citation database of information and research on all aspects of social care and social work. Resources include legislation, government documents, practice and guidance, systematic reviews, research briefings, reports, journal articles and websites. Links to full text are also included where available.

Social Sciences Citation Index: access to bibliographic and citation information to find research data, analyze trends, journals and other researchers. It focuses on essential data from 3,000 of the world's leading social sciences journals: part of **Web of Science**.

***Social Services Abstracts:** provides bibliographic coverage of current research focused on social work, human services, and related areas, including social welfare, social policy, and community development. The database abstracts and indexes over 1,300+ serials publications and includes abstracts of journal articles and dissertations, and citations to book reviews

***SPORTDiscus:** comprehensive sports research bibliographic database with journal and monograph coverage from 1800; including tens of thousands of dissertations, theses and reference to articles in 60 languages. The content also consists of international references from journal and magazine articles, books, book chapters & conference proceedings.

Swetswise: comprehensive information management and procurement platform available from Swets.

***TRIP** (Turning Research into Practice) is a clinical search engine with access to high-quality research evidence to support practice and/or care.

***TRIS** (Transportation Research Information Services) provides access to more than one million records of transportation research worldwide, including journal articles, conference papers and reports.

***UNESCO Publications Catalogue:** annual: includes reports and working papers.

***Web of Knowledge:** provides a single access to the most reliable, integrated, multidisciplinary research from multiple databases (i.e. Web of Science, Current Contents): covers data, books, journals, proceedings or patents, chemical reactions and compounds, as well as web content.

***Web of Science:** a multidisciplinary index to the academic journal literature, and also conference papers, technical and other reports. Provides combined access to 5 citation databases: Science Citation Index, Social Sciences Citation Index, Art & Humanities Citation Index, Conference Proceedings Citation Index (both Science & Social Sciences and Humanities) and 2 chemistry databases.

***WHOLIS** (WHO Library Database): partially abstracted database of WHO publications, periodical articles, technical and policy documents and publications from Pan American Health Organization (PAHO), International Agency for research on Cancer (IARC), Council for International Organisations on Medical Sciences (CIOMS)

Wiley Interscience (Wiley Online Library) provides access to over 4 million articles across nearly 1900 journals. The database has full-text access to over 1,600 journals and 2,000 ebooks via Wiley Online. Subjects covered include life, health and physical sciences, social science, and the humanities

**Appendix VII: All included studies in the systematic reviews
(indicating how many times cited, grey or black; alphabetical
order by author of study)**

Author of Study	B/G	Source	Date	Cited
Adkins S	B	Obesity Research	2004	1
Agozzino E	B	Annali di Igiene	2007	1
Agron P	B	Journal of the American Dietetic Assoc.	2002	1
Alexander LM	B	BMJ	2005	1
Alexandrov AA	B	Preventive Medicine	1992	3
Alfano CM	B	Scandinavian Journal Medicine Sport Science	2002	1
Alhassan S	B	International Journal of Pediatric Obesity	2007	2
Amaro S	B	European Journal of Pediatrics	2006	5
Ambler C	B	International Journal of Obesity and Related Metabolic Disorders	1998	1
Anand	B	Canadian Jnl of Public Health	2007	1
Anderson AS	B	Public Health Nutrition	2005	2
Angelico F	B	Public Health	1991	1
Angelopoulos PD	B	European Journal of Public Health	2009	3
Anglicare	G	Project report	2005	1
Annesi JJ	B	Research Quarterly for Exercise and Sport	2005	1
Annesi JJ	B	Psychosomatic Research	2006	1
Annesi JJ	B	Journal of Social Behavioral and Health Sciences	2007	1
Annesi JJ	B	International Journal of Clinical and Health Psychology	2007	1
Annesi JJ	B	Perceptual and Motor Skills	2007	1
Annesi JJ	B	Journal of Sport Science and Medicine	2008	1

Annesi JJ	B	Psychological Reports	2008	1
Annesi JJ	B	Psychological Reports	2009	2
Annesi JJ	B	Perceptual and Motor Skills	2010	1
Annesi JJ	B	Archives in Exercise Health and Disease	2011	1
Antonogeorgos G	B	Journal of Sports Medicine and Physical Fitness	2011	1
Aquilani R	B	Preventive Medicine	2007	1
Arbeit ML	B	Preventive Medicine	1992	1
Ashfield-Watt PA	B	Public Health Nutrition	2009	1
Ask AS	B	Nutrition Journal	2006	3
Ask AS	B	Public Health Nutrition	2010	1
Aust. Greek Welfare Society	G	Project report (web document)	2005	1
Aust. Institute of Family Studies	G	Project report (web bulletin)	2004	1
Bandini LG	B	American Journal of Clinical Nutrition	2004	1
Baranowski T	B	Health Education Quarterly	1990	1
Baranowski T	B	Health Education and Behavior	2000	2
Baranowski T	B	American Journal of Preventive Medicine	2003	1
Baranowski T	B	Ethnicity and Disease	2003	9
Barbeau P	B	Obesity	2007	3
Barbeau P	B	Obesity Research	2007	1
Barnow S	B	Psychotherapie, Psychosomatik, medizinische psy	2003	1
Bayer O	B	Clinical Nutriiton	2009	3
Bayne-Smith M	B	American Jounal of Public Health	2004	4
Beech BM	B	Ethnicity and Disease	2003	5
Beets MW	B	Journal of School Health	2005	1
Belue R	B	Journal of Adolescent Health	2009	1

Bengoechea EG	B	Research Quarterly for Exercise and Sport	2010	1
Bere E	B	Preventive Medicine	2005	1
Bere E	B	Health Education Research	2006	2
Bere E	B	International Journal of Behavior Nutrition and PA	2007	1
Berkowitz R	B	Annals of Internal Medicine 2006	2006	1
Berkowitz RI	B	JAMA	2003	2
Berry D	B	Hispanic Health care International	2009	1
Binkley T	B	Bone	2004	1
Black M	B	Pediatrics	2010	1
Boaz A	B	Health Education Journal	1998	1
Bonaccorsi G	B	Annali di Igiene	2002	1
Borys JM	B	Revue Médicale de la Suisse Romande	2000	1
Botvin	B	Journal of Pediatrics	1979	1
Bower JK	B	American Journal of Preventive Medicine	2008	1
Branscum P	B	California Journal of Health Promotion	2009	1
Bravo A	G	Report: Health Promotion Service	2003	1
Brien J	G	Project report (web document)	2004	1
Brown JB	B	Journal of Adolescent Health	2004	1
Brown K	G	Unpublished dissertation	2002	1
Brown WH	B	Child Development	2009	1
Brown WH	B	Journal of Early Intervention	2009	1
Brownell KD	B	American Journal of Clinical Nutrition	1982	1
Brownell KD	B	Pediatrics	1983	1
Budd GM	B	Journal of Cardiovascular Nursing	2007	1
Bungum T	B	Research Quarterly for Exercise and Sport	2007	1
Bunney C	G	Book	2005	1
Burgess-Champoux TL	B	Public Health Nutrition	2003	1

Burke V	B	Journal of Pediatrics	1998	4
Burnet DL	B	Journal of General Internal Medicine	2007	1
Burnet	B	Journal of National Medication Association	2011	1
Bush PJ	B	American Journal of Epidemiology	1989	2
Bush PJ	B	Health Education Quarterly	1989	2
Butte NF	B	American Journal of Clinical Nutrition	2007	1
Cabellero B	B	American Journal of Clinical Nutrition	2003	13
Cancer Council WA	G	Project report (web document)	2005	1
Cardon G	B	Journal of Behavior Nutrition and Physical Activity	2008	1
Cardon G	B	Preventive Medicine	2009	1
Carrel	B	Archives of Pediatric and Adolescent Medicine	2005	3
Carson DE	B	Family and Consumer Sciences Research Journal	2011	1
Casazza K	B	Eating Behaviors	2007	2
Cason K	B	Topics in Clinical Nutrition	2006	1
Chanoine J	B	JAMA	2005	1
Chavarro JE	B	Cancer Causes and Control	2005	2
Chen J	B	Journal for Specialists in Pediatric Nursing	2008	1
Chen MY	B	Public Health Nursing	2001	1
Chen MY	B	Journal for Specialists in Pediatric Nursing	2008	1
Chomitz VR	B	Obesity	2010	1
Coates TJ	B	Behavioral Therapy	1982	1
Coates TJ	B	Preventive Medicine	1985	1
Colchico	B	American Journal of Public Health	2000	1
Coleman KJ	B	Archives Pediatric Adolescent Medicine	2005	7
Coleman KJ	B	Journal of School Health	2008	1

Cooper AR	B	American Journal of Preventive Medicine	2003	1
Cooper AR	B	Medical Science Sports Exercise	2006	1
Cooper R	B	Journal of Hypertension	1984	1
Cotton	B	American Journal of Medical Science	2006	1
Crawford	B	American Journal of Public Health	2004	1
Crespo CJ	B	Archives of Pediatric and Adolescent Medicine	2001	1
Crespo CJ	B	Annals of Behavioral Medicine	2012	1
Croll JK	B	Journal of the American Dietetic Assoc.	2006	1
Cross D	G	Resource Manual	2004	1
Cullen	B	American Journal of Health Behavior	2008	1
Cunningham-Sabo	B	Preventive Medicine	2003	1
D'Addesa D	B	International Journal of Obesity	2006	1
Damon S	B	Acta Paediatrica	2005	1
Danielzik S	B	International Journal of Obesity	2005	2
Danielzik S	B	Acta Paediatrica Supplementum	2007	4
Danielzik S	B	Obesity	2007	1
Davis CE	B	American Journal of Clinical Nutrition	1999	1
Davis JN	B	Journal of the American Dietetic Assoc.	2011	1
Davis SM	B	Annals of the New York Academy of Science	1992	1
Davis SM	B	Journal of Health Education	1995	1
Davis SM	B	American Journal of Clinical Nutrition	1999	1
Davis SM	B	Preventive Medicine	2003	1
Deakin University	G	Report (web document)	2005	1
De Heer HD	B	American Journal of Public Health	2011	1
Deforche B	B	Tijdschrift voor Psychologie Gezondheid	2001	1
Deforche B	B	Obesity Research	2003	1
Delany JP	B	American Journal of Clinical Nutrition	2006	1

Dennison BA	B	Archives Pediatric Adolescent Medicine	2004	6
Di Noia J	B	American Journal of Health Promotion	2008	1
Dixon	G	Unpublished	2007	1
Dollahite J	B	Journal of Nutrition Education	1998	1
Dollman J	B	Pediatric Exercise Science	2007	1
Donnelly JE	B	Obesity Research	1996	7
Donnelly JE	B	Preventive Medicine	2009	3
Dowda M	B	Archives Pediatric Adolescent Medicine	2001	1
Dowda M	B	Journal of Community Health	2004	1
Dowda M	B	Pediatrics	2009	1
Doyle AC	B	Journal of Adolescent Health	2008	1
Dreimane D	B	Diabetes Research Clinical Practice	2007	1
Du X	B	British Journal of Nursing	2004	1
Duncan MJ	B	Body Image	2009	1
Dunn C	B	The Forum	2004	1
Durham	G	Unpublished report (web document)	2007	1
Dwyer T	B	International Journal of Epidemiology	1983	3
Dzewaltoski	B	International Journal of Behavior Nutrition and Physical Activity	2010	1
Eat Well Tasmania	G	Program report (web document)	2006	1
Ebbeling CB	B	Archives in Pediatric and Adolescent Medicine	2003	1
Ebbeling CB	B	Pediatrics	2006	1
Economos CD	B	Obesity	2007	2
Economos CD	B	Obesity Research	2007	1
Edmundson E	B	Preventive Medicine	1996	1
Edwards B	B	Nursing Clinics of North America	2005	1
Eichhorn C	B	International Journal of Public Health	2007	1

Eid EE	B	BMJ	1970	1
Eikner CA	G	Unpublished dissertation	1983	1
Eisenmann JC	B	BMC Public Health	2008	2
El Ansari W	B	International Journal of Environment Research Public	2010	1
Eliakim A	B	International Journal of Sports Medicine	2000	2
Eliakim A	B	Journal of Pediatric Endocrinology and Metabolism	2007	4
Epstein LH	B	Behavioral Therapy	1982	1
Epstein LH	B	Journal of Pediatrics	1985	1
Epstein LH	B	Journal of the American Dietetic Assoc.	1986	1
Epstein LH	B	American Journal of Diseases of Children	1993	1
Epstein LH	B	Addictive Behavior	1994	1
Epstein LH	B	Health Psychology	1995	2
Epstein LH	B	Medical Science Sports Exercise	1999	1
Epstein LH	B	Archives in Pediatric and Adolescent Medicine	2000	1
Epstein LH	B	Obesity Research	2001	4
Epstein LH	B	Journal of Pediatrics	2001	1
Epstein LH	B	Journal of Pediatrics	2002	1
Eriksen K	B	Public Health Nutrition	2003	1
Escobar-Chaves SL	B	Obesity	2010	1
Evans AE	B	Family and Community Health	2006	1
Ewart CK	B	American Journal of Public Health	1998	1
Faith MS	B	Pediatrics	2001	1
Falk B	B	Journal of Pediatric Endocrinology and Metabolism	2002	1
Family Action Centre	G	Project report (web document)	nd	1
Fardy PS	B	Journal of Adolescent Health	1996	1

Feng BS	B	Maternal Child Health Care China	2004	1
Ferguson MA	B	International Journal of Obesity and Related Met Dis	1999	1
Ferrer Gonzalez P	B	Anales Espanoles Pediatria	1998	1
Ferrer Lorente B	B	Anales Espanoles Pediatria	1997	1
Figuroa-Colon R	B	American Journal of Diseases of Children	1993	1
Figuroa-Colon R	B	Obesity Research	1996	1
Figuroa-Colon R	B	American Journal of Clinical Nutrition	2000	1
Fitzgibbon M	B	Journal of Pediatrics	2004	1
Fitzgibbon ML	B	Journal of Nutrition Education	1995	1
Fitzgibbon ML	B	Preventive Medicine	2002	3
Fitzgibbon ML	B	Journal of Pediatrics	2005	9
Fitzgibbon ML	B	Obesity	2006	6
Fitzgibbon ML	B	Obesity	2010	1
Fletcher A	B	ABNF Journal	2009	1
Flodmark CE	B	Pediatrics	1993	1
Flores R	B	Public Health Reports	1995	6
Fogarty AW	B	International Journal of Epidemiology	2007	1
Ford BS	B	American Journal of Preventive Medicine	2002	2
Ford P	B	Pediatric Exercise Science	2007	1
Foster GD	B	Pediatrics	2008	5
Freedman MR	B	Journal of Nutrition Education Behavior	2010	1
French SA	B	International Journal of Behavior Nutrition Physical Activity	2005	1
Frenn M	B	Journal of Community Health Nursing	2003	5
Frenn M	B	Journal of Pediatric Nursing	2003	1
Frenn M	B	Applied Nursing Research	2005	2
Friel S	B	Public Health Nutrition	1999	1

Fulkerson JA	B	Obesity	2010	1
Fullerton G	B	Obesity	2007	2
Fullerton G	B	Obesity Research	2007	1
Fulton JE	B	Research Quarterly in Exercise and Sport	2005	1
Gentile DA	B	BMC Medicine	2009	2
Gable S	B	Journal of the American Dietetic Assn	2001	1
Gann	G	Unpublished	2007	1
Garaulet M	B	Journal of Pediatric Gastroenterological Nutrition	2000	1
Gittelsohn J	B	Health Education Research	1998	1
Gittelsohn J	B	American Journal of Clinical Nutrition	1999	1
Gittelsohn J	B	Preventive Medicine	2003	1
Going S	B	Preventive Medicine	2003	2
Golan M	B	Journal of Clinical Nutrition	1998	1
Goran MI	B	Obesity Research	2005	4
Gordon-Larsen P	B	Pediatrics	2000	1
Gordon-Larsen P	B	Obesity Research	2001	2
Gortmaker SL	B	Archives Pediatric Adolescent Medicine p 409-	1999	12
Gortmaker SL	B	Archives Pediatric Adolescent Medicine p 975-	1999	5
Graf C	B	Cardiology in the Young	2005	3
Graf C	B	Journal of Sports Science and Medicine	2005	1
Graf C	B	Journal of Sports Science and Medicine	2008	1
Graham	B	Public Health Nutrition	2008	1
Gratton L	B	British Journal of Health Psychology	2007	1
Greening	B	Obesity	2011	1
Grey M	B	Journal of School Health	2004	2

Gutin B	B	American Journal of Human Biology	1999	1
Gutin B	B	Obesity Research	1999	1
Gutin B	B	Research Quarterly in Exercise and Sport	1999	1
Gutin B	B	International Journal of Pediatric Obesity	2008	1
Haerens L	B	Obesity	2006	5
Haerens L	B	Health Education Research	2006	4
Haerens L	B	Obesity	2006	1
Haerens L	B	Annals of Behavioral Medicine	2007	2
Haerens L	B	Public Health Nutrition	2007	1
Haerens L	B	Journal of Adolescent Health	2007	1
Haire-Joshu D	B	Obesity	2010	1
Hakanen M	B	International Journal of Obesity	2006	2
Hannon JC	B	Preventive Medicine	2008	1
Hansen HS	B	BMJ	1991	1
Hardin DS	B	Pediatrics	1997	1
Harrell JS	B	Journal of Pediatrics	1996	4
Harrell JS	B	Pediatrics	1996	1
Harrell JS	B	Journal of Pediatrics	1998	1
Harrell JS	B	Pediatrics	1998	3
Harrell JS	B	American Journal of Public Health	1999	1
Harrell JS	B	Journal of Pediatric Nursing	2000	1
Harrell TK	B	Southern Medical Journal	2005	1
Harris J	G	Report	2002	1
Harris J	G	Program report (web document)	2008	1
Harris MB	B	Journal of School Health	1988	1
Harrison M	B	Journal of Science Medicine and Sport	2006	2
Harvey-Berino J	B	Obesity Research	2003	6

Hassapidou MN	B	Health Education Journal	1997	1
Hawley SR	B	Journal of Community Health Nursing	2006	1
Hayden	G	Unpublished	2007	1
He M	B	Public Health Nutrition	2009	1
He YF	B	Chinese Journal of Pediatrics	2004	1
Healthy Start	G	Program report (web document)	2005	1
Heelan KA	B	Child Care Health Development	2005	1
Helitzer DL	B	American Journal of Clinical Nutrition	1999	1
Hergenroeder AC	B	Clinical Journal of Sports Medicine	1993	1
Herzog E	G	Report (web document)	2005	1
Heude B	B	Diabetes and Metabolism	2003	1
Higgins D	G	Research report	2005	1
Himes JH	B	Preventive Medicine	2003	1
Hoelscher DM	B	Obesity	2010	1
Hoerr SL	B	Journal of Adolescent Health Care	1988	1
Hoerr SM	G	Unpublished dissertation	1985	1
Hollar D	B	Health Care for the Poor and Underserved	2010	1
Hollar D	B	Journal of the American Dietetic Assoc.	2010	2
Hopper CA	B	Research Quarterly for Exercise and Sport	1992	1
Hopper CA	B	Children and Health Care	1996	2
Hopper CA	B	Research Quarterly in Exercise and Sport	2005	2
Horne PJ	B	European Journal of Clinical Nutrition	2004	1
Horne PJ	B	European Journal of Clinical Nutrition	2009	1
Horodynski M	B	Pediatric Nursing	2005	1
Howe CA	B	Journal of Obesity	2011	1
Huang S	B	Acta Paediatrica	2007	1
Huberty J	B	Park Recreational Administration	2009	1

Hunter AHS	G	Project report (web document)	2002	1
Hurst L	G	Project report	2007	1
Ignico AA	B	Research Quarterly for Exercise and Sport	1995	2
Israel AC	B	International Journal of Eating Disorders	1999	1
Jackson CJ	B	Progress in Community Health Partnerships	2010	1
Jago R	B	Obesity Research	2004	1
Jago R	B	Preventive Medicine	2006	2
Jamelske	B	Wisconsin Medical Journal	2008	1
James J	B	BMJ	2004	13
James J	B	BMJ	2007	4
James K	B	Journal for Specialists in Pediatric Nursing	2008	1
Jamner MS	B	Journal of Adolescent Health	2004	2
Jan S	B	Journal of Managed Care Pharmacy	2009	1
Janicke	B	Child Health Care	2011	1
Janz KF	B	American Journal of Preventive Medicine	2005	1
Jelalian E	B	International Journal of Obesity	2006	1
Jiang J	B	Chinese Journal of Child Health Care	2002	1
Jiang J	B	Child Care Health and Development	2007	7
Jian JX	B	Archives of Disease in Childhood	2005	1
Jiang WH	B	Chinese Journal of Nursing	2002	1
Jimenez MM	B	Journal of the American Dietetic Assoc.	2003	1
Johnson MS	B	Pediatrics	2000	1
Johnston CA	B	International Journal of Pediatric Obesity	2007	3
Johnston CA	B	Pediatrics	2007	4
Johnston CA	B	Obesity	2010	3
Jones D	B	International Journal of Behavior Nutrition Physical	2008	1
Jones M	B	Pediatrics	2008	1

Joosse	B	Wisconsin Medical Journal	2008	1
Jordan	B	Journal of the American Dietetic Assoc.	2008	1
Kafatos A	B	European Journal of Clinical Nutrition	2005	2
Kafatos A	B	European Journal of Clinical Nutrition	2007	2
Kain J	B	International Journal of Obesity	2004	11
Kain J	B	Public Health Nutrition	2009	2
Karolkiewicz J	B	Diabetologia Polska	1998	1
Katch V	B	American Journal of Clinical Nutrition	1988	1
Katmarzyk PT	B	Pediatric Exercise Science	1998	1
Katz DL	B	Preventing Chronic Disease	2010	1
Katz ML	B	Ethnicity and Disease	2004	1
Kay JP	B	Metabolism	2001	1
Kibbe D	G	Program report	2005	1
Killen JD	B	JAMA	1988	3
Kipping RR	B	Archives of Disease in Childhood	2008	4
Kirk S	B	Obesity Research	2005	1
Klepp KI	B	Health Education Research	1993	1
Klepp KI	B	European Journal of Public Health	1994	1
Klesges	B	Archives Pediatric Adolescent Medicine	2010	1
Komorowski JM	B	Pediatrics Polska	1982	1
Korsten-Reck U	B	Offentliche Gesundheitswesen	1990	1
Korsten-Reck U	B	Pediatrics Padologie	1993	1
Kramer M	B	Journal of Nutrition	2009	1
Kramer MS	B	JAMA	2001	1
Kramer MS	B	American Journal of Clinical Nutrition	2007	1
Kramer MS	B	Journal of Nutrition	2009	1
Kremers SPJ	B	Psychological Health	2004	1

Kriemler S	B	BMJ	2010	2
Krombholz H	B	Book	2005	1
Kumanyika SK	B	Ethnicity and Disease	2003	1
Lady Gowrie Centre	G	Unpublished report (web document)	2003	1
Lady Gowrie Centre	G	Unpublished report (web document)	2004	1
Lady Gowrie Centre	G	Unpublished workshop (web document)	2005	1
Lafay L	B	Revue d'Epidémiologie et de Santé Publique	1998	1
Lagstrom H	B	Archives Pediatric Adolescent Medicine	1997	1
Lagstrom H	B	Pediatrics	2008	1
Lajunen HR	B	Journal of Adolescence	2009	1
Landsberg B	B	European Journal of Clinical Nutrition	2008	1
Lane-Tillerson C	B	Journal of the National Black Nurses Association	2005	1
Lauer RM	B	American Journal of Clinical Nutrition	2000	1
Lazaar N	B	Acta Paediatrica	2007	2
Levine MD	B	International Journal of Eating Disorders	2001	1
Li H	B	Chinese Journal of Health Education	2004	1
Li YP	B	Biomedical and Environmental Sciences	2010	2
Linden C	B	Journal of Bone and Mineral Research	2006	2
Lionis C	B	Preventive Medicine	1991	4
Lionis Kafatos A	B	Preventive Medicine	1991	1
Liu A	B	Obesity Reviews	2008	2
Liu AL	B	Biomedical and Environmental Sciences	2007	1
Liu SQ	B	Chinese Journal of School Doctor	2005	1
Livieri C	B	Pediatrica Medica e Chirurgica	1992	1
Livingstone M	G	Report (London, Food Standards Agency)	2002	1
Lobstein R	B	Obesity Reviews	2004	1
Lohman T	B	Preventive Medicine	2003	3

Long JD	B	Journal of Nursing Scholarship	2004	2
Loucaides CA	B	Journal of School Health	2007	1
Loughridge JL	B	Journal of Human Nutrition and Dietetics	2005	1
Lowe CF	B	European Journal of Clinical Nutrition	2004	1
Lowe F	G	Working paper	2007	1
Lowry R	B	Journal of School Health	2002	1
Lozano GB	B	Anales Espanoles de Pediatria	1997	1
Lubans DR	B	Sports Medicine	2010	1
Luce KH	B	International Journal of Eating Disorders	2005	1
Luepker RV	B	JAMA	1996	7
Lytle LA	B	Preventive Medicine	1996	1
Lytle LA	B	Health Education and Behavior	2004	2
Ma LY	B	Chinese Journal of Child Health Care	2003	1
Macaulay AC	B	Preventive Medicine	1997	1
MacDonell	B	Journal of Adolescent Health	2011	1
MacKelvie KJ	B	Pediatrics	2003	2
MacKelvie KJ	B	Bone	2004	1
Madsen K	B	Journal of Child Health Care	2009	1
Maffeis C	B	European Journal of Clinical Nutrition	1992	1
Mangunkusumo RT	B	Health Education Research	2007	1
Mangunkusumo RT	B	Public Health Nutrition	2007	2
Manios Y	B	Health Education Research	1998	3
Manios Y	B	Public Health Nutrition	1999	1
Manios Y	B	Preventive Medicine	1999	5
Manios Y	B	British Journal of Nutrition	2002	5
Manios Y	B	American Journal of Human Biology	2004	1
Manios Y	B	British Journal of Nutrition	2006	1

Manios Y	B	Preventive Medicine	2006	1
Marcoux MF	B	Psychology and Health	1999	1
Marcus C	B	International Journal of Obesity	2009	1
Marks JT	B	Journal of Adolescent Health	2006	1
Martens M	B	Health Education Research	2006	1
Martens MK	G	Unpublished dissertation	2005	1
Martens MK	B	Public Health Nutrition	2008	2
Martin SL	B	American Journal of Preventive Medicine	2007	1
Martinez Vizcaino	B	International Journal of Obesity	2008	2
Masterson N	G	Project report	2003	1
Matheson D	G	Unpublished dissertation	2005	1
Matvienko O	B	Journal of Nutrition Education	2001	1
Matvienko O	B	American Journal of Health Promotion	2010	2
Matwiejczyk L	G	Unpublished report (web document)	2003	1
Mauriello LM	B	Preventive Medicine	2010	1
McCallum Z	B	Journal of Paediatrics and Child Health	2005	1
McCormick	B	Clinical Pediatrics	2008	1
McDuffie JR	B	Journal of Pediatric Endocrinology Metabolism	2004	1
McGarvey E	B	Ethnicity and Disease	2006	1
McKenzie TL	B	Research Quarterly in Exercise and Sport	1997	1
McKenzie TL	B	American Journal of Preventive Medicine	2001	1
McMurray RG	B	Journal of Adolescent Health	2002	4
Melbourne Royal Childrens Hospital	G	Unpublished report (web document)	2005	1
Mellin LM	B	Journal of the American Dietetic Assn	1987	1
Melnyk BM	B	Journal of Pediatric Health Care	2007	1
Messing	G	Unpublished	2008	1

Metcalf B	B	BMJ	2004	1
Michaud-Tomson L	B	ACHPER Healthy Lifestyles Journal	2003	1
Mihas C	B	Public Health Nutrition	2009	1
Mihas C	B	Public Health Nutrition	2010	2
Mitola AL	B	Journal of Pediatric Psychology	2007	1
Montano D	G	Book chapter Glanz, Rimer, Lewis	2002	1
Moon AM	B	Health Promotion International	1999	1
Moore	G	Unpublished	2006	1
Moore	G	Unpublished	2007	1
Moore KR	B	Journal of Health Education	2009	1
Moore L	B	Journal of Epidemiology and Community Health	2008	1
Moore LL	B	Preventive Medicine	2003	1
Mo-suwan L	B	American Journal of Clinical Nutrition	1998	13
Muckelbauer R	B	Obesity Facts	2009	1
Muckelbauer R	B	Pediatrics	2009	1
Muller MJ	B	International Journal of Obesity	2001	7
Muller MJ	B	Obesity Research	2001	1
Naar-King S	B	Journal of Adolescent Health	2009	1
Nader PR	B	Health Education Quarterly	1989	1
Nader PR	B	Journal of Developmental and Behavioral Pediatrics	1983	1
Nader PR	B	Preventive Medicine	1996	1
Nader PR	B	Family and Community Health	1992	1
Nader PR	B	Archives Pediatric Adolescent Medicine	1999	6
Neumark-Sztainer D	B	Preventive Medicine	2003	12
Neumark-Sztainer D	B	Health Education Research	2009	1
Newton RL	B	American Journal of Health Promotion	2010	2

Nichols M	B	Vhetta Journal	2005	1
Nicklas TA	B	American Journal of Preventive Medicine	2003	1
Niinikoski H	B	Circulation	1996	1
Niinikoski H	B	Pediatrics	1997	1
Noarlunga Health Services	G	Report	2005	1
Northern Area Health	G	Report (web document)	2005	1
Northrup	B	Journal of School Nursing	2008	1
O'Brien N	B	Health Education Journal	2002	1
Obarzanek E	B	Pediatrics	2001	1
O'Dea J	B	International Journal of eating Disorders	2000	1
Olvera N	B	American Journal of Health Behavior	2010	2
Olvera N	B	Obesity	2010	1
Osganian SK	B	Preventive Medicine	1996	1
Osganian SK	B	Health Education and Behavior	2003	1
Owens S	B	Medicine Science Sports Exercise	1999	1
Pangrazi RP	B	Journal of School Health	2003	4
Panunzio MF	B	Nutrition Research	2007	1
Parcel GS	B	Health Education Quarterly	1989	1
Parker L	B	Public Health Nutrition	2001	1
Passmore S	B	Nutrition Bulletin	2005	1
Pate RR	B	Pediatrics	2004	1
Pate RR	B	American Journal of Public Health	2005	5
Patrick K	B	Archives Pediatric Adolescent Medicine	2006	1
Pearson T	G	Report (London, Food Standards Agency)	2002	1
Peralta LR	B	Preventive Medicine	2009	2
Perez-Rodrigo C	B	Annals in Nutrition and Metabolism	2005	1
Perman JA	B	Journal of the Kentucky Medical Association	2008	2

Perry CL	B	Journal of School Health	1990	1
Perry CL	B	American Journal of Public Health	1998	1
Perry CL	B	Health Education Behavior	2004	1
Phillips JA	B	Journal of Physical Activity and Health	2009	1
Pierce	B	Hispanic Health Care International	2008	1
Plachta-Danielzik S	B	Obesity	2007	2
Pollard C	B	Health Education and Behavior	2001	1
Prell HC	B	Journal of Adolescent Health	2005	1
Puska P	B	Preventive Medicine	1982	2
Raman	B	Journal of Pediatric Endocrinology Metabolism	2010	1
Ransley JK	B	Journal of Epidemiology and Community Health	2007	1
Rasanen M	B	Appetite	2003	1
Ray R	B	Annals Academic Medicine	1994	2
Reilly JJ	G	Proc Nutr Soc (conference paper)	2003	2
Reilly JJ	B	BMJ	2005	1
Reilly JJ	B	BMJ	2006	5
Reinaerts E	B	Public Health Nutrition	2007	1
Reinaerts EB	B	Journal of School Health	2007	1
Reinhart WC	B	Journal of the American Dietetic Assn	2002	1
Resnicow K	B	Health Education Quarterly	1992	1
Resnicow K	B	Health Education Behavior	2000	2
Resnicow K	B	Obesity Research	2005	2
Reynolds KD	B	Preventive Medicine	2000	2
Ritchie L	B	Trials	2010	1
Rittenbaugh C	B	Preventive Medicine	2003	1
Robbins LB	B	Nursing Research	2006	1

Robinson EM	G	Unpublished	2007	1
Robinson TN	B	JAMA	1999	16
Robinson TN	B	Ethnicity and Disease	2003	12
Robinson TN	B	Journal of Communication	2006	1
Robinson TN	B	Contemporary Clinical Trials	2008	1
Robinson TN	B	Archives Pediatric Adolescent Medicine	2010	2
Rocchini AP	B	Pediatrics	1988	1
Rochon J	B	Ethnicity and Disease	2003	1
Rodearmel SJ	B	Pediatrics	2007	1
Rodgers DV	G	Research: Just for Kids (www document)	2001	1
Roemmich JN	B	Medicine Science Sports Exercise	2004	2
Romon M	B	Public Health Nutrition	2009	1
Rosenbaum M	B	Journal of Clinical Endocrinology and Metabolism	2007	1
Rosenberg DE	B	Obesity	2006	1
Rosenkranz RR	B	BMC Public Health	2010	1
Ross	G	Unpublished	2007	1
Russ CR	B	Journal of Gender Culture and Health	1998	1
SA Dept Health	G	Unpublished report	2005	1
Saarilehto S	B	Archives Pediatric Adolescent Medicine	2003	1
Sacher PM	B	Obesity	2010	1
Sadowsky HS	B	Cardiopulmonary Physical Therapy	1999	2
Saelens BE	B	Obesity Research	2002	3
Sahota P	B	BMJ	2001	13
Saksvig BJ	B	Archives Pediatric Adolescent Medicine	2007	1
Salbe AD	B	Pediatrics	2002	1
Salcedo Aquilar F	B	Journal of Pediatrics	2010	2
Sallis JF	B	Annals of the NY Academy of Science	1993	8

Sallis JF	B	American Journal of Public Health	1997	3
Sallis JF	B	American Journal of Preventive Medicine	2003	5
Salmon J	B	International Journal of Obesity	2008	5
Salvatoni A	B	Pediatr Oggi Med Chir	1991	1
Sangster J	B	Health Promotion Journal of Australia	1998	1
Sangster J	B	Health Promotion Journal of Australia	2003	1
Sanigorski	B	International Journal of Obesity	2008	1
Santos MP	B	Annals of Behavioral Medicine	2005	1
Savoye M	B	JAMA	2007	1
Schagen S	G	Report (web document)	2005	1
Schofield G	B	Youth Studies Australia	2005	1
Schofield L	B	Medicine Science Sports Exercise	2005	1
Shemilt I	B	Child Care Health Development	2004	1
Shi GH	B	Chinese Journal of Health Education	2004	1
Sichieri R	B	Public Health Nutrition	2009	3
Siegal JA	B	Pediatric Exercise Science	1989	1
Simon C	B	International Journal of Obesity	2004	3
Simon C	B	International Journal of Obesity	2008	2
Simonetti DA	B	Public Health	1986	1
Simons-Morton BG	B	American Journal of Public Health	1991	1
Singh AS	B	BMC Public Health	2006	2
Singh AS	B	Obesity	2006	1
Singh AS	B	Archives Pediatric Adolescent Medicine	2007	3
Singh AS	B	Archives Pediatric Adolescent Medicine	2009	2
Singhal N	B	European Journal of Clinical Nutrition	2010	1
Sirard JR	B	Medicine Science Sports Exercise	2005	1
Sirard JR	B	Pediatric Exercise Science	2008	1

Sjolie AN	B	Health Promotion International	2002	1
Skelton JA	B	Body Image	2006	1
Skybo TA	B	Pediatric Nursing	2002	2
Skybo TA	B	Health Promotion and Practice	2008	1
Slawta	B	Journal of the American Dietetic Assn	1992	1
Slootmaker SM	B	Preventive Medicine	2010	1
Snyder MP	B	American Journal of Clinical Nutrition	1999	1
Snyder P	B	Acta Paediatrica	2000	1
Sothorn MS	B	Southern Medical Journal	2000	1
Sothorn MS	B	Acta Paediatrica	2000	1
Sothorn MS	B	Journal of the American Dietetic Assoc.	2002	1
Sothorn MS	G	Report (web document)	2005	1
Southside Comm. Services	B	Journal of School Nursing	2007	1
Specker B	B	Journal of Bone and Mineral Research	2003	1
Speroni KG	B	Journal for Specialists in Pediatric Nursing	2008	1
Speroni KG	B	Obesity	2006	4
Spiegel SA	B	International Journal of Pediatric Obesity	2008	1
Spinks A	B	Journal of Paediatrics and Child Health	2006	1
Spruijt-Metz	B	Family Medicine	1998	2
Stephens MB	B	Preventive Medicine	2003	1
Stern M	B	Journal of Clinical Psychology in Medical Settings	2006	1
Stevens J	B	American Journal of Health Promotion	1997	1
Stevens J	B	Preventive Medicine	2003	1
Stevens J	B	American Journal of Epidemiology	2007	1
Stewart KJ	B	Pediatrics	2007	3
Stice E	B	International Journal of Eating Disorders	2002	1

Stice E	B	Health Psychology	2005	1
Stice E	B	International Journal of Eating Disorders	2006	1
Stice E	B	Journal of Consulting and Clinical Psychology	2006	1
Stock S	B	Health Education Behavior	1997	3
Stock S	B	Pediatrics	2007	1
Stolley MR	B	Preventive Medicine	2003	4
Stolley MR	B	Ethnicity and Disease	2003	6
Story M	B	Preventive Medicine	2003	3
Story M	B	Preventive Medicine	1990	2
Story M	B	Ethnicity and Disease	2003	3
Suskind RM	B	Pediatric Diabetes	2000	1
Tak NI	B	Public Health Nutrition	2007	1
Talvia S	B	Archives Pediatric Adolescent Medicine	2004	1
Tamir D	B	Preventive Medicine	1990	2
Tamir D	B	Science Communication	2008	1
Tanner A	B	International Journal of Pediatric Obesity	2006	1
Taylor	B	American Journal of Clinical Nutrition	2007	2
Taylor RW	B	International Journal of Pediatric Obesity	2006	1
Taylor RW	B	American Journal of Clinical Nutrition	2008	1
Taylor	G	Unpublished	2007	1
Te Velde SJ	B	British Journal of Nutrition	2008	2
Tennant	B	Clinical Pediatrics	1998	1
Tershakovec AM	B	Journal of Pediatrics	1998	1
Teufel NI	B	American Journal of Clinical Nutrition	1999	1
Teufel NI	B	Preventive Medicine	2008	1
Thibault H	B	Nutrition	2010	1
Thompson D	B	Obesity Research	2004	1

Thompson D	B	Preventive Medicine	2008	2
Thompson D	G	Unpublished dissertation	2010	1
Thompson LS	B	Journal of National Black Nurses Association	2003	1
Thompson VJ	B	Journal of Nutrition Education Behavior	2003	1
Thompson W	B	Western Journal of Nursing Research	2009	1
Topp R	B	Western Journal of Nursing Research	2009	1
Treuth MS	B	American Journal of Clinical Nutrition	2003	1
Trevino RP	B	Archives Pediatric Adolescent Medicine	2004	1
Trevino RP	B	Hispanic Journal of Behavioral Science	2005	1
Trevino RP	B	American Journal of Human Biology	2000	1
Trost SG	B	International Journal of Obesity and Related Metabolic Disorders	2001	1
Trost SG	B	Journal of Physical Activity and Health	2008	1
Trudeau F	B	American Journal of Human Biology	2001	1
Trudeau F	B	Diabetes and Metabolism	2001	1
Tsorbatzoudis H	B	Perceptual Motor Skills	2005	1
Tudor-Locke C	B	Child Care Health Development	2002	1
Tudor-Locke C	B	Medicine Science Sports Exercise	2003	1
Turnin MC	B	Diabetes and Metabolism	2001	1
Turnin MC	B	Calcified Tissue International	2006	1
Vandongen R	B	Preventive Medicine	1995	7
Venetsanou F	B	Research in Dance Education	2004	1
Verstraete SJ	B	Public Health Nutrition	2007	1
Vic. Dept Human Services	G	Project report (web document)	2005	1
Vido L	B	Padiatrie und Padologie	1993	1
Viskic-Stalec	B	Collegium Antropologicum	2007	1
Vizcaino VM	B	International Journal of Obesity	2007	1

Vizcaino VM	B	International Journal of Obesity	2008	1
W.A. Dept Health	G	Program (web document)	2005	1
Wadden TA	B	Pediatrics	1990	2
Walter HJ	B	NEJM	1988	5
Walter HJ	B	Preventive Medicine	1989	1
Walter HJ	B	Health Education Quarterly	1989	1
Wang H	B	Chinese Journal of Public Health	2005	1
Wang Y	B	Health Promotion International	2003	4
Wang Y	B	European Journal of Clinical Nutrition	2006	2
Ward DS	B	Obesity	2006	1
Warren JM	B	Health Promotion International	2003	3
Warren JM	B	Pediatrics	2003	1
Warren JM	B	Public Health Nutrition	2007	1
Watts K	B	Sports Medicine	2005	1
Webber LS	B	Preventive Medicine	1996	2
Webber LS	B	American Journal of Preventive Medicine	2008	1
Weber JL	B	American Journal of Clinical Nutrition	1999	1
Wells L	B	British Journal of Nutrition	2005	1
West F	G	Project report	2005	1
Wheling-Weepie AK	B	Journal of School Nursing	2002	1
White MA	B	Obesity Research	2004	1
Wilfley DE	B	JAMA	2007	1
Willet SL	G	Unpublished dissertation	1995	1
Williams C	B	Preventive Medicine	1998	1
Williams CL	B	American Journal of College Nutrition	2002	1
Williams CL	B	American Journal of College Nutrition	2004	1
Williams CL	B	International Journal of Food Science Nutrition	2007	1

Williamson	B	Contemporary Clinical Trials	2008	1
Williamson D	B	Obesity	2006	2
Williamson DA	B	Eating Weight Disorders	2005	2
Williamson DA	B	Obesity Reviews	2006	1
Williamson DA	B	Obesity	2007	3
Wind M	G	Unpublished dissertation	2006	1
Wind M	B	Health Education Research	2008	1
Winnett RA	B	Journal of Gender Culture and Health	1999	1
Wolf MC	G	Unpublished dissertation	1986	1
Wong PC	B	Annals of the Academy of Medicine Singapore	2008	1
Woolfe J	B	Health Education Journal	2005	1
Yang LM	B	Maternal Child Health Care China	2005	1
Yin Z	B	Obesity Research	2005	7
Yin ZQ	B	Chinese Nursing research	2005	1
Young I	B	Health Education Journal	1993	1
Young-Hyman D	B	Anbui Preventive Medicine	2002	1
Yue YL	B	Obesity Research	2000	1
Zahner L	B	Medicine Science Sports Exercise	2009	1
Ziviani J	B	Occupational Therapy International	2004	1
Zwaiuer K	B	Progress in Clinical and Biological Research	1988	1

Appendix VIII: Journals that published studies included in the systematic reviews (descending order)

Journal	Number of studies
1. Preventive Medicine	45
2. Pediatrics	27
3. Obesity	24
4. Public Health Nutrition	22
5. Obesity Research	21
6. American Journal of Clinical Nutrition	22
7. Archives of Pediatric and Adolescent Medicine	20
8. International Journal of Obesity	14
9. Journal of the American Dietetic Association	12
10. Journal of Adolescent Health	11
11. Journal of Pediatrics	11
12. American Journal of Preventive Medicine	10
13. American Journal of Public Health	10
14. BMJ	10
15. Ethnicity and Disease	9
16. European Journal of Clinical Nutrition	9
17. Health Education Research	9
18. Journal of School Health	9
19. Research Quarterly for Exercise and Sport	9
20. JAMA	8
21. Medical Science Sports Exercise	8
22. Health Education and Behavior	7

23. Health Education Quarterly	6
24. International Journal of Eating Disorders	6
25. International Journal of Pediatric Obesity	6
26. Health Education Journal	5
27. Pediatric Exercise Science	5
28. American Journal of Health Promotion	4
29. American Journal of Human Biology	4
30. British Journal of Nutrition	4
31. Child Care Health and Development	4
32. Health Promotion International	4
33. International Journal of Behaviour Nutrition and Physical Activity	4
34. Journal for Specialist in Pediatric Nursing	4
35. Journal of Pediatric Endocrinology and Metabolism	4
36. Acta Paediatrica	3
37. Acta Paediatrica	3
38. Anales Espanoles de Pediatrica	3
39. Annals of Behavioural Medicine	3
40. Diabetes and Metabolism	3
41. International Journal of Obesity and Related Metabolic Disorders	3
42. Journal of Nutrition Education	3
43. Journal of School Nursing	3
44. Journal of Sports Science and Medicine	3
45. Obesity Reviews	3
46. Perceptual and Motor Skills	3
47. American Journal of College Nutrition	2
48. American Journal of Diseases of Children	2

49. American Journal of Epidemiology	2
50. American Journal of Health Behavior	2
51. Annali di Igiene	2
52. Annals of the American Academy of Science	2
53. Archives of Disease in Childhood	2
54. Behavioural Therapy	2
55. Biomedical and Environmental Sciences	2
56. Body Image	2
57. Bone	2
58. Children's Health Care	2
59. Chinese Journal of Child Health Care	2
60. Chinese Journal of Health Education	2
61. Clinical Pediatrics	2
62. Contemporary Clinical Trials	2
63. European Journal of Public Health	2
64. Family and Community Health	2
65. Health Promotion Journal of Australia	2
66. Health Psychology	2
67. Hispanic Health Care International	2
68. International Journal of Epidemiology	2
69. Journal of Bone and Mineral Research	2
70. Journal of Community Health Nursing	2
71. Journal of Epidemiology and Community Health	2
72. Journal of Nutrition	2
73. Journal of Gender Culture and Health	2
74. Journal of Health Education	2

75. Journal of Nutrition Education Behavior	2
76. Journal of Paediatrics and Child Health	2
77. Journal of Pediatric Nursing	2
78. Journal of Physical Activity and Health	2
79. Maternal Child Health Care China	2
80. Pediatric Nursing	2
81. Psychological Reports	2
82. Public Health	2
83. Southern Medical Journal	2
84. Sports Medicine	2
85. Western Journal of Nursing Research	2
86. Wisconsin Medical Journal	2
87. ABNF Journal	1
88. ACHPER Healthy Lifestyles Journal	1
89. Addictive Behavior	1
90. American Journal of Medical Science	1
91. Anbui Preventive Medicine	1
92. Annals Academic Medicine	1
93. Annals in Nutrition and Metabolism	1
94. Annals of Internal Medicine	1
95. Annals of the Academy of Medicine Singapore	1
96. Appetite	1
97. Applied Nursing Research	1
98. Archives in Exercise Health and Disease	1
99. BMC Medicine	1
100. BMC Public Health	1

101.	British Journal of Health Psychology	1
102.	British Journal of Nursing	1
103.	Calcified Tissue International	1
104.	California Journal of Health Promotion	1
105.	Canadian Journal of Public Health	1
106.	Cancer Causes and Control	1
107.	Cardiology in the Young	1
108.	Cardiopulmonary Physical Therapy	1
109.	Child Development	1
110.	Chinese Journal of Nursing	1
111.	Chinese Journal of Pediatrics	1
112.	Chinese Journal of Public Health	1
113.	Chinese Journal of School Doctor	1
114.	Chinese Nursing Research	1
115.	Circulation	1
116.	Clinical Journal of Sports Medicine	1
117.	Clinical Nutrition	1
118.	Collegium Anthropologicum	1
119.	Diabetes Research Clinical Practice	1
120.	Diabetologia Polska	1
121.	Eating Behaviors	1
122.	Eating and Weight Disorders	1
123.	European Journal of Pediatrics	1
124.	Family and Consumer Sciences Research Journal	1
125.	Family Medicine	1
126.	Health Care for the Poor and Underserved	1

127.	Health Promotion and Practice	1
128.	Hispanic Journal of Behavioural Science	1
129.	International Journal of Clinical and Health Psychology	1
130.	International Journal of Environment Research Public Health	1
131.	International Journal of Food Science Nutrition	1
132.	International Journal of Public Health	1
133.	International Journal of Sports Medicine	1
134.	Journal of Adolescence	1
135.	Journal of Adolescent Health Care	1
136.	Journal of Behavior Nutrition and Physical Activity	1
137.	Journal of Cardiovascular Nursing	1
138.	Journal of Child Health Care	1
139.	Journal of Clinical Endocrinology and Metabolism	1
140.	Journal of Clinical Nutrition	1
141.	Journal of Clinical Psychology in Medical Settings	1
142.	Journal of Community Health	1
143.	Journal of Communication	1
144.	Journal of Consulting and Clinical Psychology	1
145.	Journal of Developmental and Behavioral Pediatrics	1
146.	Journal of Early Intervention	1
147.	Journal of General Internal Medicine	1
148.	Journal of Human Nutrition and Dietetics	1
149.	Journal of Hypertension	1
150.	Journal of Managed Care Pharmacy	1
151.	Journal of National Black Nurses Association	1
152.	Journal of National Medication Association	1

153.	Journal of Nursing Scholarship	1
154.	Journal of Obesity	1
155.	Journal of Pediatric Gastroenterological Nutrition	1
156.	Journal of Pediatric Health Care	1
157.	Journal of Pediatric Psychology	1
158.	Journal of Science Medicine and Sport	1
159.	Journal of Social Behavioral and Health Sciences	1
160.	Journal of Sports Medicine and Physical Fitness	1
161.	Journal of the Kentucky Medical Association	1
162.	Journal of the National Black Nurses Association	1
163.	Metabolism	1
164.	New England Journal of Medicine	1
165.	Nursing Clinics of North America	1
166.	Nursing Research	1
167.	Nutrition	1
168.	Nutrition Bulletin	1
169.	Nutrition Journal	1
170.	Nutrition Research	1
171.	Obesity facts	1
172.	Occupational Therapy International	1
173.	Offentliche Gesundheitswesen	1
174.	Padiatrie und Padologie	1
175.	Park Recreational Administration	1
176.	Pediatr Oggi Med Chir	1
177.	Pediatria Medica e Chirurgica	1
178.	Pediatria Padologie	1

179.	Pediatrics Polska	1
180.	Pediatric Diabetes	1
181.	Preventing Chronic Disease	1
182.	Progress in Biological and Clinical Research	1
183.	Progress in Community Health Partnerships	1
184.	Psychological Health	1
185.	Psychology and Health	1
186.	Psychosomatic Research	1
187.	Psychotherapie, Psychosomatik, Medizinische Psychologie	1
188.	Public Health Nursing	1
189.	Public Health Reports	1
190.	Research in Dance Education	1
191.	Revue d'Epidemiologie et de Sante Publique	1
192.	Revue de la Suisse Romande	1
193.	Scandinavian Journal Medicine Sport Science	1
194.	Science Communication	1
195.	Source	1
196.	The Forum	1
197.	Tijdschrift voor Psychologie Gezondheid	1
198.	Topics in Clinical Nutrition	1
199.	Trials	1
200.	Vhetta Journal	1
201.	Youth Studies Australia	1