Cauchi, D; Glonti, K; Petticrew, M; Knai, C (2016) Environmental components of childhood obesity prevention interventions: an overview of systematic reviews. Obesity reviews, 17 (11). pp. 1116-1130. ISSN 1467-7881 DOI: https://doi.org/10.1111/obr.12441

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Environmental approaches to childhood obesity prevention: an overview of systematic reviews

Appendix S1: Ovid MEDLINE(R) Search Strategy

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<td>(obesity or overweight or body mass index or BMI or adiposity or body fat or skin fold thickness or waist-hip ratio or waist circumference or BMI Z score).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]</td>
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<td>environment/ or city planning/ or environment design/ or exercise/ or recreation/</td>
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<td>(environment* or obesogenic* or built environment or physical environment or social environment or political environment or path* or playground* or playing field or park* or school* or community or neighborhood* or food outlet* or food store* or grocer* or supermarket* or restaurant* or urban design or urban planning or land-mix or public transport).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]</td>
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<td>adolescent/ or young adult/ or child/</td>
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<td>(review or meta-analysis) not (comment or letter or editorial)).pt.</td>
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### Appendix S3 - Characteristics of SRs (Part 1)

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<th>AMSTAR score</th>
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<tr>
<td>Avery et al. 2015</td>
<td>Clarify which interventions aimed at children help to reduce the consumption of SSBs and whether these interventions lead to subsequent changes in body fatness.</td>
<td>Date range: Jan 2000 - Aug 2013 Databases: Embase, Medline, WoS Language: English</td>
<td>Study design: RCT Setting: Any Participants: 2-18 years Primary outcome focus: SSB consumption leading to changes in body fatness Intervention type: Any Synthesis: Narrative Assessed study quality: Yes (Jadad Scale) Funding Sources: British Dietetic Association</td>
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<td>Barr-Anderson et al. 2014</td>
<td>Identify weight-related behavioural interventions for African American children aged between 5 and 18 years that took place during Outside-of-School Time (OST) and identify key intervention components that are relevant when focusing on specific OST periods.</td>
<td>Date range: up to Sep 2013 Databases: AGRICOLA, CINAHL, Cochrane Library, ERIC, NIH RePORTER, PsycINFO, PubMed, reference lists Language: English</td>
<td>Study design: Not reported Setting: Not in school Participants: African American children and adolescents aged 5-18 years Primary outcome focus: Weight/related behaviour Intervention type: Any Synthesis: Narrative Assessed study quality: Yes (author-derived aggregate score) Funding Sources: Robert Wood Johnson Foundation</td>
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<tr>
<td>Beauchamp et al. 2014</td>
<td>Summarize the effectiveness of interventions for the primary prevention of obesity that report their effect on anthropometric outcomes by socioeconomic strata, and to identify common attributes of interventions that may be most likely to benefit all SEP groups.</td>
<td>Date range: up to Sep 2012 Databases: Medline, Embase, CINAHL, EBM reviews, SCOPUS, Cochrane collaboration, Cochrane Public Health Group, EPPi-Centre, SIGLE, the Virtual Library for Public Health Language: English</td>
<td>Study design: RCT, Q-nRCT, Cohort, repeated XS Setting: Any Participants: whole population Primary outcome focus: Obesity-related (by SES) Intervention type: Any Synthesis: Narrative Assessed study quality: Yes (Effective Public Health Practice Project Quality Assessment Tool) Funding Sources: Australian National Preventive Health Agency Grant (188PEE2011); Australian Research Council grant (ARC)</td>
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<td>Author</td>
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<td>Bleich et al. 2013</td>
<td>Review the evidence on community-based childhood obesity-prevention programs in high-income countries.</td>
<td>Date range: up to Aug 2012&lt;br&gt;Databases: Medline, Embase, PsychInfo, CINAHL, Cochrane Library&lt;br&gt;Language: English</td>
<td>Study design: RCT, QE, NE&lt;br&gt;Setting: Community&lt;br&gt;Participants: 2-18 years&lt;br&gt;Primary outcome focus: Any&lt;br&gt;Intervention type: Any&lt;br&gt;Synthesis: Narrative&lt;br&gt;Assessed study quality: Yes (Down and Black)&lt;br&gt;Funding Sources: AHRQ contract 290-2007-10061-I; NHLBI grant 1K01HL096409</td>
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<td>Brandt et al. 2010</td>
<td>Compare results of school-based prevention programs and to identify effective methods.</td>
<td>Date range: Jan 1990 - Apr 2009&lt;br&gt;Databases: PubMed, reference lists&lt;br&gt;Language: Not reported</td>
<td>Study design: RCT, CCT&lt;br&gt;Setting: School&lt;br&gt;Participants: 4-18 years&lt;br&gt;Primary outcome focus: Any&lt;br&gt;Intervention type: Any&lt;br&gt;Synthesis: Narrative&lt;br&gt;Assessed study quality: No&lt;br&gt;Funding Sources: Not reported</td>
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<td>Branscum and Sharma 2011</td>
<td>Systematically analyze and summarize findings for health education and promotion interventions aimed at the prevention of childhood overweight and obesity among primarily Hispanic children.</td>
<td>Date range: Jan 2000 - May 2010&lt;br&gt;Databases: CINAHL, ERIC, PubMed&lt;br&gt;Language: English</td>
<td>Study design: Not reported&lt;br&gt;Setting: Any&lt;br&gt;Participants: Hispanic, Latino or Mexican American children&lt;br&gt;Primary outcome focus: Any&lt;br&gt;Intervention type: Health education and promotion&lt;br&gt;Synthesis: Narrative&lt;br&gt;Assessed study quality: No&lt;br&gt;Funding Sources: Not reported</td>
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<td>Brown and Summerbell 2009</td>
<td>Determine effectiveness of school-based interventions that focus on changing dietary intake and physical activity levels to prevent childhood obesity.</td>
<td>Date range: Jan 2006 - Sep 2007&lt;br&gt;Databases: Embase, Medline, reference lists&lt;br&gt;Language: No restrictions</td>
<td>Study design: RCT, CCT&lt;br&gt;Setting: School&lt;br&gt;Participants: 5-18 years&lt;br&gt;Primary outcome focus: Obesity-related&lt;br&gt;Intervention type: Any&lt;br&gt;Synthesis: Narrative&lt;br&gt;Assessed study quality: No&lt;br&gt;Funding Sources: Not reported</td>
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<td>Brown et al. 2015</td>
<td>Assess the effectiveness of diet and physical activity interventions to prevent or treat obesity in South Asian children and adults and to</td>
<td>Date range: 2006 – 2014&lt;br&gt;Databases: ASSIA, CCTR, Embase, Medline, SSCI, Google, reference lists, experts contacted&lt;br&gt;Language: English</td>
<td>Study design: RCT, CCT, CBA&lt;br&gt;Setting: Any&lt;br&gt;Participants: South Asian ethnicity (whole population)</td>
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| Budd and Volpe 2006 | Review the school-based RCTs aimed at reducing body weight or preventing weight gain. | Date range: 1985 - 2004  
Databases: Medline, CINAHL, PsycINFO, CDSR reference lists, websites of professional organizations and governmental agencies (unspecified)  
Language: Not reported | Study design: RCT  
Setting: School  
Participants: elementary, middle, or high school students  
Primary outcome focus: Obesity-related  
Intervention type: Any  
Synthesis: Narrative  
Assessed study quality: No  
Funding Sources: NIHR, Project ID: RP-PG-0407-10044 | 3 |
| Calanci e et al. 2015 | Synthesize available evidence on the adaptation, implementation, and effectiveness of policy and environmental obesity-prevention strategies in rural settings. | Date range: Jan 2002 - Jun 2013  
Databases: PubMed, CINAHL, PAIS, Cochrane databases, reference lists, experts contacted  
Language: English | Study design: Not reported  
Setting: Community  
Participants: whole population  
Primary outcome focus: Any  
Intervention type: Nutrition-related policy/environmental  
Synthesis: Narrative  
Assessed study quality: No  
Funding Sources: NOPREN Rural Food Access Working Group (grant no. 5-37850); University of North Carolina (no. U48/DP000059); NINR grants T32NR007100-06 & T32NR008856 | 5 |
| Campbell et al. 2002 | Assess the effectiveness of educational, health promotion and/or psychological/ family/behavioural /counselling/management interventions that focussed on diet, physical activity and/or lifestyle and social support, and were designed to prevent obesity in childhood. | Date range: 1985 - July 2001  
Databases: Medline, Psyclit, Embase, SCI, SSCI, CINAHL, CCTR and the Cochrane Heart Group’s specialised register  
Language: No restrictions | Study design: RCT, nRCT  
Setting: Any  
Participants: 0-18 years  
Primary outcome focus: anthropometric  
Intervention type: Any  
Synthesis: Narrative  
Assessed study quality: Yes (Jadad Scale)  
Funding Sources: Collaborating Institutes acknowledged but main source of funding unclear; external sources of support were the Department of Human Services, Victoria, Australia; NHS Centre for Reviews and Dissemination, University of York, UK | 9 |
| Chen and | Evaluate the literature reporting on the effectiveness of technology-based interventions in preventing obesity in | Date range: Jan 1990 - Jan 2014  
Databases: CINAHL, Embase, PubMed, PsycINFO, the Cochrane Library, reference lists | Study design: RCT, QE  
Setting: Any | 6 |
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<th>Study design eligible for inclusion in the review **</th>
<th>AMSTAR score</th>
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| Wilkosz 2014   | Adolescents and to explore components of these interventions that are associated with significant BMI outcomes. | Language: English                                                                 | Participants: 2-18 years  
Primary outcome focus: Obesity-related/behavioural  
Intervention type: internet/active video game  
Synthesis: Narrative  
Assessed study quality: Yes (Cochrane Effective Practice and Organization of Care Review Group’s methodological rigor assessment)  
Funding Sources: Not reported |              |
| Chriqui 2013   | Examine the influence of state laws and local policies on changes to school and other environments, individual activity and nutrition-related behaviours, and obesity and weight outcomes. | Date range: Jan 2012 - March 2013  
Databases: PubMed, PAIS, EconLit  
Language: Not reported | Study design: quantitative, review, and qualitative studies  
Setting: Any  
Participants: whole population  
Primary outcome focus: Any  
Intervention type: Policy  
Synthesis: Narrative  
Assessed study quality: No  
Funding Sources: Robert Wood Johnson Foundation; NIDDKD grant R01DK089096; NCI grant R01CA158035 | 2            |
| Chriqui et al. 2014 | Examine the influence of specific state laws and district level competitive food policies on changes to student BMI and weight outcomes; student consumption, purchasing, and dietary intake; or in-school competitive food availability and access. | Date range: Jan 2005 - March 2013  
Databases: PubMed, CINAHL, EconLit, ERIC, PAIS, "Childhood Obesity" journal archives  
Language: English | Study design: NE  
Setting: Any  
Participants: pre-school to grade 12  
Primary outcome focus: Obesity-related /SSB consumption or availability  
Intervention type: Policy  
Synthesis: Narrative  
Assessed study quality: No  
Funding Sources: Robert Wood Johnson Foundation | 4            |
| Cole et al. 2006 | Describe the theoretical and methodological characteristics of effective school-based interventions that used healthy lifestyle education, dietary habits, and/or physical activity interventions. | Date range: up to Feb 2005  
Databases: PubMed, CINAHL, reference lists  
Language: Not reported | Study design: RCT, nRCT  
Setting: School  
Participants: 4-14 years  
Primary outcome focus: Obesity-related  
Intervention type: Any  
Synthesis: Narrative  
Assessed study quality: No  
Funding Sources: Not reported | 1            |
Databases: Medline, PsycINFO, CINAHL, Academic Search Premier, CDSR, reference lists  
Language: English | Study design: RCT, nRCT  
Setting: School  
Participants: Pre-school to Grade 12  
Primary outcome focus: Obesity-related | 6            |
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<tr>
<td>de Sa and Lock 2008</td>
<td>Systematically synthesize worldwide evidence from published and unpublished literature on interventions to promote fruit and/or vegetable consumption in children in school settings.</td>
<td>Date range: up to Aug 2007 Databases: PubMed, CABDirect, Cochrane Library, WoK, IBSS, PsycINFO, Embase, Biomed Central, reference lists, experts contacted Language: English abstract but no language restrictions</td>
<td>Study design: RCT, CRCT, nRCT Setting: School Participants: 5-18 years Primary outcome focus: F&amp;V consumption/knowledge Intervention type: Any Synthesis: Narrative Assessed study quality: Yes (using a published tool utilised previously in a similar review. No details provided) Funding Sources: No external funding sources</td>
<td>5</td>
</tr>
<tr>
<td>Dobbins et al. 2013</td>
<td>Summarize the evidence of the effectiveness of school-based interventions in promoting physical activity and fitness in children and adolescents.</td>
<td>Date range: 1985 to Jul 2007 Databases: Medline, BIOSIS, CINAHL, Embase, SPORTDiscus, PsycINFO, Sociological Abstracts, CENTRAL, reference lists, experts contacted Language: No restrictions</td>
<td>Study design: RCT Setting: School Participants: 6-18 years Primary outcome focus: PA Intervention type: Any Synthesis: Narrative Assessed study quality: Yes (Effective Public Health Practice Project Quality Assessment Tool) Funding Sources: Cochrane Health Promotion and Public Health Field, Australia and the City of Hamilton Public Health Services, Canada.</td>
<td>10</td>
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<td>Author</td>
<td>Review aim</td>
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<td>Study design eligible for inclusion in the review **</td>
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<tr>
<td>Gao and Chen 2014 93</td>
<td>Synthesize the exergame-related research carried out in less controlled field-based settings including homes, schools and communities, and discuss the effectiveness of exergames on children’s obesity-related outcomes.</td>
<td>Date range: 1985 – 2013 Databases: Academic Search Complete, ERIC, Medline, PubMed, PsyielFNO, SPORTDisicus, reference lists Language: English</td>
<td>Intervention type: Any Synthesis: Narrative Assessed study quality: Yes (author- proposed quality criteria) Funding Sources: Not reported</td>
<td>6</td>
</tr>
<tr>
<td>Haynos and O'Donhue 2012 94</td>
<td>Review RCTs of universal prevention of obesity in children.</td>
<td>Date range: Not reported Databases: Medline, PsyielFNO, reference lists Language: Not reported</td>
<td>Study design: RCT Setting: Any Participants: Children and adolescents (age unspecified) Primary outcome focus: Obesity-related /fitness Intervention type: Exergaming Synthesis: Narrative Assessed study quality: No Funding Sources: Not reported</td>
<td>1</td>
</tr>
<tr>
<td>Holub et al. 2014 95</td>
<td>Examine the effects of obesity-related interventions on Latino children in U.S. schools and identify specific strategies that can be used to combat childhood obesity, specifically in Latino youth.</td>
<td>Date range: 1965 – 2010 Databases: PsyielFNO, Medline, CINAHL, Cochrane Library, Current Controlled Trials, LIILACS, Global Health, Global Index Medicus, WoS Language: English, Spanish, Portuguese</td>
<td>Study design: Not reported Setting: School Participants: children and adolescents (age unspecified) Primary outcome focus: Obesity-related Intervention type: multi-component, obesity related Synthesis: Narrative Assessed study quality: Yes (CDC’s Community Guide) Funding Sources: CDC grant 1U48 DP001917</td>
<td>6</td>
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<tr>
<td>Jaime and Lock 2009</td>
<td>Systematically review the evidence on the effectiveness of school-based nutrition policy on the food environment, and student's dietary intake and BMI</td>
<td>Databases: PubMed, CAB abstracts, WoK (including WoS and ISI databases), The Cochrane Library, and LILACS, Google, reference lists, experts contacted Language: Not reported</td>
<td>Study design: RCT, nRCT, NRNCT, XS Setting: School Participants: children and adolescents (age unspecified) Primary outcome focus: menu composition; availability/sales of school food and beverages; dietary intake; BMI Intervention type: Food/Nutrition policies Synthesis: Narrative Assessed study quality: No Funding Sources: International Nutrition Foundation; Ellison Medical Foundation</td>
<td>6</td>
</tr>
<tr>
<td>Kaiser et al. 2013</td>
<td>Assess whether: (i) an increase in SSB intake increases body weight or BMI in humans; (ii) a reduction of SSB intake reduces body weight or BMI in humans.</td>
<td>Date range: Jan 2010 - Oct 2012 Databases: PubMed, PsycINFO, the Cochrane Collaborative Website, SCOPUS, PROQUEST Language: No restrictions</td>
<td>Study design: RCT Setting: Any Participants: whole population Primary outcome focus: Obesity-related Intervention type: SSB consumption Synthesis: Narrative Assessed study quality: Yes (Cochrane risk of bias tool) Funding Sources: NIH grant P30DK056336</td>
<td>9</td>
</tr>
<tr>
<td>Kamath et al. 2008</td>
<td>Assess the effectiveness of behavioural interventions to prevent childhood obesity.</td>
<td>Date range: up to Feb 2006 Databases: Medline, ERIC, Embase, CINAHL, PsycINFO, Dissertation Abstracts, SCI, SSCI, CENTRAL, reference lists, experts contacted Language: Not reported</td>
<td>Study design: RCT Setting: Any Participants: 2-18 years Primary outcome focus: Nutrition/PA/BMI Intervention type: Behavioural Synthesis: Meta-analysis Assessed study quality: Yes (No specific tool; quality assessment criteria included: allocation concealment; blinding of participants (to allocation and to study hypothesis), health care providers and/or data collectors; use of intention to treat analysis; and extent of losses to follow up.) Funding Sources: The Endocrine Society</td>
<td>8</td>
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<tr>
<td>Kanekar and Sharma 2008</td>
<td>Assess the effect of school-based interventions to prevent childhood obesity, and conduct a meta-analysis focusing on the outcome indicator of BMI.</td>
<td>Date range: 2000 – 2007 Databases: Medline, CINAHL, reference lists Language: English</td>
<td>Study design: Not reported Setting: School Participants: 0-18 years Primary outcome focus: BMI Intervention type: Curricular Synthesis: Meta-analysis Assessed study quality: Yes (Author- proposed quality criteria)</td>
<td>4</td>
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<tr>
<td>Kesten et al. 2011</td>
<td>Evaluate the effectiveness of interventions to prevent overweight and obesity in pre-adolescent girls.</td>
<td>Date range: 1990 - Feb 2010 Databases: Medline, SPORTDiscus, PsycINFO, WoS, Biological Sciences, PEI Language: English</td>
<td>Study design: RCTs, CBA, Non-controlled studies Setting: Any Participants: Pre-adolescent girls (7-11 years) Primary outcome focus: Any Intervention type: Any Synthesis: Narrative Assessed study quality: Yes (Effective Public Health Practice Project Quality Assessment Tool) Funding Sources: Not reported</td>
<td>6</td>
</tr>
<tr>
<td>Knowlden and Sharma 2013</td>
<td>Examine the usefulness of school-based obesity-prevention interventions targeting African American and Hispanic children, and develop a set of recommendations to enhance their effectiveness.</td>
<td>Date range: Jan 2001 - May 2012 Databases: CINAHL, ERIC, Medline, Psychology and Behavioral Sciences Collection, CENTRAL Language: Not reported</td>
<td>Study design: Experimental, QE Setting: School Participants: African American or Hispanic children Primary outcome focus: Anthropometric Intervention type: Any Synthesis: Narrative Assessed study quality: No Funding Sources: Not reported</td>
<td>1</td>
</tr>
<tr>
<td>Kropski et al. 2008</td>
<td>Examine the effectiveness of and provide a focused evaluation of the quality and results of long-term school-based obesity prevention programs, and to offer guidance for future investigations.</td>
<td>Date range: Jan 1990 - Dec 2005 Databases: PubMed, Biological Abstracts, Education Abstracts, reference lists, experts contacted Language: Not reported</td>
<td>Study design: Experimental, QE Setting: School Participants: children and adolescents (age unspecified) Primary outcome focus: Obesity-related Intervention type: Curricular/environmental Synthesis: Narrative Assessed study quality: Yes (GRADE) Funding Sources: Not reported</td>
<td>6</td>
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<tr>
<td>Lamboglia et al. 2013</td>
<td>Evaluate the use of exergaming as a strategic tool for the promotion of healthy behaviours.</td>
<td>Date range: Jan 2008 - Apr 2012 Databases: SciELO, LILACS, PubMed, EBSCO, Science Direct Language: Portuguese, English</td>
<td>Study design: XS, Experimental Setting: Any Participants: 6-15 years Primary outcome focus: PA; body composition; fitness levels</td>
<td>3</td>
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| Lavelle et al. 2012 106 | Determine the efficacy of school-based interventions on reducing BMI in children. | Date range: up to Feb 2011  
Databases: Medline, Embase, reference lists  
Language: English                                                      | Intervention type: Exergaming  
Synthesis: Narrative  
Assessed study quality: No  
Funding Sources: CAPES; FUNCAP                                                                 | 6             |
| LeBlanc et al. 2013 107 | Explore the relationship between active video games and several health and behavioural indicators in young people aged 0 to 17 years. | Date range: Not reported  
Databases: Medline, Embase, PsycINFO, SPORTDiscus,  
CENTRAL  
Language: English, French                                                  | Study design: RCT, C-RCT, efficacy trail, QE, PCS  
Setting: School  
Participants: 0-18 years  
Primary outcome focus: BMI  
Intervention type: Any  
Synthesis: Meta-analysis  
Assessed study quality: No  
Funding Sources: Not reported                                                                 | 7             |
| Leung et al. 2012 108 | Assess the effectiveness of interventions that focus on reducing sedentary behaviour among school-age youth and to identify elements associated with interventions’ potential for translation into practice settings. | Date range: 1980 - Apr 2011  
Databases: Medline, PubMed, PsycINFO, Cochrane Library  
Language: English                                                   | Study design: RCT  
Setting: Any  
Participants: 0-17 years  
Primary outcome focus: Health or behavioural indicator  
Intervention type: Active video game  
Synthesis: Narrative  
Assessed study quality: Yes (GRADE)  
Funding Sources: Active Healthy Kids, Canada                                                                           | 1             |
| Li et al. 2008 109 | Systematically review intervention studies aimed at the prevention or control of excess weight among children and adolescents in China. | Date range: 1990 – 2006  
Databases: China Journal Full Text Database, Wanfang Database, Medline, Meditext  
Language: Chinese, English                                             | Study design: RCT, nRCT  
Setting: School  
Participants: Children and adolescents (age unspecified)  
Primary outcome focus: Obesity-related, knowledge  
Intervention type: Behavioural  
Synthesis: Narrative  
Assessed study quality: Yes (Effective Public Health Practice Project Quality Assessment Tool) | 6             |
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| Liao et al. 2014 | Assess the effects of sedentary behaviour interventions on BMI in children, and to compare whether multi-component interventions have a higher mean effect size than interventions with single component. | Date range: up to July 2012  
Databases: Medline, PsycINFO, WoS, Google Scholar, reference lists  
Language: English | Study design: RCT  
Setting: Any  
Participants: 0-18 years  
Primary outcome focus: BMI  
Intervention type: Behavioural  
Synthesis: Meta-analysis  
Assessed study quality: Yes (Effective Public Health Practice Project Quality Assessment Tool)  
Funding Sources: National Health and Medical Research Council of Australia | 8             |
| Lissau 2007     | Identify studies on the prevention of paediatric obesity within the school arena. | Date range: 2001 – Aug 2005  
Databases: PubMed, Embase, PsycINFO, NHS – Economic Evaluation Database, ERIC, experts contacted  
Language: Not reported | Study design: RCT, CCT  
Setting: School  
Participants: Children and adolescents (age unspecified)  
Primary outcome focus: Obesity-related  
Intervention type: Any  
Synthesis: Narrative  
Assessed study quality: No  
Funding Sources: Not reported | 3             |
| Lobelo et al. 2013 | Examine the effectiveness of school-based intervention aimed at preventing or treating obesity among youth in Latin America. | Date range: 1965 - Dec 2010  
Databases: PsycINFO, Medline, CINAHL, Cochrane Library, Current Controlled Trials, LILACS, Global Health, Global Index Medicus, WoS  
Language: English, Spanish, Portuguese | Study design: RCT, CBA, Crossover design  
Setting: School  
Participants: Children and adolescents (age unspecified)  
Primary outcome focus: Obesity-related  
Intervention type: Any  
Synthesis: Narrative  
Assessed study quality: Yes (CDC’s Community Guide)  
Funding Sources: CDC 1U48DP001917 | 7             |
| Malik et al. 2013 | Conduct a systematic review and meta-analyses of prospective cohort studies and RCTs in children and adults and to provide a comprehensive summary of the literature evaluating SSBs and body weight gain | Date range: up to Mar 2013  
Language: English | Study design: RCT, PCS  
Setting: Any  
Participants: whole population  
Primary outcome focus: body weight  
Intervention type: SSB  
Synthesis: Meta-analysis  
Assessed study quality: Yes (Newcastle Ottawa scale; Cochrane risk of bias tool)  
Funding Sources: NIH grants DK58845, P30 DK46200, U54CA155626, and HL60712 | 6             |
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<tr>
<td>Marsh et al. 2014 114</td>
<td>Systematically synthesize evidence from RCTs of interventions with a family component that targeted reduction of sedentary time, including TV viewing, video games and computer use, in children.</td>
<td>Date range: up to Mar 2012 Databases: Medline, PubMed, PsycINFO, CINAHL, Embase, reference lists, experts contacted Language: English</td>
<td>Study design: RCT Setting: Family-based Participants: 2-18 years Primary outcome focus: Sedentary behaviour Intervention type: Active parental involvement Synthesis: Narrative Assessed study quality: Yes (Cochrane risk of bias tool) Funding Sources: Not reported</td>
<td>4</td>
</tr>
<tr>
<td>Petersohn and Fox 2007 116</td>
<td>Review the evidence on the effectiveness of school-based interventions and contribute to the design and implementation of the &quot;next generation&quot; of school-based obesity prevention interventions.</td>
<td>Date range: 1966 – 2001 Databases: Not reported (referred to a 'parent' CDC Guide to Community Preventive Services Task Force report) Language: English</td>
<td>Study design: RCT, QE Setting: School Participants: Children and adolescents (age unspecified) Primary outcome focus: Obesity-related Intervention type: Any Synthesis: Narrative Assessed study quality: No Funding Sources: Not reported</td>
<td>3</td>
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<tr>
<td>Reilly and McDowell 2003 117</td>
<td>Systematically review and critically appraise intervention studies in paediatric obesity prevention and treatment; examine the clinical relevance of intervention effects and make suggestions for further research</td>
<td>Date range: Jun 2000 - May 2002 Databases: Medline, Embase, CINAHL, Healthstar, Cochrane Library, internet search, reference lists Language: Not reported</td>
<td>Study design: RCT Setting: Any Participants: Children and adolescents (age unspecified) Primary outcome focus: Obesity-related Intervention type: Any Synthesis: Narrative Assessed study quality: Yes (Scottish Intercollegiate Guidelines Network) Funding Sources: Sport Aiding Medical Research for Kids (SPARKS), the British Heart Foundation and the Scottish Executive Health Department.</td>
<td>4</td>
</tr>
<tr>
<td>Sbruzzi et al. 2013 118</td>
<td>Assess the effectiveness of educational interventions to prevent or treat childhood obesity through a</td>
<td>Date range: up to May 2012 Databases: Medline, CENTRAL, Embase, reference lists Language: No restrictions</td>
<td>Study design: RCT Setting: School/Home Participants: 6-12 years</td>
<td>6</td>
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<tr>
<td>Sharma 2007 119</td>
<td>Review and summarise international (excluding the US) school-based interventions for preventing obesity in children aged between 3 - 18 years</td>
<td>Date range: 1999 – 2005 Databases: CINAHL, ERIC, Medline Language: English</td>
<td>Study design: RCT, nRCT, QE Setting: School Participants: 3-18 years Primary outcome focus: Any Intervention type: Any Synthesis: Meta-analysis Assessed study quality: Yes (GRADE) Funding Sources: Instituto de Cardiologia grant MCT/CNPq/CT-Saúde/MS/SCTIE/ DECEIT (no. 067/2009); Conselho Nacional de Desenvolvimento Científico e Tecnológico; CAPES</td>
<td>2</td>
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<tr>
<td>Shirley et al. 2014 120</td>
<td>Update the findings of an AHRQ review on obesity prevention programs for children and adolescents, focusing on elementary school students in the US. A secondary aim was to examine the importance of parental and community involvement in the success of school-based obesity prevention programmes.</td>
<td>Date range: Jan 2007 - Dec 2012 Databases: PubMed, CINAHL Language: English</td>
<td>Study design: Experimental, QE Setting: School Participants: 6-12 years Primary outcome focus: Obesity-related Intervention type: Educational, PA or nutrition modification Synthesis: Narrative Assessed study quality: No Funding Sources: National Institute on Drug Abuse; NIH grants K12 DA031794 and K23DA034879</td>
<td>6</td>
</tr>
<tr>
<td>Showell et al. 2013 121</td>
<td>Review the effectiveness of home-based interventions on weight, intermediate (e.g. diet and physical activity), and clinical outcomes.</td>
<td>Date range: up to Aug 2012 Databases: Medline, Embase, PsycINFO, CINAHL, clinical-trials.gov, Cochrane Library, reference lists, grey literature search Language: Not reported</td>
<td>Study design: RCT, QE, NE Setting: Home Participants: 2-18 years Primary outcome focus: Obesity-related Intervention type: Diet/PA/Sedentary behaviour modification Synthesis: Narrative Assessed study quality: Yes (Down and Black) Funding Sources: AHRQ contract 290-2007-10061-I; NICHD grant U54HD070725; AHRQ grant T32 HS19488-01</td>
<td>8</td>
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| Silveira et al. 2011        | Examine the effectiveness of school-based nutrition education interventions to prevent and reduce obesity in children and adolescents | ASSIA, PEI, Social Care Online, Social Services Abstracts, Sociological Abstracts, reference lists Language: Any language except those based on logograms (e.g. Chinese and Japanese) | Synthesis: Meta-analysis  
Assessed study quality: Yes (Aggregate score derived using: (i) GRADE; (ii) Effective Public Health Practice Project Quality Assessment Tool)  
Funding Sources: FAPESP protocol no. 09/12438-5). | 7            |
| Small et al. 2007           | Identify effective early treatment or prevention intervention programmes for use in primary care for young children who are overweight or obese, or who are at high risk of obesity | Date range: up to May 2010  
Databases: PubMed, Embase, WoS, CENTRAL, ERIC, CINAHL, LILACS, PsycINFO, SPORTDiscus, ASSIA, PEI, Social Care Online, Social Services Abstracts, Sociological Abstracts  
Language: No restrictions | Study design: RCT  
Setting: School  
Participants: 5-18 years  
Primary outcome focus: Obesity-related or dietary  
Intervention type: Behavioural  
Synthesis: Narrative  
Assessed study quality: Yes (Effective Public Health Practice Project Quality Assessment Tool)  
Funding Sources: FAPESP; CAPES | 2            |
| Sobol-Goldberg et al. 2013  | Evaluate the effectiveness of school-based obesity prevention programmes     | Date range: 2006 – Jan 2012  
Databases: Medline, ERIC, Embase, CINHAL, PsycInfo, DAI, SCI, SSCI, CENTRAL  
Language: English | Study design: RCT  
Setting: School  
Participants: 5-18 years  
Primary outcome focus: BMI  
Intervention type: Any  
Synthesis: Meta-analysis  
Assessed study quality: Yes (No specific tool used; quality assessment criteria included: allocation concealment; blinding of patients, healthcare providers, data collectors; use of intention to treat analysis; and loss to follow up)  
Funding Sources: Not reported | 8            |
| Stice et al. 2006           | Evaluate obesity prevention programmes for children and adolescents, and to assess the characteristics of those interventions associated with larger effects. | Date range: 1980 - Oct 2005  
Databases: PsycINFO, Medline, CINAHL, DAI, reference lists, experts contacted  
Language: Not reported | Study design: CT  
Setting: Any  
Participants: 0-22 years  
Primary outcome focus: Obesity-related | 5            |
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<tr>
<td>van Grieken et al. 2012 128</td>
<td>Evaluate the effects of interventions, at school or in the community, to prevent excessive sedentary behaviour, in children and adolescents, on their sedentary behaviour and BMI.</td>
<td>Date range: 1990 - Mar 2011 Databases: PubMed, Embase, WoS, PsycINFO, CDSR, reference lists Language: Not reported</td>
<td>Study design: RCT, CT Setting: Any Participants: 0-18 years Primary outcome focus: Obesity-related Intervention type: Sedentary behaviour Synthesis: Meta-analysis Assessed study quality: Yes (Cochrane risk of bias tool) Funding Sources: Canadian Institutes for Health Research/Institute</td>
<td>6</td>
</tr>
<tr>
<td>Verstraten et al. 2012 130</td>
<td>Systematically review the evidence on the effectiveness of school-based interventions targeting dietary behavior and/or physical activity for the primary prevention of obesity in children and adolescents aged 6–18 y in low- and middle-income countries.</td>
<td>Date range: Jan 1990 - Jul 2011 Databases: Medline, Embase, WoS, CENTRAL, ERIC, Cochrane Library, CRD Language: English, Spanish, French, German, Dutch</td>
<td>Study design: CT Setting: School Participants: 6-18 years Primary outcome focus: Diet/PA, anthropometric Intervention type: Dietary/PA behaviour Synthesis: Narrative Assessed study quality: Yes (Effective Public Health Practice Project Quality Assessment Tool) Funding Sources: No external funding sources</td>
<td>7</td>
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| Waters et al.   | Update the previous Cochrane review and determine the effectiveness of educational, health promotion and/or psychological/family/behavioural therapy/counselling/management interventions which focus on diet, physical activity or lifestyle support, or both and were designed, or had an underlying intention to prevent obesity/further weight gain, in children. | Date range: 1990 - Mar 2010
Setting: Any
Participants: 0-18 years
Primary outcome focus: Any (BMI for meta-analysis)
Intervention type: Any
Synthesis: Narrative
Assessed study quality: Yes (Cochrane risk of bias tool)
Funding Sources: Department of Health, UK; WHO; Victorian Health Promotion Foundation (VicHealth), Victoria, Australia; Commonwealth Department of Health and Ageing, Australia; the National Health and Medical Research Council Capacity Building Grant, Australia; the Jack Brockhoff Foundation, Australia and other author-specific sources | 11           |
| Williams et al. | Evaluate the effects of policies related to diet and physical activity in schools, either alone, or as part of an intervention programme on the weight status of children aged 4 to 11 years. | Date range: up to Jun 2011
Language: Not reported | Study design: RCT, CBA, ITS, CS, XS
Setting: School
Participants: 4-11 years
Primary outcome focus: Obesity-related
Intervention type: Nutrition/PA policy
Synthesis: Meta-analysis
Assessed study quality: Yes (Newcastle-Ottawa Scale)
Funding Sources: Medical Research Council Doctoral Training; University of Exeter; NIHR; CLAHRC | 7            |
| Wolfenden et al. | Evaluate the effects of whole of community interventions to prevent excessive population weight gain. | Date range: 1990 – 2011
Databases: Medline, Embase, CENTRAL, Google Scholar, reference lists Language: English | Study design: RCT, C-RCT, QE with a parallel control group
Setting: Community
Participants: whole population
Primary outcome focus: Obesity-related
Intervention type: Any
Synthesis: Meta-analysis
Assessed study quality: Yes (Cochrane risk of bias tool)
Funding Sources: Not reported | 7            |
| Zenzen and Kridli | Conduct an integrative review using Cooper’s framework to provide an overview of the degree of variability in the methodological approaches and theoretical frameworks of school-based obesity programs. | Date range: 2000 – 2007
Databases: Medline, PsycINFO, CINAHL, reference lists Language: English | Study design: Not reported
Setting: School
Participants: 4-18 years
Primary outcome focus: Any
Intervention type: Any
Synthesis: Narrative
Assessed study quality: Yes (Stetler’s quality criteria of research)
Funding Sources: Not reported | 2            |
* Databases: AEI (Australian Education Index), AHRQ (Agency for Healthcare Research and Quality), ASSIA (Applied Social Sciences Index and Abstracts), BEI (British Education Index), BIOSIS (Biosciences Information Service), CDSR (Cochrane Database of Systematic Reviews), CCTR (Cochrane Controlled Trials Register), CENTRAL (Cochrane Central Register of Controlled Trials), CINAHL (Cumulative Index to Nursing and Allied Health Library), CPCI (Conference Proceedings Citation Index), CRD (The Centre for Reviews and Dissemination), DAI (Dissertation Abstracts International), DARE (Database of Abstracts of Reviews of Effects), DoPHER (Database of Promoting Health Effectiveness Reviews), Embase (Excerpta Medica database), EPPI-Centre (The Evidence for Policy and Practice Information and Coordinating Centre database for health promotion research), ERIC (Education Resource Information Center), HMIC (Health Management Information Consortium), IBSS (International Bibliography of the Social Sciences), ICTRP (World Health Organization International Clinical Trials, Registry Platform), LILACS (Literatura Latino Americana em Ciências da Saúde), Medline (Medical Literature Analysis and Retrieval System Online), NCCHTA (NIHR Coordinating Centre for Health Technology), NICE (National Institute for Health and Care Excellence), PAIS (Public Affairs Information Service), PEI (Physical Education Index), PsycINFO (Psychological Information Database), SCI (Science Citation Index), SSCI (Social Sciences Citation Index), SciELO (Scientific Electronic Library Online), SIGN (Scottish Intercollegiate Guideline Network), SIGLE (System for Information on Grey Literature in Europe), TRoPHI (Trials Register of Promoting Health Interventions, WoK (Web of Knowledge, including WoS and ISI databases), WoS (Web of Science)

** Study design specified for inclusion in the SR: CT (Controlled Trial, with or without randomisation), CCT (Controlled Clinical Trial), RCT (Randomized controlled trial), nRCT (non-RCT), Q-RCT (Quasi-RCT); Q-nRCT (Quasi-experimental nRCT), NRNCT (Non-Randomised Non-Controlled Trials) C-RCT (Cluster RCT), CBA (Controlled before-and-after study), PCS (Prospective cohort study), RCS (Retrospective cohort study), PCCS (Prospective controlled cohort studies), HCT (Historically controlled trial), NCC (Nested case-control study), CC (Case-control study), XS (Cross-sectional study), CR/CS (Case report/Case series), ITS (Interrupted Time Series), NE (Natural experiments), QE (Quasi-experimental study), PPT (Pre-and Post-test repeated measures design), QE-PPT (Quasi-experimental Pre- and Post-test evaluation), PA (Physical activity)

*** % BF (Percentage Body Fat), BMI (Body Mass Index), FFST (fat-free soft tissue), FMI (Fat Mass Index) RR (Relative Risk), SFT (Skin Fold Testing), TSF (Triceps Skin Fold), WC (Waist Circumference), WHR (Waist-to-Hip Ratio)
### Appendix S4 – Characteristics of SRs (Part 2)

<table>
<thead>
<tr>
<th>Author</th>
<th>Inclusion and Exclusion criteria</th>
<th>Main findings of the SR</th>
<th>Implications for practice &amp; research</th>
<th>Limitations of the SR</th>
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</thead>
<tbody>
<tr>
<td>Avery et al. 2015</td>
<td>Inclusion criteria: (i) trial involves ≥100 healthy children; (ii) focus on reducing consumption of sugary drinks; (iii) control data available; (iv) change in consumption of SSBs and weight outcomes; (v) ≥6 months duration</td>
<td>School-based education programmes focusing on reducing SSB consumption, and which include follow-up modules, are effective. Peer support and changing the school environment could improve effectiveness. There is a lack of relevant reported interventions carried out outside of the school environment.</td>
<td>Practice: Medium intensity (4 - 10 x 1-h sessions over 6 weeks to 12 months) nutrition education programme focussing on beverage choices could be an effective way of reducing consumption of sugary drinks in school-aged children. The use of computer or web-based nutrition education may offer an effective contemporary educational route.</td>
<td>Small number of studies selected for comparison; heterogeneous studies; exclusion of unpublished data and studies</td>
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<tr>
<td>Baker et al. 2011</td>
<td>Inclusion criteria: (i) ≥6 month follow up from the start of the intervention to measurement of outcomes; (ii) Community wide interventions had to comprise at least two broad strategies aimed at physical activity for the whole population</td>
<td>There was a noticeable inconsistency of findings, confounded by serious methodological issues within the included studies. The most intense interventions failed to demonstrate consistent improvements. Further, effectiveness was not demonstrated in the long term studies, which some shorter included studies had recommended. The body of evidence in this review does not support the hypothesis that multi-component community wide interventions effectively increase population levels of physical activity.</td>
<td>Practice: No evidence that adherence to a particular theoretical framework or model is advantageous. There are significant challenges to implementing multi-strategic community wide interventions. Research: review demonstrates a need for: (i) further exploration of combined community interventions using rigorously designed studies; (ii) more sensitive, reliable and valid tools to measure PA at multiple points; (iii) consideration of gender differences in effectiveness and during study design; (iv) a focus on outcomes by population characteristics; (v) publication of process evaluations with information on potential facilitators and barriers; (vi) economic evaluations</td>
<td>Potential publication bias: the inclusion criteria required studies to have at least two intervention strategies and this excluded a number of large scale mass media interventions. Studies showing a single strategy approach without evidence of multiple strategies were excluded</td>
</tr>
<tr>
<td>Barr-Anderson et al. 2014</td>
<td>Inclusion criteria: (i) &gt; 12 weeks duration; (ii) study sample ≥80% African American or results specific to African American youth available; (iii) intervention conducted outside school time; (iv) intervention included pre- and post-measurements; (v) conducted in the United States</td>
<td>The inconsistency in MQ scores, imbalance of full trials vs. pilot studies and variability of study designs among the interventions made it challenging to draw overarching conclusions about effective strategies in minority youth. Findings were inconsistent due to a lack of scientific rigor, dearth of full trials powered to detect differences compared to the excess of pilot studies, and heterogeneity of study designs. There was no consistent pattern of cultural adaptation or community engagement for eligible programmes. However, regardless of the study design, after-school studies tended to positively impact physical activity.</td>
<td>Practice: After-school and summer programmes, alone or in combination, may favourably influence diet and physical activity behaviour in African American youth. Research: More high-quality, full-length trials with consistent methodologies are needed</td>
<td>None reported</td>
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<tr>
<td>Beauchamp et al. 2014</td>
<td>Inclusion criteria: (i) studies aimed at whole population; (ii) interventions aimed at primary prevention of weight gain or with a primary goal of preventing further weight gain in overweight/obese children Exclusion criteria: Interventions that (i) are clinical in nature; (ii) specifically target weight loss in overweight/obese populations; (iii) are directed at particular ethnic, socioeconomic or otherwise minority groups (unless the study results were stratified by a measure of SEP)</td>
<td>Information-based interventions targeting individual-level behaviour change may be less successful in lower SEP populations. Studies that were shown to be effective in lower SEP participants primarily included community-based strategies or policies aimed at structural changes to the environment. Such Interventions must be given priority in order to reduce population levels of obesity without increasing socioeconomic inequalities in population weight, although it is difficult to draw firm conclusions due to the generally weaker quality of interventions that were not effective in lower SEP groups.</td>
<td>Practice: Effective interventions in lower SEP groups tend to be those of longer duration that incorporate some environmental, structural, community or social support for behaviour change (e.g. improved community access to physical activity or mandatory school nutrition policies); Information-based interventions risk increasing existing health inequalities. Research: Further research is required to identify and evaluate appropriate support strategies for obesity prevention; strategies based solely on information provision should be evaluated for their socioeconomic impact and supported by additional strategies targeted towards preventing weight gain among lower SEP groups, in addition to being embedded within broader strategic initiatives.</td>
<td>Publication bias: only English-language papers included; It was unclear whether interventions were sufficiently powered to stratify by SEP. Studies reporting unadjusted BMI percentiles do not take into account normal BMI variation with age and must be interpreted with caution</td>
</tr>
<tr>
<td>Bleich et al. 2013</td>
<td>Inclusion criteria: (i) community-based studies; (ii) at least 1 year of follow up after baseline; (iii) control group present; (iv) reported differences in anthropometric outcomes Exclusion criteria: Studies that (i) targeted only overweight or obese subjects or those with a chronic medical condition; (ii) observational studies; (iii) studies expressly targeted at weight loss; (iv) qualitative studies</td>
<td>Moderate evidence that community-based interventions that include a school component and use interventions focused on both diet and physical activity effectively prevent obesity or overweight in children, regardless of study design</td>
<td>Practice: Combination interventions implemented in multiple settings may be more effective at preventing weight gain in children than single-component interventions located in the community only. Research: More research and more consistent methods are needed to understand the comparative effectiveness of these intervention programs</td>
<td>Sub-optimal design of included studies; restriction to interventions located primarily in the community setting excluded several studies that included the community as a secondary component; Possible publication bias as successful programs may not have been included in the analysis because of a lack of published data; English language articles only</td>
</tr>
<tr>
<td>Brandt et al. 2010</td>
<td>Inclusion criteria: interventions that (i) had anthropometric and behavioural primary outcomes; (ii) &gt; 6 months duration; (iii) took place in the school and/or involved the environment; (iv) aimed at children</td>
<td>Combined interventions including nutrition, physical activity, and television viewing modification lasting at least one year are effective. Installation of water fountains in schools, implementation of the topics “sugar-containing drinks” and “television viewing” in</td>
<td>Practice: None stated Research: More research needed to: determine ideal starting age and duration of interventions; to determine whether use of BMI to determine the effectiveness of an intervention is appropriate; to investigate the role of</td>
<td>Language restrictions not reported, search was only performed in PubMed</td>
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<tr>
<td>Brown et al. 2015</td>
<td>any type of lifestyle intervention, of any length of follow-up, that reported any</td>
<td>Meta-analysis of a limited number of controlled trials found an unclear picture of the effects of interventions on BMI for South Asian children.</td>
<td>Practice: None stated</td>
<td>Possible publication bias: studies which undertook subgroup analysis by</td>
</tr>
<tr>
<td>Brown and Summerbell 2009</td>
<td>Inclusion criteria: (i) lifestyle interventions; (ii) set in schools; (iii) ≥ 12 weeks duration. Study designs that compared lifestyle interventions with usual care or with other active interventions were included. Exclusion criteria: Studies on children with critical illnesses or eating disorders</td>
<td>Studies were grouped by type of intervention: dietary interventions alone, physical activity interventions alone, combination of diet and physical activity. Of 38 studies, one out of three diet studies, five out of 15 physical activity studies and nine out of 20 combined diet and physical activity studies found significant and positive differences between intervention and control for BMI. Evidence is insufficient to assess the effectiveness of dietary interventions or diet vs. physical activity interventions to prevent obesity in school children, but overall results suggest that combined diet and physical activity school-based interventions may prevent children from becoming overweight in the long term.</td>
<td>Practice: The success of interventions varies by gender, age or weight status of children</td>
<td>Poor analysis plan and synthesis of findings. Results summarized methods of studies but did not synthesis or draw together general findings or summary conclusions. Did not include critical appraisal.</td>
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<tr>
<td>Branscum and Sharma 2011</td>
<td>Inclusion criteria: (i) any form of intervention strategy for the treatment or prevention of childhood obesity (ii) the primary audience for intervention was Hispanic, Latino or Mexican American Exclusion criteria: Reviews were excluded</td>
<td>Interventions were more likely to be successful when participants were at higher risk for obesity, a parental component was included, the intervention contained theoretical underpinnings, the intervention was delivered by a dedicated staff, the intervention served older children and the intervention was of longer duration</td>
<td>Practice: interventions should target both physical activity (participation in 60 min of MVPA on most days of the week) and dietary behaviours (e.g. increasing fruit and vegetable consumption, decreasing fat intake, decreasing the consumption of SSB, adequate consumption of water and/or non-caloric beverages and restricting portion sizes of meals and snacks)</td>
<td>Risk of publication bias: Few databases searched (no grey literature searched); search restricted to English only; no appraisal of risk of bias</td>
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<td>Brown and Summerbell 2009</td>
<td>Inclusion criteria: (i) any form of intervention strategy for the treatment or prevention of childhood obesity (ii) the primary audience for intervention was Hispanic, Latino or Mexican American Exclusion criteria: Not reported</td>
<td>the curriculum, modification of existing physical education and more physical activity during the school day are effective prevention strategies</td>
<td>parents and the family play; to evaluate cost and potential savings; need to include variables such as cultural background and socio-economic status of children/families in analysis; develop guidelines for the content and implementation of school-based interventions</td>
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<td>Budd and Volpe 2006 81</td>
<td>Inclusion criteria: (i) studies including BMI for age and gender as an outcome, (ii) studies conducted in US schools during the school day, (iii) publication in a peer-reviewed journal</td>
<td>Several successful interventions targeted older children who were better-suited participants for the behaviour change curriculum. Older adolescents are more likely to possess the needed competencies for health-related instruction and behaviour change. In addition, the use of a multicomponent, comprehensive, and detailed nutrition and physical activity curricula for the students in higher grades greatly contributed to the success of programs.</td>
<td>Practice: Schools must consider classroom and policy strategies to prevent the problem of childhood obesity, tailored to the age of students. Strategies might include: (i) using behaviour modification techniques with younger students to reduce sedentary behaviour, increase physical activity, and encourage proper nutrition; (ii) instituting a schedule of physical education classes with longer and more vigorous exercise; (iii) working with the broader health community to maximise efficiency. Research: Few research studies have examined BMI as an end point of school-based obesity prevention interventions and many are more than 5 years old. There was significant study heterogeneity in type of intervention, duration of follow up and study population, making concrete conclusions difficult.</td>
<td>Results summarized methods of studies but did not synthesise general findings or summary conclusions. Did not include critical appraisal.</td>
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<tr>
<td>Calancie et al. 2015 82</td>
<td>Inclusion criteria: Studies that reported findings from empirical formative, process, or outcome research related to policy or environmental obesity-prevention strategies in rural communities in the United States or Canada. Articles that included both rural and urban communities were included only if they reported rural-specific findings. Exclusion criteria: Not reported</td>
<td>The CDC Recommended Community Strategies and Measurements to Prevent Obesity in the United States (COCOMO) strategies most commonly implemented in rural areas focused on increasing the availability of healthy foods and beverages in small retail food outlets and increasing access to farmers markets and limiting the availability of unhealthy ones. Fewer studies examined approaches to limiting advertising of less healthy foods and beverages or modifying portion sizes. None of the studies reviewed sought to improve the geographic availability of supermarkets.</td>
<td>Practice: None stated. Research: Need for research that (i) compares the effectiveness of interventions in urban and suburban settings versus rural settings; (ii) assessed policy and environmental, social, psychosocial, behavioural, and biological outcomes associated with nutrition-related policy and environmental strategies; (iii) is applied to a variety of intervention settings (e.g. parks, recreational sites and hospitals) to identify the mix of settings that will yield the greatest population-level reach and effects; (iv) explores the possibility of aligning federal food and nutrition assistance programs with efforts to increase access to local foods; (v) reports on the costs...</td>
<td>None reported.</td>
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<td>Campbell et al. 2002</td>
<td>Inclusion criteria: (i) &gt; 3 months duration; (ii) reported report one or more of the following primary outcomes: % BF, BMI, ponderal index, SFT; (iv) reported outcome data at baseline and at post-intervention, or at baseline and change from baseline</td>
<td>Ten studies were included; seven were long-term (&gt; 1 year), three were shorter term (at least 3 months). Eight were school/nursery-based interventions, one was a community-based intervention targeting low-income African-American families, and one was a family-based intervention that targeted non-obese children of obese parents. There is limited high quality data on the effectiveness of obesity prevention programs and no generalizable conclusions can be drawn. However, concentration on strategies that encourage reduction in sedentary behaviours and increase in physical activity may be fruitful</td>
<td>Practice: None stated Research: the need for well-designed studies which examine a range of interventions remains a priority. Future studies should pay attention to: (i) Sufficient power-adequate numbers; (ii) Adequate follow-up; (iii) Reliability of outcome measurements (reporting of BMI); (iv) Process indicators; (v) Cost effectiveness; (vi) Appropriate and adequate statistical analysis; (vii) Sustainability and generalisability</td>
<td>Not reported by authors. No appraisal of risk of bias</td>
</tr>
<tr>
<td>Chen and Wilkosz 2014</td>
<td>Inclusion criteria: (i) primary outcome including BMI or BMI z-score and health behaviours; (ii) trials that tested lifestyle/weight management interventions; (iii) using at least one eHealth/mHealth component including web (Internet)-based, social media, and mobile communication technology</td>
<td>All effective interventions utilized dietary and physical activity strategies as part of intervention components. Because of the variation in duration of intervention (range 10 weeks to 2 years), it is not clear what length of intervention is most effective</td>
<td>Practice: None stated Research: Future research should include rigorous evaluation of cost-effectiveness as well as the mediating and moderating factors associated with effective technology based interventions. More long-term follow-up and assessment of weight-related health outcomes, such as physical activity, sedentary activity, dietary behaviours, self-efficacy, and quality of life, should be included in future research</td>
<td>Not reported</td>
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<td>Chriqui 2013</td>
<td>Inclusion criteria: To be included, the study must have empirically examined a formal, public policy adopted at the state, local, and/or school district level in the United States Exclusion criteria: Simulation models, extrapolation studies, survey studies that contain data on policies reported by respondents, or summaries of the literature that failed to document the formal public policy(ies) studied</td>
<td>Most studies were cross-sectional and focused on policies affecting school environments, primarily reporting on policy implementation rather than impacts on physical activity behaviours, food intake, and/or obesity-related outcomes. Existing state and school district policies can influence school PE and PA environments, but they alone are not sufficient to change the rates of child and adolescent PA to meet the national recommendations of 60 minutes of daily PA</td>
<td>Practice: Schools are only one piece of the obesogenic environment. Thus, it is important for policy makers to start to look beyond schools by focusing on broader population-based strategies that aim to improve all aspects of society, particularly given that school-level changes alone are insufficient for addressing the obesity problem. Research: More research is needed to: (i) examine the influence of state and local natural policy experiments affecting non-school environments; (ii) study impacts beyond policy implementation, without which it will be difficult to convince policy makers to adopt such policies. Policy impacts are critical to facilitate the diffusion and adoption of such policies nationwide</td>
<td>Not reported</td>
</tr>
<tr>
<td>Chriqui et al. 2014</td>
<td>Inclusion criteria: Studies that (i) were based in the United States based; (ii) focused on the food and beverage environment in schools; (ii) examine the effects of a formally adopted policy at state and/or district levels; (iv) focus on the relationship between the policy and BMI and weight outcomes or student consumption, purchasing, and dietary intake or in-school availability/access to competitive foods Exclusion criteria: (i) non peer-reviewed; (ii) describe self-reported policies or information obtained from surveys; (iii) report categories that are not related to Competitive Food &amp; Beverages; (iv) qualitative, pilot or non-scientific studies; (v) do not report on outcomes of interest</td>
<td>The studies reported mixed results, and many lacked rigorous study designs. Furthermore, many had very limited (if any) time lags between their policy date and the outcomes examined, which could have contributed to the mixed results. However, in 15 of the 24 studies reviewed, state laws and/or district policies have influenced outcomes in the expected direction. Most of the studies reporting results in the expected direction focused on in-school availability and/or in-school consumption, but studies examining BMI and weight outcomes and overall consumption were mixed</td>
<td>Practice: Societal changes may be required to facilitate sustained changes to overall consumption and student BMI/weight outcomes, but schools play a critical role in shaping children’s food and beverage environments and should be a national focal point for obesity prevention. Changes made in schools should be reinforced in environments outside the school setting Research: more research is needed to understand the influence of CF&amp;B policies on overall (in- and out-of-school) student consumption behaviours and student BMI and weight outcomes. In particular: (i) more robust, longitudinal study designs; (ii) examining the impact of CF&amp;B policies on changes in NSLP/SBP participation rates and food service revenues; (iii) examine whether implementation of the impending federal rule will vary based on the strength of existing state and/or district policies; (iv) resources are clearly needed for more longitudinal outcome data nationwide</td>
<td>No quality assessment of included studies was carried out; threats to internal and external validity due to the inherent nature of the included studies were acknowledged</td>
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<td>Cole et al. 2006 87</td>
<td>Inclusion criteria: (i) school-based; (ii) manipulation of at least one of the variables of healthy lifestyle education, dietary habits, and/or physical activity; (iii) statistically significant decrease in BMI or weight Exclusion criteria: Studies not meeting inclusion criteria</td>
<td>The majority of school-based interventions used multiple treatment modalities. Providing education in a nonthreatening, familiar setting with a supportive network of friends and family is an effective educational strategy for targeting childhood overweight. In addition, the provision of incentives to promote positive behavioural changes may be effective in younger children. Teachers were commonly responsible for the teaching of the healthy lifestyle curriculum and are important role models in the school setting for children</td>
<td>Practice: Social Cognitive Theory is a sound theoretical perspective for designing and implementing successful interventions with children. Modeling is a primary technique that should be encouraged when designing interventions for children in the school setting. Demonstration of and the opportunity to rehearse behaviours that improve overweight in children by teachers, peers, and students themselves should be highlighted. The use of contracts with goals and rewards can regulate and reinforce new behaviours and improve self-efficacy</td>
<td>Only trials with statistically significant decrease in BMI were reported; No attempt made to evaluate the quality of the studies, including sample size and power. No conclusion about the actual effectiveness of the interventions can be drawn.</td>
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<tr>
<td>Cook-Cottone et al. 2009 88</td>
<td>Inclusion criteria: Studies that (i) are published in English; (ii) school based (during or after school hours); (iii) obesity-prevention programs; (iv) have an objective anthropometric outcome measure; (v) targeting children of normal weight along with children who may have been at risk for overweight or who were overweight at the time of the program’s implementation Exclusion criteria: Treatment interventions; trials measuring only PA or dietary outcomes; clinical populations; eating disorder prevention programs; Head Start and community programs</td>
<td>Of studies reviewed, only 38% yielded significant weight gain prevention effects. Overall the findings indicated small effects on BMI for school-based obesity prevention programmes ($r = 0.05$ [0.04, 0.06], $P = 0.000$) with significant variance among outcomes ($Q_{[65]} = 626.40$, $P &lt; 0.001$). The most significant moderators included interventions delivered predominately among Asian students; by combination of school teachers and interventionists; with high parental involvement; which encouraged healthy eating and which were aimed at reducing sedentary behaviours.</td>
<td>Practice: Weight prevention programmes must be carefully planned and suited to each school’s population, risk and needs. Goals must include more than BMI reduction or weight loss Research: Research that assesses the efficacy of integrating a holistic approach with integral prevention of binge eating and eating disorders is required. Further analysis is required to explore possible interaction between moderator variables. For example, more research is needed to explore the relationships between program length and outcomes, given that this meta-analysis found programs with longer durations to be associated with efficacy, whereas others have found brevity to be associated with efficacy</td>
<td>Poor description of study selection. Did not provide flow chart of selection process. Did not perform a critical appraisal of the quality of included studies</td>
</tr>
<tr>
<td>De Bourdeau dhuij et al. 2010 89</td>
<td>Inclusion criteria: studies had to report at least the effects on behaviour or on measures of obesity. Studies were considered regardless of their design Exclusion criteria: (i) non-European studies; (ii) published before 1990; (iii) conducted mainly</td>
<td>European studies constitute only a small proportion (around 10%) of the literature. Interventions that include only an educational component without any environmental strategy seem to be ineffective. There was moderate evidence that multi-component interventions focussing on healthy diets and PA habits that combining an educational and an environmental component had a positive impact upon obesity</td>
<td>Practice: There is a need to implement sustainable interventions under real life conditions, without a continued need for external help or support from a research team. A combination of approaches combining educational and environmental strategies focussing on both nutrition and PA habits seems to be most effective. Policy initiatives to ensure that schools are able to implement these strategies locally are warranted</td>
<td>The authors’ conclusions appear somewhat strong given the evidence and so should be interpreted with some caution.</td>
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<td>de Sa and Lock 2008</td>
<td>Inclusion criteria: (i) controlled studies; (ii) school-based intervention to encourage fruit and/or vegetable; (iii) &gt; 3 months follow up; (iv) record one change in intake of fruit and/or vegetables or a change in knowledge, attitude or preference to fruit and/or vegetables. Exclusion criteria: Not reported.</td>
<td>School schemes are effective at increasing both intake and knowledge, and results can be maintained long term, but multiple changes in social, economic and physical aspects of children’s environments are also likely to be required to sustain increased FV intake. The EU agriculture policy for school fruits and vegetables schemes should be an effective approach with both public health and agricultural benefits.</td>
<td>Practice: Implementation of effective school-based interventions to promote fruit/vegetable consumption requires careful consideration of context-specific factors such as differences in education systems, school meal programmes, producer organisations, supply chains and food cultures. Research: None stated.</td>
<td>Lack of details on data extraction and validity assessment make it difficult to rule out reviewer error and/or bias or to assess the reliability of the primary studies. Pooling of different study designs without explicitly consideration of quality means that the results may not be reliable.</td>
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<tr>
<td>Dobbins et al. 2013</td>
<td>Inclusion criteria: (i) health promotion study; (ii) not conducted by physicians but implemented, facilitated, or promoted by staff in local public health units; (iii) school setting; (iv) aimed at increasing PA; (v) included all school-attending children; (vi) &gt; 12 weeks duration. Exclusion criteria: studies not focused on changing PA and fitness levels or were not implemented primarily in the school setting.</td>
<td>There is evidence that school-based PA interventions have a positive impact on duration of PA, television viewing, VO2 max, and physical activity rates (MVPA during school hours; odds ratio (OR) 2.74, 95% confidence interval (CI), 2.01 to 3.75). There was no positive impact on blood cholesterol. However, given these studies are at a minimum of moderate risk of bias, and the magnitude of effect is generally small, these results should be interpreted cautiously.</td>
<td>Practice: (i) PA interventions should continue; (ii) school-based PA interventions should focus on fostering positive attitudes toward PA and be geared toward the developmental level of students; (iii) staff should encourage students to be more physically active during the course of the school day, including PA during school-based interventions; (iv) Parental involvement could be an integral part of such interventions; (v) collaboration with public health staff to increase resources for the promotion of PA within the school system would be beneficial.</td>
<td>It is possible that bias was introduced during the review process despite the implementation of strategies to reduce bias. Publication bias due to focus on English-language articles (e.g. articles published in Chinese that were not indexed in English language databases were not eligible for inclusion).</td>
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<td>Flodmark et al. 2006</td>
<td>Inclusion criteria: studies that (i) address prevention of overweight or obesity; (ii) &gt; 12 months follow-up; (iii) include a control group; (iv) relevant outcome measures, primarily the percentage of overweight or obese subjects, BMI or SFT; (v) address a normal population Exclusion criteria: Treatment interventions</td>
<td>Many studies do not demonstrate positive effects, suggesting that it is difficult to create an effective program based only on limited interventions in schools. No differences in the occurrence of positive effects were reported for low quality studies in comparison with high and medium quality studies. Positive effects were found in 41% of cases. Overall, the results suggest that it is possible to avoid overweight and obesity in children and adolescents by using preventive interventions</td>
<td>Research: Future research should: (i) assess the impact on PA rates, duration and intensity; (ii) assess the validity and appropriateness of outcomes, including: student satisfaction, health-related quality of life, self-esteem, self-efficacy for PA, reduction in alcohol/drug consumption, involvement in extracurricular activities, and cost-effectiveness; (iii) assess known barriers and facilitators of PA, particularly among children of various socioeconomic status and ethnicity and urban/rural location; (iv) conduct subgroup analysis (e.g. differences in PA by gender, age and ethnicity); (v) collect long-term follow-up impact data; (vi) national funding agencies need to prioritise research related to PA promotion, funding projects that span multiple years</td>
<td>Given a meta-analysis was not conducted, it is possible that the review team may have overestimated treatment effects when interpreting the results across studies</td>
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<td>Gao and Chen 2014</td>
<td>Inclusion criteria: (i) peer reviewed, data-based research articles; (ii) published in English; (iii) studied some type of exergames (e.g. DDR, EyeToy, Wii, etc.) in relation to obesity-related outcomes; (iv) The effects of field-based exergames on children’s habitual PA and obesity-related outcomes remain unclear due to design problems, measurement issues and other methodology concerns</td>
<td>Practice: None stated Research: None stated</td>
<td>Unclear how papers were selected for review, how data were extracted, how study validity assessment was carried out and how the quality of studies was assessed. Study data were tabulated and outcomes summarised in terms of the overall positive or negative effect, rather than reporting individual numerical data, without outlining the differences between the studies. Conclusions contradict the findings that few interventions showed positive effects</td>
<td>Not reported</td>
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<td>Haynos and O'Donohue 2012 94</td>
<td>Inclusion criteria: Studies that (i) used randomization procedures and controls; (ii) obesity prevention programs; (iii) reported outcomes on at least one weight- or adiposity-related variable, such as BMI or % BF</td>
<td>Of those programs identified to produce outcomes on weight and adiposity, results are generally modest and not uniform across prevention studies, possibly due to problems with intervention or research design</td>
<td>Practice: None stated</td>
<td>Not reported</td>
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<td>Exclusion criteria: Interventions that specifically targeted particular high-risk groups based on variables such as sex, ethnicity, weight status, etc.</td>
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<td>Research: Need for (i) well-powered studies with greater effect sizes, and thus more clinically significant outcomes; (ii) replication of prevention programs found to positively affect obesity outcomes by independent research groups; (iii) improving the quality and effectiveness of the already modestly effective prevention programs available; (iv) developing better-designed, theory-based studies that are generalizable to the general population and which publish economic costs</td>
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<td>Holub et al. 2014 95</td>
<td>Inclusion criteria: interventions that (i) focused on obesity-related topics (eg, not general health promotion); (ii) sample included at least 50% Latino/Latin American participants or had results stratified by race/ethnicity; (iii) evaluated and included obesity-related outcome measures; (iv) controlled study; (v) was conducted in a community setting; (vi) and (vii) was published</td>
<td>Mixed results observed: while many studies received the highest marks in study design suitability, few had significant results related to obesity outcomes and effect sizes ranged considerably. Studies that were able to demonstrate a statistically significant reduction in weight or BMI z-scores also included strategies to improve behavioural skills (e.g. goal setting, self-monitoring) or an intensive, daily program. The strategies implemented in these studies provide promising directions for</td>
<td>Practice: The evidence around targeted interventions for overweight/obese children is more limited and strategies require greater intensity and tailoring compared with prevention interventions Research: Need for suitable study designs with control groups, and to apply methods and protocols that would reduce the potential for error (e.g. lack of measurement to gauge exposure, not correcting for potential biases or confounders, maintaining less than 80% of the sample at follow-up, and various selection biases)</td>
<td>Narrow focus on obesity-related measures as the outcome of interest, excluding interventions that target nutrition and physical activity as the primary outcome may also impact obesity; inability to compare effect sizes due to the variety in</td>
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<td>Ickes et al. 2014</td>
<td>Inclusion criteria: (i) primary research; (ii) overweight or obesity prevention interventions; (iii) school-based; (iv) child-based interventions, which could include parents; and (v) reported outcome data Exclusion criteria: (i) preschool, early childcare, or after-school programs; (ii) not available in the English language; (iii) treatment interventions; (iv) articles reporting study design and/or process evaluation only; (v) non-primary research; (vi) intervention not conducted during regular school hours</td>
<td>Each of the global school-based interventions included in this review resulted in at least one positive, measurable outcome. Elementary schools appear to be an ideal setting for childhood obesity prevention interventions given the vast array of opportunities for promoting physical activity and nutrition education through practice, policy, and supportive environments. Targeting specific grades and classrooms within elementary schools may be easier when compared to targeting middle schools and high schools due to scheduling, built in opportunities for physical activity, and flexibility in the curriculum</td>
<td>Practice: A critical component of successful school-based obesity prevention interventions is tailoring the program to the targeted audience. Research: Future research should (i) include theoretical frameworks; (ii) be tailored to target audience; (iii) Integrate a combination of nutrition and PA strategies; (iv) include parents; (v) consider environmental strategies; (vi) involve training of teachers; (vii) last longer than one year; (viii) incorporate multiple outcomes, including knowledge, attitudes, behaviours, related theoretical constructs, and anthropometric data; (ix) Implement follow-up measures to determine long-term efficacy</td>
<td>Possible publication bias: only peer-reviewed studies in English included; excluded studies that were conducted outside of regular school hours and studies published prior to 2002</td>
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<td>Jaime and Lock 2009</td>
<td>Inclusion criteria: (i) food or nutrition policies (nutrition guidelines, regulation of food and beverage availability, price intervention) Exclusion criteria: (i) Not school-based nutrition policy; (ii) focus on education or behavioural interventions without changes in school food environment; (iii)</td>
<td>Nutrition guidelines and price interventions were effective in improving school food environments and dietary intake. Only one included study evaluated the impact of school food policies on BMI</td>
<td>Practice: None stated Research: Need for research to evaluate the effect of school nutrition policies on childhood obesity, with particular focus on which were most effective and cost-effective, and for emphasis on which school policies could tackle the influence of the food industry in school environments.</td>
<td>Possible publication bias: It was unclear whether the authors used language restrictions. Study abstracts were screened by only one reviewer and no details were provided on how data was extracted, with the possibility of reviewer error and bias in the review process. No</td>
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<td>Kaiser et al. 2013</td>
<td>Inclusion criteria: (i) human trials, (ii) 3 weeks duration; (iii) random assignment to conditions differing only in consumption of SSBs; (iv) including a BWI outcome. Exclusion criteria: Not reported.</td>
<td>The currently available randomized evidence for the effects of reducing SSB intake on obesity is equivocal. Even if statistical significance is ignored, the point estimates of effects on BMI reduction are small, accounting for only 1.5% of the variance observed in those who were overweight at baseline. However, the lower limit of the confidence interval around the estimated effect of SSB reduction is very close to statistical significance.</td>
<td>Practice: None stated. Research: Additional, larger or otherwise stronger studies are needed to provide clear and convincing evidence that lowering SSB consumption will reduce obesity and obesity-related disease prevalence.</td>
<td>Assessment of study quality was carried out.</td>
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<td>Kamath et al. 2008</td>
<td>Inclusion criteria: interventions that (i) are aimed at changing lifestyle behaviours to prevent obesity; (ii) simple or multimodal; (iii) delivered by a healthcare professional, community member or health authority in a home, school, clinic or community setting; (iv) reporting on self-reported or objective outcomes of interest. Exclusion criteria: (i) participants with eating disorders; (ii) only obese participants; (iii) mostly adult participants; (iv) study targeted the consequences of obesity (e.g. cardiovascular risk factors).</td>
<td>Interventions caused small changes on their respective target behaviours and no significant effect on BMI compared with control. Further exploration found: (i) a lack of sex-treatment interaction; (ii) trials in children found larger reductions in sedentary activity than trials in adolescents; (iii) trials of long treatments &gt; 6 months found larger reductions in sedentary activity and BMI than shorter trials, which were more effective in reducing unhealthy dietary behaviours; and (iv) trials measuring outcomes during treatment found larger reductions in sedentary activity and smaller reductions in BMI than trials that measured these outcomes after treatment. Behavioural interventions to prevent paediatric obesity had small beneficial effects on target behaviours and no significant effect on BMI.</td>
<td>Practice: None stated. Research: Need for studies of promising long term interventions for prevention of childhood obesity, with detailed definition and measurement of target behaviours, extended follow up and improved reporting of details of interventions. They suggested that systematic reviews in this area should be structured to permit comparison of intervention types across studies.</td>
<td>Review was restricted to published studies and may be subject to publication bias; unclear whether there were language restrictions.</td>
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<td>Kanekar and Sharma 2008</td>
<td>Inclusion criteria: (i) English language peer-reviewed publication; (ii) USA or UK study; (iii) focus on general population; (iv), having an explicit school-based curriculum for prevention of childhood obesity interventions did not seem to modify BMI.</td>
<td>This review concluded that school-based childhood obesity interventions did not seem to modify BMI.</td>
<td>Practice: None stated.</td>
<td>Possible publication and language bias. Quality assessment was limited and did not fully assess risk of bias. Methods used for study selection and.</td>
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<td>Katz et al. 2008&lt;sup&gt;101&lt;/sup&gt;</td>
<td>Inclusion criteria: (i) controlled studies; (ii) school setting; (iii) &gt; 6 months follow up; (iv) reported on common weight-related outcomes (e.g. BMI) Exclusion criteria: (i) data presented in graphs or which were categorical; (ii) unknown sample size; (iii) poor methodological quality; (iv) lack of standard deviation</td>
<td>Meta-analysis indicated a significant weight reduction among intervention participants. Combination nutrition and PA interventions with a parent or family component were effective at achieving weight reduction in school settings. No single intervention, in school or elsewhere, is likely to be sufficient to reverse the childhood obesity trend</td>
<td>Practice: None stated Research: Interventions that modify school policies and the physical environment in ways that support improved dietary practices and regular physical activity but do not provide behavioural programs, and evaluation of these (preferably with anthropometric outcomes), are needed.</td>
<td>Quality assessment were not reported; risk of reviewer errors as data extraction was performed by only one reviewer; Use of meta-analysis was probably inappropriate and the results may not be meaningful.</td>
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<td>Kesten et al. 2011&lt;sup&gt;102&lt;/sup&gt;</td>
<td>Inclusion criteria: (i) &gt; 3 months duration; (ii) Community, Family, School (or/and combination) setting; (iii) primary prevention Intervention modifying: PA behaviours, eating behaviours, attitudes and knowledge, BMI or other indices of fat mass; (iv) present results separately for girls Exclusion criteria: (i) treatment interventions; (ii) results presented for boys exclusively; (iii) participants exclusively &lt;7 years of age or &gt;12 years of age; (iv) systematic reviews, meta-analysis, editorials, cross-sectional studies</td>
<td>The majority of the interventions failed to produce medium to large effect sizes over the long term in a broad range of behavioural and physical measures. There was potential for interventions aimed at pre-adolescent girls to reduce the risk factors associated with childhood overweight and obesity. The sustainability of intervention effects was unclear</td>
<td>Practice: Although a simple recommendation for best practice is difficult, potentially successful interventions might have included reducing sedentary behaviours and modifying school food provision, with longer term follow up. Interventions should take account of cultural, age and gender characteristics across a broad range of social settings. Research: funding the follow-up of interventions is crucial in order to produce sustainable, effective interventions</td>
<td>Included studies show inconsistencies with the inclusion criteria in terms of participant age and outcomes; potential language and publication biases could not be excluded</td>
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<td>Knowlden and Sharma 2013</td>
<td>Inclusion criteria: interventions that (i) were aimed at preventing obesity or overweight; (ii) were conducted in the United States, (iii) targeted African American or Hispanic children, (iv) school settings, (v) incorporated at least one anthropometric outcome variable Exclusion criteria: interventions that (i) did not employ an experimental or quasi-experimental design; (ii) did not target African American or Hispanic children</td>
<td>Efficacy of school-based interventions targeting minorities can be enhanced through explicit operationalization of behavioural theories, incorporation of systematic process evaluation, long-term follow-up of intervention outcomes, and inclusion of the family and home environment.</td>
<td>Practice: Need to (i) culturally adapt interventions; (ii) include the family and home environment (e.g. targeting parents over summer and winter break periods to preserve or improve school-based intervention effects, newsletters, weekend programmes to recruit parents Research: Need to (i) create or adopt psychometrically valid and reliable instruments; (ii) before-after measures; (iii) include and improve implementation process evaluation; (iv) measure long-term intervention effects</td>
<td>Not reported</td>
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<td>Kropski et al. 2008</td>
<td>Inclusion criteria: (i) experimental or quasi-experimental design, (ii) report primary or secondary outcomes in terms of BMI, a measure of body fat or obesity/overweight prevalence; (iii) report outcomes at least 6 months post-baseline; (iv) be curricular and/or environmental (as opposed to extracurricular) in design; (v) apply preventive interventions involving both overweight and normal-weight children Exclusion criteria: (i) extracurricular programs specifically targeting overweight children; (ii) lasting &lt;6 months</td>
<td>Studies were grouped by type of intervention: dietary interventions alone, PA interventions alone, combination of diet and PA. Quantity and quality of evidence were deemed to be insufficient for firm conclusions. Twelve of 14 studies reported significant improvement in at least one measure of dietary intake, physical activity and/or sedentary behaviour. Girls may respond better to educational components while boys are more influenced by structural and environmental changes. Programs including younger children were generally not effective in reducing BMI or obesity prevalence. Studies demonstrating significant findings frequently involved subjects more overweight than peers. Cognitive and physiological developments likely influence impact of interventions</td>
<td>Practice: High-quality evaluation protocols are essential Research: Future studies require adequate power (sample sizes) and need to examine issues related to sustaining health behaviour climate and ‘upstream factors’. Further research is needed to examine if novel or more aggressive approaches to address health behaviours at home through school-based programs are effective</td>
<td>No description of data extraction or data analysis plan. No description of selection process. Focus on quality of evidence instead of actual findings</td>
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| Lamboglia et al. 2013 105 | Inclusion criteria: (i) focus on children and adolescents aging 6–15 years; (ii) cross-sectional and experimental study design; (iii) evaluate energy expenditure during exergaming; (iv) discuss the association between active games and health behaviour; (v) evaluate changes in the level of physical activity, body composition, musculoskeletal system, and cardiovascular system  
Exclusion criteria: (i) full text unavailable; (ii) exergaming used for rehabilitation or cognitive therapy; (iii) did not quantify outcome variables  | Exergaming was found to increase physical activity levels, energy expenditure, maximal oxygen uptake, heart rate; and to reduce waist circumference and sedentary screen time. Thus, exergaming may be considered a highly relevant strategic tool for the adoption of an active and healthy lifestyle and may be useful in the fight against childhood obesity  | Practice: None stated  
Research: None stated  | Discussion limited to description of interventions; no recommendations made to enhance the effectiveness of exergaming as a strategy to prevent obesity  |
| Lavelle et al. 2012 106 | Inclusion criteria: (i) children aged <18 years; (ii) any intervention delivered in a school setting and aimed at decreasing BMI or weight; (iii) effect reported as the mean change in BMI, or this could be calculated from the pre- and post-intervention data provided; (iv) inclusion of a control group for which change in BMI was also reported or able to be calculated; (v) Non-randomized intervention studies were not excluded  
Exclusion criteria: Not reported  | There is reasonably consistent evidence that school-based interventions can significantly reduce children’s BMI, especially if they include a physical exercise component. The effect size did not vary by length of follow-up, suggesting that the benefits may be maintained over time, but only one study has followed-up participants for more than 4 years. Evidence of significant benefit is currently lacking for interventions that do not include a physical activity component. The absolute reduction in BMI was greater for interventions targeted at overweight and obese children, but studies delivered to all children nonetheless produced a small, significant reduction in overall BMI that is unlikely to be clinically significant at an individual level  | Practice: Reduction in BMI was unlikely to be clinically significant at an individual level  
Research: Further randomized studies are needed to determine duration of benefit and the ideal type of intervention. Studies should take not only efficacy but also cognisance and cost effectiveness into consideration  | Studies that used other measures were excluded; Possible publication bias (English language articles only); unclear whether appropriate steps to minimise error or bias were taken; unclear whether quality of the included trials was assessed; details on interventions were limited (no mention of dropout rates); Substantial statistical heterogeneity was found in the primary meta-analysis so pooling may not have been appropriate; It was unclear whether or not participants were included more than once in the meta-analyses  |
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<td>LeBlanc et al. 2013</td>
<td>Inclusion criteria: (i) subjective or objective measure of time spent using active video games and a measure of at least one relevant health or behaviour indicator; (ii) published, peer-reviewed articles in English or French; (iii) mean age of study participants &lt; 18 years&lt;br&gt;Exclusion criteria: (i) evaluated only passive video games; (ii) risk of a confounding intervention (such as diet modification)</td>
<td>Although active video games could increase light-to-moderate physical activity, it was unclear if such games could lead to increase in habitual physical activity or decreases in sedentary behaviour</td>
<td>Practice: None stated  &lt;br&gt;Research: There is a need for better quality studies that involve larger sample sizes, use both direct and indirect measures of total active video game use, and involve follow-up measurements at longer time points. The authors advised comparing active video games with traditional physical exercise in addition to comparison with rest or sedentary behaviour.</td>
<td>Restrictions to published articles in English and French may have led to publication bias</td>
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<td>Leung et al. 2012</td>
<td>Inclusion criteria: (i) intervention aimed at decreasing SB, separately or in combination with BMI or other anthropometric changes; (ii) children and adolescents aged 6 to 19 years; (iii) randomized trials, conducted in the community, school, home, or clinic setting; (iv) &gt; 12 weeks duration; (v) strategies such as educational, health promotion, behavioural therapy, counselling, or management strategies at the individual and family levels; &lt;br&gt;Exclusion criteria: (i) not published in English; (ii) controlled laboratory setting</td>
<td>Interventions aimed at reducing SB appear to be effective in decreasing SB and improvements in anthropometric measures of childhood obesity</td>
<td>Practice: Feasibility is an important consideration when implementing interventions in real-world settings  &lt;br&gt;Research: need for (i) more comprehensive study designs, which include post-intervention follow-up measures, to better understand the impact and potential sustainability of different strategies on outcomes measures related to SB and anthropometry; (ii) more valid and reliable measures of SB; (iii) Inequalities related to race/ethnicity, SES and gender should be incorporated into the design of future interventions (iv) Collection and provision of cost data</td>
<td>Not reported</td>
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<td>Li et al. 2008</td>
<td>Inclusion criteria: interventions that (i) are population-based; (ii) lifestyle behavioural interventions for the prevention or control of overweight and obesity in children and adolescents in China; (iii) reporting on prevalence of overweight and obesity, weight and BMI, SFT, blood glucose and lipid profile, aerobic fitness and blood</td>
<td>All trials indicated at least one significant results for at least one outcome. Eighteen studies showed a significant difference ($p&lt;0.05$) in body adiposity as measured by the prevalence of overweight and obesity, weight, BMI or SFT. The methodological shortcomings inherent in most of the included studies prevent any conclusions being drawn regarding the effectiveness of any of the interventions studied</td>
<td>Practice: None stated  &lt;br&gt;Research: There is a clear and urgent need for well-designed trials of interventions for the prevention and treatment of overweight and obesity among children and adolescents in China. Quantitative and qualitative research is required to identify important lifestyle behaviours and environmental risk factors, and to assess the needs and acceptance of health programmes in schools and among children and their parents</td>
<td>Possible publication bias: by including only studies published in English and Chinese some studies may have been missed; it was unclear whether appropriate methods were used when selecting studies for inclusion</td>
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<td>Liao et al. 2014</td>
<td>Inclusion criteria: (i) all study participants aged &lt; 18 years; (ii) randomized controlled intervention with a no-treatment control; (iii) the intervention must have components to reduce sedentary behaviours Exclusion criteria: intervention used PA promotion as a method to reduce sedentary behaviours (rather than specifically designed to limit time spent in sedentary behaviours); (ii) no reporting of BMI before and after the intervention; (iii) study only reported adjusted BMI at post-intervention</td>
<td>Interventions that target to reduce sedentary behaviours among children are effective in reducing BMI, although the difference in BMI was not clinically significant. However it could be effective in reducing BMI at a population level for non-obese children. Adding a physical activity promotion and diet improvement component to the intervention program did not appear to have an additive effect. A comprehensive sedentary behaviour intervention that targets to reduce multiple sedentary activities may be as effective as multi-component programs in BMI reduction, and could be a promising way to prevent obesity in children.</td>
<td>Practice: Clinical health practitioners could consider focusing on limiting sedentary behaviour to reduce BMI in paediatric patients Research: None stated</td>
<td>The restriction to English-language publications means that relevant trials may have been missed. Unclear study selection was carried out by two researchers independently, so reviewer error and bias cannot be ruled out. Given the small effects, and limitations in the review methods and generalisability, the authors' conclusions seem overstated and may not be reliable</td>
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<td>Lissau 2007</td>
<td>Inclusion criteria: (i) school setting with a main purpose of preventing overweight; (ii) control group present; (iii) at least one of the following outcome parameters: BMI, SFT, WC, %BF Exclusion criteria: Not reported</td>
<td>Of 14 included studies, half were successful and had an effect on either overweight or obesity. Studies differed in age group, type and length of intervention, the type and number of intervention components, and the measures used to evaluate the effect differed. Programmes that were theory based were not more successful than those not based on theory.</td>
<td>Practice: Barriers to school-based obesity programs include: (i) programs are considered a low priority; (ii) lack of support at the school; (iii) school staff are not motivated or are too burdened by workload; (iv) poor or lack of supervision of the school meals Research: More research is needed to understand how school-based obesity interventions may prevent obesity in different groups. Future studies need statistical power, and should use several measures of obesity in order to accurately detect a possible effect</td>
<td>No description of study selection, thus unclear why studies were excluded. No description of data extraction or data analysis plan. Did not critically appraise studies. Only provided aggregate study findings. Insufficient information on individual studies (e.g. no quantitative study results reported).</td>
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<td>Lobelo et al. 2013</td>
<td>Inclusion criteria: interventions that (i) focused on obesity; (ii) evaluated and included obesity-related objective outcome measures; (iii) controlled studies; (iv) reported in a format with viable information for abstraction and quality evaluation &lt;br&gt; &lt;br&gt; Exclusion criteria: interventions that (i) focused on general health promotion</td>
<td>This review found sufficient evidence to recommend school-based interventions to prevent overweight and obesity among children and adolescents in Latin America. Two studies also were identified showing significant improvements in obesity-related outcomes among overweight/obese youth, although this was not sufficient evidence to recommend obesity treatment interventions in school settings in LA. At least 3 interventions from different countries were identified with adequate design and execution that led to statistically (and clinically) sufficient improvements in obesity-related outcomes. The most successful interventi &lt;br&gt; &lt;br&gt; Practice: Future efforts should include continued replication and refinement of evidence-based, scalable prevention approaches in school settings as important components for integrated programs, policies, and monitoring frameworks aimed at reversing childhood obesity; there needs to be a strong collaboration between health and education authorities and other stakeholders for the implementation of obesity prevention activities in school settings &lt;br&gt; &lt;br&gt; Research: Alternative frameworks for gathering evidence may be useful to summarize the literature on behavioural interventions by allowing inclusion of data from promising and emerging interventions</td>
<td>The restriction to English, Portuguese and Spanish-language publications means that relevant trials may have been missed; the review was restricted to published studies, which may have increased the possibility of publication bias</td>
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<td>Malik et al. 2013</td>
<td>Inclusion criteria: (i) original research; (ii) prospective cohort studies or clinical trials conducted in children or adults; (iii) reported multivariable-adjusted coefficients for the association between SSBs and body weight from prospective cohort studies or the difference in changes in body weight between intervention and control groups from clinical trials; (iv) did not combine SSBs with other beverages, foods, or lifestyle factors as a composite exposure; (v) had a control group and intervened for at least 2 weeks in clinical trials &lt;br&gt; &lt;br&gt; Exclusion criteria: (i) non-English language articles; (ii) cross-sectional or ecologic studies</td>
<td>Results showed an overall positive association between consumption of SSBs and body weight gain in both children and adults with the exception of trials in children from the random-effects model. Trials in children were of 2 modalities, either reducing SSBs by substitution with non-caloric beverages or school-based education programs aimed at discouraging intake of SSBs. In sensitivity analysis, we showed that the substitution trials resulted in significantly less BMI gain compared with the education interventions. Eliminating SSBs from the diet could be an effective way to prevent age-related weight gain &lt;br&gt; &lt;br&gt; Practice: Results suggest the need for targeted strategies to reduce SSB consumption among high-risk populations, particularly children who are already overweight to prevent further weight gain, and highlight the importance of sustained strategies &lt;br&gt; &lt;br&gt; Research: None stated</td>
<td>Possible publication bias: the restriction to English-language publications means that relevant trials may have been missed; the relatively high degree of unexplained heterogeneity observed in the analyses may limit the validity of summary estimates; the data transformations performed to obtain consistent units across studies may further limit the validity of estimates; the assumption of a 12-oz serving size for some studies may have introduced misclassification and</td>
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<td>Marsh et al. 2014</td>
<td>Inclusion criteria: (i) family based interventions (ii) reporting changes in sedentary time; (iii) active involvement of a parent with the intervention team (e.g. via telephone, counselling or group sessions, or use of a TV-monitoring device at home, which required parental monitoring and therefore participation) was required; (iv) no restrictions on body-weight status and intervention setting Exclusion criteria: (i) comparison group was actually an intervention (e.g. if a study compared the effects of increasing PA vs. decreasing sedentary activity); (ii) participation in family component was voluntary; (iii) no active parental involvement (e.g. newsletters or brochures sent to parents)</td>
<td>This review revealed inconsistent evidence with respect to improvements in sedentary time. Differences in the study population, level of family involvement, setting, study aim and intervention type warrant further consideration of specific study characteristics that may have contributed to differences. The review supports the need for interventions that focus on the family and, more specifically, interventions that involve a parent at more than just a supervisory or administrative level. There is also a need to consider child characteristics and the motivation of the parent, with interventions tailored accordingly.</td>
<td>Practice: A more difficult (though, as this review suggests, potentially more fruitful) approach is to involve the parent and family unit as a whole in efforts to reduce children’s screen time. It seems unreasonable to expect children to restrict their level of exposure to a media saturated environment, while simultaneously dismissing the interest of parents in the health and well-being of their children by neglecting to address the role they play in creating a healthy family environment Research: more research is required to (i) address how food-related behaviours moderate the relationship between screen time and overweight in youth; (ii) assess whether interventions that target pre-school children are sustained over time; (iii) assess whether targeting of parents considered to be at high risk for low intervention compliance may help improve outcomes. More studies are also required that either primarily target the parent, or utilize a more intensive parent component.</td>
<td>Inadequate reporting on study quality by authors meant that the risk of bias for a number of domains (allocation concealment and random sequence generation) could not be established. Other limitations included reliance on studies with small sample sizes and short follow-up</td>
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<td>Pérez-Morales et al. 2012</td>
<td>Inclusion criteria: interventions that (i) are published in English; (ii) are conducted in the USA; (iii) &gt; 6 months follow-up; (iv) target low income Hispanic children; (iv) obesity prevention studies; (v) at least one indicator of adiposity (weight, BMI, z-BMI, % BF) Exclusion criteria: Not reported</td>
<td>Few interventions have been implemented in underserved populations. The overall quality rate of evidence with respect to reducing BMI or the prevalence of childhood obesity among Hispanic children was low. The overall findings were inconsistent improvements in BMI, z-BMI, and % BF</td>
<td>Practice: None stated Research: None stated</td>
<td>Not reported</td>
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<td>Peterson &amp; Fox 2007</td>
<td>Inclusion criteria: (i) controlled studies; (ii) &gt; 6 months follow up Exclusion criteria: Not reported</td>
<td>CDC’s recommendations to foster healthy eating and physical activity behaviours in schools nationwide by utilizing a Coordinated School Health Program (CSHP) approach provides a good model for supporting schools. Adoption of evidence-based approaches to impact weight-related measures is a process that poses challenges in time, resources, and training, and may require school systems to make trade-offs among competing demands. School personnel need additional assistance in training and maintaining skills in delivering different intervention components, developing teams and collaborations with community organizations and providers, and in grant-making and support for networking.</td>
<td>Practice: school-based interventions should be multi-component in nature and address nutrition, PA and sedentary behaviours; Integrating nutrition and PA messages into core subjects might be a useful model for future interventions, which should target easily understood modifiable health behaviours such as fruit and vegetable consumption, or MPA. School environments and policies should support and promote healthy food choices and active lifestyles. Research-practice partnerships also will be useful in helping schools identify, monitor, and evaluate current and emerging best practices as well as novel approaches.</td>
<td>Not reported</td>
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<td>Reilly &amp; McDowell 2003</td>
<td>Inclusion criteria: RCTs with: (i) &gt; 12 months follow up; (ii) studies on prevention had to have included non-clinical groups of subjects; (iii) studies on obesity treatment were required to have objective criteria to classify children as obese; (iv) objective outcome measures of body weight, BMI or body composition Exclusion criteria: short term studies</td>
<td>The evidence on childhood obesity prevention is not encouraging, although promising targets for prevention are now clear, notably reduction in sedentary behaviour. There is stronger evidence that targeting activity and/or inactivity might be effective in paediatric obesity treatment, but doubts as to the generalisability of existing interventions, and the clinical relevance of the interventions is unclear</td>
<td>Practice: None stated Research: Recommendation for interventions to: (i) focus wholly on reducing inactivity; (ii) focus trial outcomes on more measurable variables such as activity or inactivity, while avoiding less measurable outcomes such as fruit and vegetable consumption; (iii) recognise that inactivity is best considered as a distinct construct from activity; (iv) quantify potential harm</td>
<td>Short timeframe for search (2 years); quality rating of included RCTs unclear; no information on data extraction and search strategy</td>
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<td>Sbruzzi et al. 2013 118</td>
<td>Inclusion criteria: (i) assessed the impact of educational interventions for prevention or treatment of childhood obesity; (ii) &gt; 6 months duration; (iii) reported outcomes in BMI, BMI z-score, weight, WC, blood pressure levels, total cholesterol and high-density lipoprotein cholesterol; (iii) included euthrophic, overweight or obese school children 6-12 years old; (iv) were delivered in a school-based program and/or family-based programs; (v) there was a deliberate approach to increase physical activity, decrease participation in sedentary activities, improve dietary behaviours, decrease intake of dietary fat and sugar, or a combination of the above approaches</td>
<td>Educational interventions to treat childhood obesity resulted in reduction of anthropometric measurements and diastolic blood pressure. However, it was not possible to show that educational interventions to prevent childhood obesity were effective in improving outcomes as compared with usual care or no intervention. No significant changes determined by education interventions to prevent childhood obesity in non-selected paediatric populations in anthropometric measurements, blood pressure and lipids, as compared to usual care or no intervention, were observed. In conclusion, educational interventions are effective in treating, but not preventing, childhood obesity and its consequences (specifically diastolic blood pressure).</td>
<td>Practice: None stated&lt;br&gt;Research: It is necessary for authors to make available sufficient detail about their strategies, about the theoretical basis and components of interventions, and of the dose and intensity of the interventions to improve these results; new studies should be carried out with a larger number of participants</td>
<td>Low methodological quality of included studies</td>
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<td>Sharma 2007 119</td>
<td>Inclusion criteria: (i) English language; (ii) conducted outside the United States (iii) focus on general population of children in school settings (including pre-school) for children between 3 and 18 years old&lt;br&gt;Exclusion criteria: (i) non-English language publications; (ii) US studies; (iii) studies outside school settings; (iv) non-peer-reviewed; (v) focused solely on overweight/obese children or adolescents</td>
<td>Mixed results for overweight and adiposity indices (6 out of 14 trials had significant effects); other outcomes: significant effects in 16 out of 19 interventions. All interventions that documented parental involvement successfully influenced obesity indices. Most interventions targeting primary school children and focused on individual-level behaviour change approaches. Few are theory-based</td>
<td>Practice: Primary school settings are the most ideal settings for school-based interventions as obesity prevention behaviours are formed at these ages. School-based interventions directed towards addressing childhood obesity prevention should target improvement of physical activity, healthy nutrition and reduction of TV watching behaviours</td>
<td>The restriction to English-language publications means that relevant trials may have been missed</td>
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| Shirley et al. 2014 | **Inclusion criteria:** (i) were published in English; (ii) targeted children ages 6–12; (iii) were school-based and aimed to prevent obesity through school-based physical activity, education, and/or nutrition modification; (iv) were implemented in the US; (v) utilized an experimental or quasi-experimental study design with a control group  
**Exclusion criteria:** Studies: (i) of programs organized primarily by churches or other community groups; (ii) primarily aimed at preventing diabetes or other metabolic syndromes                                                                 | Strategies involving a combination of PA, nutritional, and educational interventions are likely to yield better outcomes than single component strategies, although no nutrition-only studies were reviewed. When the use of all three interventions is not possible, schools should invest in nutritional interventions accompanied by some increase in physical activity. Research does not support the effectiveness of physical activity beyond mandated state physical education requirements as a single component strategy. Parental involvement may be a beneficial program addition, and schools should involve community stakeholders when feasible. The ideal length of obesity prevention programs remains undetermined                                                                 | Practice: Schools should regularly monitor outcomes of interest (e.g., student BMI) when implementing an intervention to ensure effectiveness and inform modifications. There is some evidence that gains attenuate after interventions cease, so the systematic and continuous implementation of programs throughout the elementary school years is likely necessary to sustain effects  
Research: None reported                                                                                                                                                                                                 | Study heterogeneity precluded the use of meta-analyses, which would have provided more definitive conclusions regarding effect sizes                                                                                   |
| Showell et al. 2013 | **Inclusion criteria:** Studies conducted in high income countries that: (i) reported the effects of interventions to prevent obesity in children and adolescents aged 2 to 18 years old; (ii) were RCTs, quasi experimental studies, or natural experimental studies with at least 1 year follow-up; (iii) targeted children in their homes or included significant family involvement; (iv) involved a modification of diet, PA, sedentary behaviours, or a combination of these; (v) reported the effect(s) of the intervention on weight-related outcomes  
**Exclusion criteria:** focus on overweight or obese children or children with pre-existing medical conditions                                                                 | Only a small number of studies examined childhood obesity prevention programs in the home setting. The strength of evidence is low, at best, to support the effectiveness of home-based programs on childhood obesity prevention                                                                 | Practice: None stated  
Research: More research is needed to test home-based interventions with larger sample sizes, greater intervention duration and intensity, and adequate participant follow-up to improve statistical power of studies. Widespread integration of parenting strategies in home-based interventions should also be considered and additionally evaluated. Implementing and testing the effectiveness of home-based interventions that address important physical environmental influences on obesity-risk behaviours should be a research priority                                                                                                                                 | Not reported                                                                                                                                                                                                 |
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<td>Silveira et al. 2013</td>
<td>Inclusion criteria: RCTs of nutrition education interventions conducted in schools to reduce or prevent overweight in children and adolescents (5 to 18 years) Interventions had to be administered by health professionals or school teachers Exclusion criteria: (i) studies on children with eating disorders, dyslipidaemia, mental or physical disabilities, diabetes or anaemia; (ii) afterschool interventions were excluded.</td>
<td>School-based nutrition education interventions were effective in reducing the BMI of children and adolescents, particularly where the intervention duration was longer than one school year. Only two of the eight trials reported statistically significant reductions in BMI and some trials had wide confidence intervals. The overall effect size was small and its clinical significance is unclear.</td>
<td>Practice: None stated Research: There is a need for future research to identify the most effective approaches over medium and long term periods and consider theoretical framework and intervention components.</td>
<td>Only one reviewer extracted data so reviewer error and bias could not be ruled out; there was significant statistical heterogeneity for both overall and subgroup analyses and the reasons for this were not explored; few trial details were reported (e.g. participant characteristics)</td>
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<td>Silveira et al. 2011</td>
<td>Inclusion criteria: RCTs that assessed the effectiveness of school-based behavioural lifestyle change interventions recommended by health professionals or school teachers in children aged five to 18 years and which reported absolute or standardised measures of BMI, SFT, WC and % BF or lean mass, or dietary outcomes Exclusion criteria: Trials that assessed: (i) children with illnesses; (ii) afterschool interventions; (iii) drugs or food supplements as components of interventions; (iv) addressed impacts of different follow-up periods</td>
<td>Evidence from RCTs show that school-based interventions were effective in reduced rates of overweight and obesity, and increased fruit and vegetable consumption. Characteristics of interventions that demonstrated effectiveness are: duration &gt; 1 year, introduction into the regular activities of the school, parental involvement, introduction of nutrition education into the regular curriculum, and provision of fruits and vegetables by school food services</td>
<td>Practice: None stated Research: None stated</td>
<td>Only one reviewer performed the data extraction hence reviewer error and bias could not be ruled out</td>
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<td>Small et al. 2007</td>
<td>Inclusion criteria: Studies that compared prevention or early treatment programmes with a control or comparison programme, with children aged 4-7 years who were overweight, obese, or at risk of obesity Exclusion criteria: Not reported</td>
<td>Currently, there is a paucity of RCTs designed to test intervention strategies (e.g. prevention or treatment) with young children who are overweight/obesity or at risk for later-life obesity. Intervention strategies for which there is some evidence of effectiveness include: (i) a combination of nutritional and activity information; (ii) a cognitive-behavioural aspect to the intervention; (iii) parent-directed activities; (iv) limiting sedentary child behaviours; (v) positive approaches with children by parents and practitioners (e.g., emphasize positive rewards for healthy behaviours, encourage self-efficacy)</td>
<td>Practice: None stated Research: There is an urgent need for future research that develops and tests theory-based reproducible interventions with overweight/obese or at-risk young children and their parents.</td>
<td>Inclusion criteria unclear with regards to intervention type; possibility of publication bias: it is unclear whether language restrictions were applied; no reporting of methods used to assess validity and to extract data not described, hence unclear whether there was reviewer error and bias</td>
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<td>Sobol-Goldberg et al. 2013</td>
<td>Inclusion criteria: Studies with at least an English language abstract; School-based intervention programs relative to control groups who did not receive any intervention Exclusion criteria: Trials that only included obese children, and those of interventions for eating disorders or other medical conditions, were excluded</td>
<td>Unlike earlier studies, more recent studies showed convincing evidence that school-based prevention interventions are at least mildly effective in reducing BMI in children, possibly because these newer studies tended to be longer (at least 1 year), more comprehensive and included parental support</td>
<td>Practice: None stated Research: Further research is required to develop and test school-based interventions to reduce BMI in teenagers. These trials should clearly identify the theoretical model guiding the intervention and compare various weight reduction programmes and other school-based health interventions that might result in weight loss</td>
<td>No efforts were made to locate unpublished data; it was unclear whether language restrictions were applied</td>
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<td>Stice et al. 2006 126</td>
<td>Inclusion criteria: primary obesity prevention programmes or other interventions that were expected to reduce weight gain or risk of obesity, such as physical activity programmes, eating disorder prevention programmes and psycho-educational interventions&lt;br&gt;Exclusion criteria: Studies that only compared active interventions and studies described as obesity treatment programmes</td>
<td>Most interventions did not produce the hypothesised weight gain prevention effects. The overall intervention effect was small. Larger effects emerged for programs targeting children and adolescents (versus preadolescents) and females, programs that were relatively brief, programs solely targeting weight control versus other health behaviours (e.g., smoking), programs evaluated in pilot trials, and programs wherein participants must self-select into the intervention. Other factors, including mandated improvements in diet and exercise, sedentary behaviour reduction, delivery by trained interventionists, and parental involvement, were not associated with significantly larger effects</td>
<td>Practice: None stated&lt;br&gt;Research: Future trials should follow up promising findings with improved methodology (randomisation, blinded outcome assessment, direct measures of body fat and attempts to minimise attrition), in particular the use of long-term follow-up post-intervention</td>
<td>Unclear whether appropriate methods were used when extracting data; no formal assessment of study validity was carried out</td>
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<td>Towns et al. 2014 127</td>
<td>Inclusion criteria: Studies on prevention or community health addressing child, youth (ages 0 to 18 years), or family health&lt;br&gt;Exclusion criteria: no description or evaluation of intervention; Articles focusing on clinical treatment and individual outcomes</td>
<td>None of the published evaluations reported significant reductions in obesity or overweight or sustained increases in PA, although some evaluations presented evidence of positive effects on children’s diets or on nutrition knowledge or intentions. Two programs (SHARE-AP and KDSP) combined participatory, community-based approaches and environmental supports for behaviour change with strong evaluation and measurement designs. Even for these interventions the evidence for intervention effectiveness was mixed. Only the KDSP found some evidence of improvement in obesity, but this was not sustained. One explanation may be that aspects of the broader social and economic environment may limit the potential effectiveness of local interventions</td>
<td>Practice: Structural factors may limit the effectiveness of even community-based, multi-component intervention programs for reducing overweight or obesity among Aboriginal children. It may therefore be more appropriate for practitioners to focus on intermediate outcomes such as dietary knowledge or self-efficacy. Collaborative programs might also yield unmeasured benefits in community capacity and control, which may work to reduce structural barriers in the longer term&lt;br&gt;Research: Future intervention research should focus on improvements made at community service provision and how they might lead to improved health outcomes in a range of Aboriginal community contexts</td>
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<td>van Grieken et al. 2012</td>
<td>Inclusion criteria: controlled studies that (i) detailed an intervention, of any duration, that aimed to reduce the level of sedentary behaviour in children aged 0–18 years, or targeted sedentary behaviour with other behaviours. They did not have a control group; (ii) included a sedentary behaviour (i.e. TV viewing, snacks during TV viewing) and/or a weight related outcome (e.g. BMI, BMI-Z, percentage overweight children). Exclusion criteria: Studies that: (i) were performed in laboratory settings; (ii) had a pre-post test design; (iii) did not have a control group; (iv) cohort studies; (v) were aimed at high-risk (overweight or obese) populations; (vi) did not have sedentary behaviour elements in their intervention.</td>
<td>Thirty-four controlled trials were included. Interventions aimed at preventing excessive sedentary behaviour significantly reduced sedentary behaviour by around 18 minutes per day (MD -17.95, 95% CI -26.61 to -9.28; 22 trials). There was some evidence of heterogeneity between study results. There was a mean difference in BMI of -0.25 (95% CI -0.40 to -0.09; 14 trials; I² = 33%) in favour of the intervention group. The change in BMI from baseline to after intervention mean difference was -0.14 (95% CI -0.23 to -0.05; 13 trials; I² = 33%) in favour of the intervention group. There were no significant differences in the effects on sedentary behaviour and BMI, between single and multiple health behaviour interventions. No moderating effects of age and intervention setting were found for either outcome. Interventions, at school or in the community, could help prevent excessive sedentary behaviour, preventing unfavourable health outcomes, for children and adolescents.</td>
<td>Practice: None stated. Research: Studies with long-term follow-up are needed to evaluate the sustainability of the intervention effects. These studies should provide details on the intervention, and the types of outcome measures, to explore effective intervention elements. This should include the health behaviours targeted and the alternatives provided for sedentary behaviour. Mediation analyses could explore the relationship between sedentary behaviours and weight-related outcomes.</td>
<td>Unclear whether appropriate steps were taken to minimise reviewer error and bias during data extraction. The quality assessment raised notable concerns about selection, performance and detection biases, which could have overestimated the intervention effects.</td>
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<td>Vasques et al. 2014</td>
<td>Inclusion criteria: (i) School and after-school intervention; (ii) children &lt; 19 years old; (iii) RCTs or nRCTs with a control group; (iv) &gt; 6 weeks duration; (v) reported the effect size of intervention or the pre- and post-intervention values on children’s BMI, BMI-Z score, BMI percentile, percentile of overweight/obesity, or body fat. Exclusion criteria: Interventions that: (i) did not have a control group; (ii) intervened only in subjects’ diets; (iii) involved children suffering from eating.</td>
<td>Intervention programs had a positive effect in prevention and in decreasing the obesity in children, although this effect is of low magnitude (r = 0.08). The programs with older children seem to be more effective compared with those targeted at younger children. Girls achieved higher effect sizes than boys. Mixed gender intervention programs produced a greater effect than the intervention programs with girls only. After-school programs had a very similar effect to those interventions developed in school settings. The results of the current study also demonstrate that intervention programs of 1 year in length had a greater effect size than those with longer or shorter durations. The intervention programs that best contribute to the prevention program should provide details on the intervention, and the types of outcome measures, to explore effective intervention elements. This should include the health behaviours targeted and the alternatives provided for sedentary behaviour. Mediation analyses could explore the relationship between sedentary behaviours and weight-related outcomes.</td>
<td>Practice: easier access to and reduced price of healthier food, as well as the ability to pay sports activity fees, can make a difference in the effect of an obesity prevention program. Research: Reviews should be conducted using several anthropometric measurements and evaluating their impact on the metabolic profile of children; further meta-analytical studies are needed to determine the effect size of high-intensity activity.</td>
<td>Not reported.</td>
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<td>Verstraeten et al. 2012</td>
<td>Inclusion criteria: studies (i) in a school setting in an lower middle income country; (ii) healthy children 6–18 years of age; (iii) controlled trial design; (iv) focus on primary prevention of overweight or obesity through dietary and/or PA behaviour; (v) baseline and post-intervention measurements of dietary and PA behaviour outcomes and/or anthropometric outcomes. Exclusion criteria: (i) letters, book chapters, dissertations, conference proceedings, and abstracts; and (ii) secondary prevention interventions targeting only overweight, obese, or underweight subjects.</td>
<td>Most interventions had a positive effect on dietary behaviour and physical activity behaviour (effect size ranged from 20.48 to 1.61). BMI decreased in 8 studies (effect size ranged from 20.7 to 0.0). Effective interventions targeted both diet and physical activity, involved multiple stakeholders, and integrated educational activities into the school curriculum. School-based interventions have the potential to improve dietary and physical activity behaviour and to prevent unhealthy body weights in low- and middle-income countries.</td>
<td>Practice: None stated. Research: future studies should consider (i) stronger evaluation designs; (ii) information on cost-effectiveness; (iii) use of WC as an outcome measure; (iv) use of accelerometers and the measurement of physical fitness; (v) a theoretical framework to develop their intervention, and need to carefully document the pathways through which the interventions have their effect in order to learn from program implementation and adoption to identify which intervention components are effective and feasible.</td>
<td>A potential limitation of this review was the exclusion of studies based on language, and the exclusion of grey literature.</td>
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<td>Waters et al. 2011</td>
<td>Inclusion criteria: childhood obesity prevention studies that used a controlled study design with a minimum duration of 12 weeks, and if they evaluated interventions, policies or programs in place for twelve weeks or more. If studies were randomised at a cluster level, 6 clusters were required. Exclusion criteria: treatment interventions.</td>
<td>Childhood obesity prevention may be effective at reducing adiposity in children. A meta-analysis of 37 studies with a combined sample of 27,946 children revealed that these interventions may be effective in reducing the magnitude of the change in BMI/zBMI from pre- to post-intervention by -0.15 units (95% confidence interval (CI): -0.21 to -0.09), relative to the change in the control group, which would correspond to a small but clinically important shift in population BMI if sustained over several years. Subgroup analysis revealed that the effectiveness of interventions in young children and adolescents is less clear. There was a high level of observed heterogeneity (I²=82%) in all three age groups that could not explained by randomisation status or the type, duration or setting of the intervention. Interventions did not appear to increase health inequalities.</td>
<td>Practice: Interventions need to be developed that can be embedded into ongoing practice and operating systems; all studies should monitor the potential occurrence of unhealthy practices and adverse outcomes; The following activities have been included in beneficial programmes: (i) school curriculum that includes healthy eating, physical activity and body image; (ii) increased sessions for physical activity and the development of fundamental movement skills throughout the school week; (iii) improvements in nutritional quality of the food supply in schools environments and cultural practices that support children eating healthier foods and being active throughout each day; (iv) support for teachers and other staff to implement health promotion strategies and activities (e.g. professional development, capacity building activities); (v) parent support and home activities that encourage children to be more active, eat more nutritious foods and spend less time in screen based activities.</td>
<td>Substantial unexplained heterogeneity of effects and the likelihood of publication bias exist.</td>
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<td>Williams et al. 2013</td>
<td>Inclusion criteria: Studies that: (i) addressed children undertaking primary education aged between 4 and 11 years; (ii) assessed diet or PA-related school policies either alone or as part of intervention programmes; (iii) assessed anthropometric outcomes; (iv) were of experimental or observational study design; (v) &gt; 6 months follow up Exclusion criteria: studies where (i) policy components were insufficiently described to enable replication; (ii) outcomes assessed were change in diet, physical activity or knowledge; (iii) conducted in clinical settings; (iv) had less than 6 months follow up</td>
<td>The pooled effects of the PA, and other diet related policies on BMI-SDS were non-significant. The multifaceted interventions tended to include policy elements related to both diet and physical activity (combined cluster), and although these interventions were too varied to pool their results, significant reductions in weight-related outcomes were demonstrated. There is evidence to suggest that when implemented alone, school diet and physical activity related policies have little effect. However, they appear to have an effect when developed and implemented as part of a more extensive intervention programme, hence diet and physical activity related policies need to be located within more complex approaches focusing on multiple factors (e.g. diet, PA, sedentary behaviour, self-esteem) and at multiple levels of influence (e.g. home, school, neighbourhood)</td>
<td>Practice: Diet and physical activity related policies need to be located within more complex approaches to preventing childhood obesity which focus on multiple factors (e.g. diet, physical activity, sedentary behaviour, self-esteem) and at multiple levels of influence (e.g. home, school, neighbourhood) to be effective Research: Natural experiments (e.g. controlled before and after studies, interrupted time series studies) could be used to evaluate new policies. Future studies should be comprehensively reported and have a duration of years rather than months</td>
<td>None reported</td>
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<td>Wolfenden et al. 2014</td>
<td>Inclusion criteria: RCTs and quasi-experimental designs with (i) a parallel control group; (ii) examining the effects of any population-based, whole of community intervention seeking to prevent population weight gain; (iii) Language and publication restrictions raised the possibility that relevant studies were overlooked</td>
<td>The review suggests that population-based, whole-of-community interventions could be effective in achieving modest reductions in population weight gain among children, albeit with very substantial heterogeneity between trials. Seven of the eight trials reported a positive intervention effect on at least one measure of obesity. However, the evidence is not consistent, and the findings are limited by the use of different outcome measures and the lack of standardization across trials.</td>
<td>Practice: None stated Research: Rigorous evaluation of population-based whole of community interventions is needed, particularly for adults</td>
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<td>(i) Inclusion criteria: studies (i) published between 2000 and 2007; (ii) in the English language; (iii) involved children ages 4 to 18 years or in grades kindergarten through high school; (iv) school-based curriculum programs for obesity prevention; and (v) a manipulation of at least one of the variables of dietary habits, physical activity, healthy lifestyle education, and/or parental involvement</td>
<td>Studies were grouped by duration of interventions, use of theoretical frameworks, level of evidence and whether interventions demonstrated a reduction in BMI or weight loss. Nine studies included parental involvement in the intervention. None of the studies found a significant lowering of BMI, and only one achieved a statistically significant difference between intervention group and control group. All studies included a healthy lifestyle education component which was associated with significant increases in knowledge. Dietary habit modification was associated with significant changes in fat intake and in food-related and health-related knowledge and behaviours, while studies which included a PA component found little change in PA patterns</td>
<td>Practice: The most effective school-based obesity intervention programs should be guided by behavioural theoretical frameworks Research: Future studies need to have longer interventions, include parental involvement as an interventional component and report long-term post-intervention follow-up of outcome measures. Studies should include an experimental research design that includes the intervention components of dietary habit modification, physical activity modification, healthy lifestyle education, and parental involvement. BMI should be one of the outcome measures</td>
<td>No description of study selection or data analysis. No summary of study findings and whether school-based programs are actually effective.</td>
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% BF (Percentage Body Fat), BMI (Body Mass Index), FFST (fat-free soft tissue), FMI (Fat Mass Index), MVPA (Moderate to Vigorous Physical Activity), PA (Physical Activity), RR (Relative Risk), SFT (Skin Fold Testing), SSB (Sugar Sweetened Beverages), TSF (Triceps Skin Fold), WC (Waist Circumference), WHR (Waist-to-Hip Ratio)
### Appendix S5 – Methodological Quality of Systematic Reviews (AMSTAR) criteria

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*score of 1 = ‘Yes’ according to AMSTAR criteria; score of 0 = ‘No’ or ‘Can’t Answer’ or ‘Not Applicable’ according to AMSTAR criteria. High methodological quality: 8-11 times a score of 1; medium methodological quality: 5-7 times a score of 1; low methodological quality: 0-4 times a score of 1.
### Appendix S6. Characteristics of primary studies having an eligible environmental component

<p>| Author date | URL | Setting | Study design | Sample size | Age range (years) | Intervention Time: Elements included in intervention | Follow up period from end of intervention (months) | Anthropometric outcome ** | Difference in change from baseline for intervention vs control (95% CI) | Significance | Desirable Effect | Funding |
|-------------|-----|---------|--------------|-------------|-------------------|-----------------------------------------------------|-------------------------------------------------|-----------------------------------------------|----------------|-----------------|---------|
| Angelopoulos et al. 2009 | Angelopoulos, P.D., et al., Changes in BMI and blood pressure after a school based intervention: the CHILDREN study. Eur J Public Health, 2009. 19(3): p. 319-25. | School | RCT | 646 | 10 - 11 | 12 mo: educational component integrated in the existing school curriculum; playgrounds and school yards were made accessible for children to play in after the end of the curricular programme; school canteens were also obliged to have fresh fruit and freshly made juices throughout the whole intervention period; parental involvement and support in the home | 3 | BMI, BMI z-score | BMI: -1.1 (CI: -1.2 to -0.9; P = 0.047); BMI z-score: -0.46 (CI: -0.5 to -0.42; P = 0.074) | Significant | Yes | Not reported |
| Ask et al. 2006 | Ask, A.S., et al., Changes in dietary pattern in 15 year old adolescents following a 4 month dietary intervention with school breakfast--a pilot study. Nutr J, 2006. 5: p. 33. | School | RCT | 54 | 15 | 4 mo: a 'healthy' breakfast was served at the beginning of each school day. Students were also offered a food supplement | No follow up | BMI | Boys: -0.11 (P &lt; 0.05); Girls: -0.2 (P &lt; 0.05). No significant increase in BMI in the intervention group | Significant | Yes | University of Agder, TINE BA, COOP Lista and Young Enterprise, West-Agder provided food and the food supplements; the National Association for Nutrition and Health provided their Data program &quot;Mat på data&quot; for free to the school. |
| Ask et al. 2010 | Ask, A.S., et al., Serving of free school lunch to secondary-school pupils - a pilot study with health implications. Public Health Nutr, 2010. 13(2): p. 238-44. | School | RCT | 141 | 14 - 15 | 4 mo: a 'healthy' free lunch was introduced consisting of wholemeal bread, different kinds of cheese, cold cuts of lean meat, fish and jam, low-fat milk and fresh fruit and vegetables. Lunch was prepared by the students and eaten in class. | No follow up | BMI | BMI did not increase among the girls at the intervention school, but increased significantly among the boys at the intervention school and among the control school groups | Significant | Mixed | University of Agder, Kristiansand, Norway |</p>
<table>
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<th>Author date</th>
<th>URL</th>
<th>Setting</th>
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<th>Anthropometric outcome **</th>
<th>Difference in change from baseline for intervention vs control (95% CI)</th>
<th>Significance</th>
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<tr>
<td>Barbeau et al. 2007</td>
<td><a href="https://doi.org/10.1016/j.amjclinnut.2006.10.039">Barbeau, P., et al.</a></td>
<td>School</td>
<td>RCT</td>
<td>278</td>
<td>8 - 12</td>
<td>10 mo: daily after-school intervention of 2hrs duration which included provision of a free healthy snack, and 80 minutes of PA (25 minutes of skills development; 35 minutes of MVPA, and 20 minutes of toning and stretching). Subjects wore heart rate monitors throughout.</td>
<td>No follow up</td>
<td>BMI, WC, % BF</td>
<td>BMI: -0.45 CI: (-0.79 to -0.11); P = 0.0088; WC: -1.34 CI: -2.78 to 0.09; P = 0.0888; % BF: -2.01 CI: -2.98 to -1.04; P = -0.0001</td>
<td>Significant</td>
<td>Yes</td>
<td>NIH grant HL64972</td>
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<td>Caballero et al. 2003</td>
<td><a href="https://doi.org/10.1016/S0002-928X(03)00217-0">Caballero, B., et al.</a></td>
<td>School</td>
<td>RCT</td>
<td>1704</td>
<td>8 - 11</td>
<td>36 mo: Pathways Obesity Prevention Program involved: (i) nutrition education; (ii) skill building and practical tools meals for food service to reduce fat content in school meals to less than 30%; (iii) sessions of 30 minutes of MVPA weekly (based on SPARK curriculum); (iv) Take home family action packs and family events at schools; (v) Control schools—normal instruction</td>
<td>No follow up</td>
<td>BMI, % BF, SFT</td>
<td>BMI: -0.2 CI: -0.5 to 0.15; P = 0.29; % BF: -0.2 CI: -0.84 to 1.31; P = 0.66; SFT: +0.1 CI: -0.67 to 0.70; P = 0.837</td>
<td>Not significant</td>
<td>Yes</td>
<td>NHLBI grants U01 HL-508869, 50885, 50887, 50905, 50906, 50907</td>
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<td>Chomitz et al. 2010</td>
<td><a href="https://doi.org/10.3122/jama.2009.09.090749">Chomitz, V.R., et al.</a></td>
<td>Commuity, School</td>
<td>Cohort</td>
<td>1858</td>
<td>8</td>
<td>36 mo: city policies, community awareness campaigns, physical education enhancements, food service reforms, farm-to-school-to-home programs, family outreach, BMI and fitness reports</td>
<td>No follow up</td>
<td>BMI, BMI z-score</td>
<td>BMI z-score: -0.04 (P &lt; 0.001)</td>
<td>Significant</td>
<td>Yes</td>
<td>Cambridge Public Health Department, School Health, Institute for Community Health, other</td>
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<td>Coffield et al. 2011</td>
<td><a href="https://doi.org/10.1016/j.amjhealtheduc.2011.03.002">Coffield, J.E., et al.</a></td>
<td>School</td>
<td>NE</td>
<td>40713</td>
<td>17 - 19</td>
<td>NA: School wellness policies mandated by the 2004 Child Nutrition and WIC Reauthorization Act, implemented by 2006</td>
<td>26</td>
<td>overweig ht and obesity prevalenc e</td>
<td>Each additional component included in a district’s wellness policy was associated with a 3.2% lower odds in the prevalence of adolescent overweight (OR 0.968; CI 0.941-0.997), 2.5% lower odds of obesity (OR 0.975; CI 0.952-0.997), and 3.4% lower odds of severe obesity (OR 0.966; CI 0.938-0.995).</td>
<td>Significant</td>
<td>Yes</td>
<td>Institute of Public and International Affairs and the Vice President for Research, University of Utah</td>
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<td>Follow up period from end of intervention (months)</td>
<td>Anthropometric outcome **</td>
<td>Difference in change from baseline for intervention vs control (95% CI)</td>
<td>Significance</td>
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<td>Coleman et al. 2005</td>
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<td>Coleman, K.J., et al., Prevention of the epidemic increase in child risk of overweight in low-income schools: the El Paso coordinated approach to child health. Arch Pediatr Adolesc Med, 2005. 159(3): p. 217-24.</td>
<td>School</td>
<td>Matched control</td>
<td>896</td>
<td>8 - 9</td>
<td>36mo: adaptation of the Child and Adolescent Trial for Cardiovascular Health (CATCH) involving (i) purchase of new PE equipment; (ii) staff training; (iii) CATCH events throughout the year</td>
<td>No follow up</td>
<td>BMI percentile (RR of &gt; 85th percentile at year 3)</td>
<td>Girls: significantly lower rate of increase in risk of overweight compared to control (2% vs 13%); Boys: significantly lower rate of increase in risk of overweight compared to control (1% vs 9%) over 3 years</td>
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<td>Crespo et al. 2012</td>
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<td>Crespo, N.C., et al., Results of a multi-level intervention to prevent and control childhood obesity among Latino children: the Aventuras Para Ninos Study. Ann Behav Med, 2012. 43(1): p. 84-106.</td>
<td>Community, School</td>
<td>RCT</td>
<td>808</td>
<td>4 - 7</td>
<td>36 mo: in the Aventuras para Niños (APN) study, school and community-based interventions targeted the home, school and community environments via social and physical changes. Measures in the home included having cut-up vegetables within a child's reach and moving a TV out of a child's bedroom, setting of rules and boundaries by parents, discipline methods etc. Measures in the community were designed to alter physical structures (e.g., improve playgrounds and introduce well-stocked salad bars), social structures and policies (e.g., teachers' discipline and classroom practices and public park maintenance), availability of protective or harmful products (e.g., physical education equipment and healthy children's menus in restaurants).</td>
<td>No follow up</td>
<td>BMI z-score</td>
<td>Unclear Not significant</td>
<td>No</td>
<td>NHLBI grant 5R01HL073776, CDC grant 5U48DP000036, American Cancer Society grants RSGPB 113653 and PPT-04-156-01, NIDDK grant F31DK079891, NHLBI grant T32HL079891</td>
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<td>de Ruyter et al. 2012</td>
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<td>de Ruyter, J.C., et al., A trial of sugar-free or sugar-sweetened beverages and body weight in children. N Engl J Med, 2012. 367(15): p. 1397-406.</td>
<td>School</td>
<td>RCT</td>
<td>641</td>
<td>4 - 12</td>
<td>18 mo: children provided with 1 can per day of a noncaloric, artificially sweetened, noncarbonated beverage or a sugar-containing noncarbonated beverage. Daily intake confirmed by teachers.</td>
<td>No follow up</td>
<td>BMI z score, SFT, WC</td>
<td>BMI: -0.13 (CI: -0.21 to -0.05; P = 0.001); WC: -0.66 (CI: -1.23 to -0.09; P = 0.02); SFT: -2.2 (CI: -4.0 to -0.4)</td>
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<td>Sample size</td>
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<td>Donnelly et al. 1996</td>
<td></td>
<td>School</td>
<td>108</td>
<td>8 - 11</td>
<td>24 mo: (i) Nutrition education (ii) Physical activity program: 3 weekly sessions 30-40 minutes, focused on individual, noncompetitive activities; (iii) “Lunch Power!” program to reduce energy, fat, and sodium in school lunches; (iv) Control group: existing lunch program, team sports activity program</td>
<td>No follow up</td>
<td>BMI</td>
<td>Body weight and body composition were similar between control and intervention schools both at baseline and at the end of the intervention</td>
<td>Not significant</td>
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<td>National Livestock and Meat Board, Health Management Resources, and the Research Services Council, University of Nebraska</td>
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<td>Dzewaltowski et al. 2010</td>
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<td>School</td>
<td>246</td>
<td>8-10</td>
<td>36 mo: Healthy Opportunities for Physical Activity and Nutrition (HOPN): included an organised daily after-school PA session for at least 30 minutes, a daily healthful snack that included fruit and vegetables, and a weekly nutrition and PA education experience</td>
<td>BMI z-score</td>
<td>BMI z-score: -0.1 (P = 0.11)</td>
<td>Not significant</td>
<td>Yes</td>
<td>Yes</td>
<td>National Research Initiative grant 2005-35215-15418 from the USDA National Institute of Food and Agriculture</td>
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<td>Ebbeling et al. 2006</td>
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<td>Home</td>
<td>103</td>
<td>13 - 18</td>
<td>6 mo: four 12-oz servings of non-caloric beverages per day provided by weekly home deliveries; motivational phone calls; mailed fridge magnets with intervention messages</td>
<td>No follow up</td>
<td>BMI</td>
<td>BMI: Overall sample: -0.14 (CI: -0.54 to 0.26); Children in the upper tertile of BMI: -0.75 (P = 0.03)</td>
<td>Significant</td>
<td>Yes (for high-BMI children only)</td>
<td>NIDDK grants R01 DK63554 and K01 DK62237, the Charles H. Hood Foundation, NIH grant M01 RR02172</td>
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<tr>
<td>Economos et al. 2007</td>
<td></td>
<td>Commu.</td>
<td>nRCT</td>
<td>1178</td>
<td>7 years: physical activity options and availability of healthy foods before, during and after school, improved school food service; new equipment; social marketing; walk to school campaign, family outreach and engagement,</td>
<td>BMI z-score</td>
<td>BMI z-score: -0.10 (CI: -0.12 to -0.086)</td>
<td>Significant</td>
<td>Yes</td>
<td>CDC grant R06CCR121519-01</td>
<td></td>
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<tr>
<td>Author</td>
<td>URL</td>
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<td>Study design*</td>
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<td>Intervention Time: Elements included in intervention</td>
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<td>Anthropometric outcome **</td>
<td>Difference in change from baseline for intervention vs control (95% CI)</td>
<td>Significance</td>
<td>Desirable Effect</td>
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<td>Engels et al. 2005</td>
<td>149</td>
<td>School</td>
<td>NRNCT</td>
<td>56</td>
<td>9 - 12</td>
<td>3 mo: Active involvement in design, implementation and evaluation of study: (i) 60-75 min sessions 4 d/week; (ii) Dance, sport games and other fitness activities; (iii) Pedometers provided; (iv) Targeted educational handouts on nutrition and fitness; (v) Recording of fruit and vegetable intake and step counts; (vi) Poster board displays in school</td>
<td>No follow up</td>
<td>BMI, % BF</td>
<td>BMI: +0.1 (P = 0.446); BF: - 0.3 (P = 0.428)</td>
<td>Not significant</td>
<td>No</td>
<td>Aramark Service Master/Aramark Gourmet</td>
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<tr>
<td>Foster et al. 2008</td>
<td>170</td>
<td>School</td>
<td>RCT</td>
<td>1349</td>
<td>9 - 12</td>
<td>24 mo: multi-component school-based intervention involving the introduction of a School Nutrition Policy that banned all sodas, sweetened drinks and snacks that did not meet nutritional standards from vending machines and cafeteria line. In addition, there was a nutrition education component, parental involvement and social marketing.</td>
<td>No follow up</td>
<td>Incidence of overweight and obesity</td>
<td>Incidence of overweight and obesity combined: 15% lower for intervention group [OR 0.85 (CI: 0.74 to 0.99; P = &lt;0.05)]</td>
<td>Significant</td>
<td>Yes</td>
<td>CDC grant R06/CCR321534-01 and the USDAFNS</td>
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<tr>
<td>Author date</td>
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<td>Foster et al. 2010 [1]</td>
<td>Foster, G.D., et al., A school-based intervention for diabetes risk reduction. N Engl J Med, 2010. 363(5): p. 443-53.</td>
<td>School</td>
<td>C-RCT</td>
<td>4603</td>
<td>11 - 12</td>
<td>36 mo: IG: intervention consisted of four integrated components: nutrition (improvement in nutritional quality of school food environment); physical activity (increase in time spent performing MVPA); behavioural knowledge and skills (classroom-based curricular changes); and communication/social marketing.</td>
<td>No follow up</td>
<td>BMI, WC</td>
<td>Odds of having BMI &gt; 95th percentile: - 19% (OR 0.81; 95% CI: 0.66 to 1.00; P = 0.05); Odds of WC &gt; 90th percentile: -20% (OR 0.80; 95% CI: 0.64–0.99; P = 0.04); reduction in prevalence of obesity occurred in both IG and CG after 2 years, but was greater in the intervention schools compared to control schools (OR 0.79; CI: 0.63 to 0.98; P = 0.04)</td>
<td>Significant</td>
<td>Yes</td>
<td>NIDDK grants U01-DK61230, U01-DK61249, U01-DK61231, and U01-DK61223, additional support from the American Diabetes Association</td>
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<tr>
<td>Author</td>
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<td>Sample size</td>
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<tr>
<td>Fotu et al. 2011</td>
<td></td>
<td>Fotu, K.F., et al., Outcome results for the Ma’alahi Youth Project, a Tongan community-based obesity prevention programme for adolescents. Obesity reviews : an official journal of the International Association for the Study of Obesity, 2011. 12 Suppl 2: p. 41-50.</td>
<td>Community, School</td>
<td>QE</td>
<td>2479</td>
<td>11 - 19</td>
<td>36 mo: Community consultation and engagement processes with government health and education departments and other community stakeholders were conducted to develop community actions plans. In addition to TV, radio and print media strategies a range of initiatives were implemented in schools, churches and villages including village walking groups, school and community vegetable gardens, school canteen and church nutrition policies, sports tournaments and the provision of healthy eating and physical activity information.</td>
<td>No follow up</td>
<td>BMI, BMI z-score, % BF, % overweight and obese</td>
<td>% BF: −1.46 (p = 0.01); BMI: −0.02 (p = 0.36); BMI z-score: −0.03 (p = 0.26); proportion of participants who are overweight or obese: −0.05 (p = 0.84).</td>
<td>Significant (for % BF only)</td>
<td>Yes</td>
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<tr>
<td>French et al. 2011</td>
<td></td>
<td>French, S.A., et al., Household obesity prevention: Take Action - a group-randomized trial. Obesity, 2011. 19(10): p. 2082-8.</td>
<td>Home</td>
<td>RCT</td>
<td>90</td>
<td>12 - 17</td>
<td>12 mo: intervention included both household environment and individual-level behavioural components such as placement of TV time-limiting devices, provision of guidelines about food availability, face-to-face group sessions, and monthly newsletters.</td>
<td>No follow up</td>
<td>BMI z-score</td>
<td>BMI z-score: +0.0638 (P = 0.55)</td>
<td>Not significant</td>
<td>No</td>
</tr>
<tr>
<td>Gao and Xiang 2014</td>
<td></td>
<td>Gao, Z. and P. Xiang, Effects of exergaming based exercise on urban children's physical activity participation and body composition. J Phys Act Health, 2014. 11(5): p. 992-8.</td>
<td>School</td>
<td>PPT</td>
<td>185</td>
<td>8 - 12</td>
<td>9 mo: 4th grade children were assigned to the intervention group, participating in 30-minute Dance Dance Revolution (DDR)-based exercise 3 times per week during recess periods; DDR is an active video game that combines real physical dancing requiring fast-foot movement with energetic music and visuals. Third and fifth grade children were in the comparison group.</td>
<td>No follow up</td>
<td>% BF</td>
<td>% BF: Chi square = 5.42, df = 3, P = 0.14</td>
<td>Not significant</td>
<td>No</td>
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<tr>
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<td>Gombosi et al. 2007 153</td>
<td></td>
<td>Community, School, Home</td>
<td>PPT</td>
<td>4804</td>
<td>5 - 14</td>
<td>60 mo: school-based education initiative; community-based physical activity events; initiation of menu labeling in participating restaurants</td>
<td>No follow up</td>
<td>BMI</td>
<td>BMI increased less among children in intervention versus comparison community</td>
<td>Unclear</td>
<td>No</td>
<td>American Academy of Pediatrics (AAP); NIH Maternal and Child Health Bureau; Healthy Tomorrows Partnership for Children Program, Pennsylvania Department of Health, Bureau of Chronic Disease and Risk Reduction, Cardiovascular Risk Reduction grant; US Department of Health and Human Services Administration (HRSA)</td>
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<tr>
<td>Graves et al. 2010 156</td>
<td></td>
<td>Home</td>
<td>RCT</td>
<td>58</td>
<td>8 - 10</td>
<td>3 mo: a peripheral device (jOG), a step-powered video game, was given to children to encourage light-tomoderate intensity activity and reduce sedentary time.</td>
<td>No follow up</td>
<td>BMI, % BF</td>
<td>BMI: -0.2 (CI: -0.6 – 0.2); % BF: -0.1 (CI: -0.7 – 0.6)</td>
<td>Not significant</td>
<td>No</td>
<td>Not reported</td>
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<tr>
<td>Greening et al. 2011 157</td>
<td></td>
<td>Community, School</td>
<td>RCT</td>
<td>450</td>
<td>6 - 10</td>
<td>9 mo: intervention program included monthly family events that alternated between nutrition and physical activities/contests; changes to the intervention school’s food service including replacing the deep frying equipment with baking ovens</td>
<td>No follow up</td>
<td>WC, % BF</td>
<td>WC: +0.1 (P = 0.92); % BF: -0.96% (P = 0.02)</td>
<td>Significant (for % BF only)</td>
<td>Yes</td>
<td>University of California, San Francisco, National Center of Excellence in Women’s Health and the Johnson &amp; Johnson Company</td>
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<tr>
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<td>Gutin et al. 2008</td>
<td>[559]</td>
<td>Gutin, B., et al., Preliminary findings of the effect of a 3-year after-school physical activity intervention on fitness and body fat: the Medical College of Georgia Fitkid Project. Int J Pediatr Obes, 2008. 3 Suppl 1: p. 3-9.</td>
<td>School</td>
<td>C-RCT</td>
<td>206</td>
<td>8.5</td>
<td>36 mo: 2-hour after-school intervention sessions were offered 5 days/wk on school days. The programme included 40 min of academic enrichment activities, during which healthy snacks were provided (healthy snacks could be construed as a modest dietary intervention) followed by 80 min of moderate-to-vigorous PA (MVPA) including 40 min of vigorous PA. Control group received regular health screenings and diet/PA information</td>
<td>No follow up</td>
<td>% BF, FFST, BMI, WC</td>
<td>Over the six measurement points, the intervention group increased more than the control group in fat-free soft tissue (p &lt; 0.01) and BMI (p &lt; 0.05)</td>
<td>Significant (for BMI only)</td>
<td>No</td>
</tr>
<tr>
<td>Haerens et al. 2006</td>
<td>[178]</td>
<td>Haerens, L., Deforche, B., Maes, L., Stevens, V., Cardon, G., &amp; De Bourdeaudhuij, I. (2006). Body mass effects of a physical activity and healthy food intervention in middle schools. Obesity Research, 14(5), 847–854</td>
<td>School</td>
<td>C-RCT</td>
<td>2291</td>
<td>12 - 14</td>
<td>21 mo: IG: Schools were encouraged to: (i) create more opportunities to be physically active during breaks, at noon or after school hours (extra sports material/PE equipment provided); (ii) increase fruit consumption and reduce soft drink and increase water consumption (free or low-price water and fruit made available); (iii) education on nutrition and physical activity provided; (iv) Parental education</td>
<td>No follow up</td>
<td>BMI z-score</td>
<td>Boys: No significant positive intervention effects found; Girls: significant lower increase in BMI (F = 12.52, P = &lt;0.05) and BMI z-score (F = 2.68, P = &lt;0.05)</td>
<td>Significant (for girls only)</td>
<td>Yes (among girls only)</td>
</tr>
<tr>
<td>Author date</td>
<td>URL</td>
<td>Setting</td>
<td>Study design*</td>
<td>Sample size</td>
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<tr>
<td>Ho et al. 2008 [8]</td>
<td>Ho, L.S., et al., An integrated multi-institutional diabetes prevention program improves knowledge and healthy food acquisition in northwestern Ontario First Nations. Health Educ Behav, 2008. 35(4): p. 561-73.</td>
<td>Community, School</td>
<td>QE-PPT</td>
<td>95</td>
<td>Whole population</td>
<td>9 mo: multicomponent intervention including nutrition education in schools; modification of school nutrition policies and meals; community mass media promotion and events; participation of stores in the community (stocking and promotion of healthier foods and drinks)</td>
<td>No follow up</td>
<td>BMI, % BF</td>
<td>BMI: -0.3 (P = 0.89); %BF: -0.1 (P = 0.78)</td>
<td>Not significant</td>
<td>Yes</td>
<td>American Diabetes Association Clinical Research Award No. 7-04-CR-15 and a US-Canada Fulbright Award</td>
</tr>
<tr>
<td>Hoelscher et al. 2010 [82]</td>
<td>Hoelscher, D.M., et al., Reductions in child obesity among disadvantaged school children with community involvement: the Travis County CATCH Trial. Obesity (Silver Spring), 2010. 18 Suppl 1: p. S36-44.</td>
<td>Community, School</td>
<td>Serial</td>
<td>1107</td>
<td>9 - 10</td>
<td>12 mo: CATCHBasicPlus program with a community involvement component. Intervention given to 4th-grade students via classroom curricula, PE program, child nutrition services component, and family involvement. Community was involved for larger partnerships to extend school programs to surrounding community.</td>
<td>No follow up</td>
<td>% overweight and obese</td>
<td>% overweight (&gt;85th percentile): −7.0 (P = 0.051); % obese (&gt;95th percentile): −1.7 (P = 0.33)</td>
<td>Significant (for obese only)</td>
<td>Yes</td>
<td>Flaghouse, Inc. and the Michael &amp; Susan Dell Foundation</td>
</tr>
<tr>
<td>Hollar et al. 2010a [83]</td>
<td>Hollar, D., et al., Effective multi-level, multi-sector, school-based obesity prevention programming improves weight, blood pressure, and academic performance, especially among low-income, minority children. J Health Care Poor Underserved, 2010. 21(2 Suppl): p. 93-108.</td>
<td>School</td>
<td>RCT</td>
<td>3769</td>
<td>4 - 12</td>
<td>24 mo: Healthier options for public schoolchildren (HOPS): a multilevel (individual, community, and policy) and multi agency collaboration. Teachers were trained on curriculum and given technical assistance. Components included modified school meal menus, nutrition/lifestyle educational curricula, in-school PE, and wellness projects like growing gardens.</td>
<td>No follow up</td>
<td>BMI z-score</td>
<td>BMI z-score: -1.26 (P = 0.004)</td>
<td>Significant</td>
<td>Yes</td>
<td>W.K. Kellogg Foundation</td>
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<tr>
<td>Author date</td>
<td>URL</td>
<td>Setting</td>
<td>Study design*</td>
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<tr>
<td>Hollar et al. 2010b</td>
<td>Effect of a two-year obesity prevention intervention on percentile changes in body mass index and academic performance in low-income elementary school children. Am J Public Health, 2010. 100(4): p. 646-53.</td>
<td>School</td>
<td>QE</td>
<td>3769</td>
<td>4 - 12</td>
<td>24 mo: Description: Nutritious school meals; healthy nutrition and lifestyle curricula; school-based wellness activities</td>
<td>No follow up</td>
<td>BMI percentile</td>
<td>More children in the intervention group remained within the normal BMI percentile range (P = 0.02)</td>
<td>Significant</td>
<td>Yes</td>
<td>Agatston Research Foundation</td>
</tr>
<tr>
<td>Hollar et al. 2010c</td>
<td>Healthier options for public schoolchildren program improves weight and blood pressure in 6- to 13-year-olds. J Am Diet Assoc, 2010. 110(2): p. 261-7.</td>
<td>School</td>
<td>QE</td>
<td>2494</td>
<td>6 - 13</td>
<td>24 mo: Healthier Options for Public Schoolchildren (HOPS) included: provision of nutritious ingredients and whole foods in school breakfasts, lunches, and extended day snacks; nutrition and PA education; and the implementation of other school-based wellness activities such as fruit and vegetable gardens</td>
<td>No follow up</td>
<td>BMI z-score</td>
<td>BMI z-score: Boys: -0.11 (P = 0.86); Girls: -0.03 (P = 0.0031)</td>
<td>Significant</td>
<td>(for girls only)</td>
<td>Yes</td>
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<tr>
<td>Howe et al. 2011</td>
<td>A 10-month physical activity intervention improves body composition in young black boys. J Obes, 2011. 2011: p. 358581.</td>
<td>School</td>
<td>RCT</td>
<td>106</td>
<td>8 - 12</td>
<td>10 mo: after school PA program for boys delivered by study personnel and school teachers. 80 min of PA after school every day, consisting of 25 min of skill development, 35 min of moderate-to-vigorous PA, and 20 min of stretching/toning. Boys wore heart rate monitors to record PA intensity and asked to maintain a heart rate of at least 150 bpm. Healthy snack provided.</td>
<td>No follow up</td>
<td>BMI, % BF, WC</td>
<td>For boys attending &gt; 60% of program: % BF: -2.9 (P = 0.029); BMI: -0.6 (P = 0.009); WC: -0.9 (P = &gt;0.05)</td>
<td>Significant</td>
<td>Yes</td>
<td>NIH grant HL69999</td>
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<tr>
<td>Jansen et al. 2011</td>
<td>Effectiveness of a primary school-based intervention to reduce overweight. Int J Pediatr Obes, 2011. 6(2-2): p. e70-7.</td>
<td>School</td>
<td>C-RCT</td>
<td>2622</td>
<td>6 - 12</td>
<td>12 mo: IG: Multi-component, school-based intervention program consisting of (i) implementation of an additional PE session weekly; (ii) organization of additional sports activities outside of school hours; (iii) classroom-based education; (iv) administration of a fitness test; (v) sports events. CG: usual curriculum</td>
<td>No follow up</td>
<td>BMI, WC, % overweight and obese</td>
<td>For ages 9 - 12 years: no effects; For ages 6 - 8 years: BMI: -0.10 (CI: -0.22 - 0.03; P = &gt;0.05); % overweight children (OR 0.53; CI: 0.36 - 0.78); WC: -1.29 cm (CI: -2.16 to -0.42; P = &lt; 0.05)</td>
<td>Significant</td>
<td>(for younger children only)</td>
<td>Not reported</td>
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<tr>
<td>Author</td>
<td>URL</td>
<td>Setting</td>
<td>Study design</td>
<td>Sample size</td>
<td>Age range (years)</td>
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<td>Jordan et al. 2008</td>
<td>Jordan, K.C., et al., Evaluation of the Gold Medal Schools program. J Am Diet Assoc, 2008. 108(11): p. 1916-20.</td>
<td>School</td>
<td>CBA</td>
<td>577</td>
<td>8 - 11</td>
<td>12 mo: Gold Schools Program consisted of criterion-based implementation of multi-component policies with the goal of establishing policy and environmental supports that give students and staff more opportunities for nutritious food choices, regular physical activity, and tobacco prevention.</td>
<td>No follow up</td>
<td>BMI z-score</td>
<td>BMI z-score increased significantly in the comparison group (0.53 +/- 0.38; P = &lt; 0.05), but not in the intervention group (0.21 +/- 0.47; P = 0.484)</td>
<td>Not significant</td>
<td>Yes</td>
<td>Utah Department of Health and the Children’s Health Research Center</td>
</tr>
<tr>
<td>Kain et al. 2004</td>
<td>Kain, J., et al., School-based obesity prevention in Chilean primary school children: methodology and evaluation of a controlled study. Int J Obes Relat Metab Disord, 2004. 28(4): p. 483-93.</td>
<td>School</td>
<td>Longitudinal controlled evaluation</td>
<td>3086</td>
<td>6 - 14</td>
<td>8 mo: IG: nutrition education to children, parents and school kiosk owners; physical activity intervention that included an additional PE lesson, purchase of PA equipment and playing music to encourage active play during recess. CG: standard curriculum</td>
<td>No follow up</td>
<td>BMI, BMI z-score</td>
<td>Boys: BMI: -0.3 (P = &lt;0.001); BMI z-score: -0.14 (P = &lt;0.001); Girls: no change</td>
<td>Significant (for boys only)</td>
<td>Yes</td>
<td>Chilean Ministry of Education, Chile Deportes (Government Sports Promotion Agency) and an unrestricted grant from Corpora Tresmontes</td>
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<tr>
<td>Kremer et al. 2011</td>
<td>Kremer, P., et al., Reducing unhealthy weight gain in Fijian adolescents: results of the Healthy Youth Healthy Communities study. Obesity reviews: an official journal of the International Association for the Study of Obesity, 2011. 12 Suppl 2: p. 29-40.</td>
<td>Community</td>
<td>QE</td>
<td>2936</td>
<td>13 - 18</td>
<td>36 mo: Community consultation and engagement processes with school, parent and church representatives and other stakeholders. Community workshops were held to develop actions plans. In addition to small media strategies such as newspaper articles and pamphlets, a range of initiatives were implemented in schools, faith organisations and the community including walking groups, school food gardens, provision of water bottles and activity equipment, provision of training for school staff, poster displays, community events, and student aerobics clubs.</td>
<td>No follow up</td>
<td>BMI, BMI z-score, weight, % BF, % overweight or obese</td>
<td>% BF: −1.17 (p = &lt; 0.01). No significant differences in weight (+0.05 kg; p = 0.81); BMI (+0.10; p = 0.13); BMI-z (+0.02; p = 0.33); or proportion of participants who are overweight or obese (+0.34%; p = 0.07).</td>
<td>Significant (for % BF only)</td>
<td>Yes</td>
<td>Ministry of Health, AusAID.</td>
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<tr>
<td>Author date</td>
<td>URL</td>
<td>Setting</td>
<td>Study design</td>
<td>Sample size</td>
<td>Age range (years)</td>
<td>Intervention Time: Elements included in intervention</td>
<td>Follow up period from end of intervention (months)</td>
<td>Anthropometric outcome **</td>
<td>Difference in change from baseline for intervention vs control (95% CI)</td>
<td>Significance</td>
<td>Desirable Effect</td>
<td>Funding</td>
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<td>Luepker et al. 1996</td>
<td>Luepker, R.V., et al., Outcomes of a field trial to improve children's dietary patterns and physical activity. The Child and Adolescent Trial for Cardiovascular Health (CATCH) collaborative group. Jama, 1996. 275(10): p. 768-76.</td>
<td>School</td>
<td>RCT</td>
<td>5106</td>
<td>8 - 11</td>
<td>36 mo: The Child and Adolescent Trial for Cardiovascular Health (CATCH) involved (i) Diet and physical activity patterns classroom lessons; (ii) Physical activity intervention; (iii) Family involvement; (iv) School food service modification; (v) Control schools—usual PE, food service, and health education</td>
<td>No follow up</td>
<td>BMI, SFT</td>
<td>BMI: +0.06 (P = 0.32); SFT: +0.1 (P = 0.7)</td>
<td>Not significant</td>
<td>No</td>
<td>NHLBI Grants U01-HL-39880, U01-HL-39906, U01-HL-39982, U01-HL-39927, and U01-HL39870</td>
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<tr>
<td>Maloney et al. 2008</td>
<td>Maloney, A.E., et al., A pilot of a video game (DDR) to promote physical activity and decrease sedentary screen time. Obesity (Silver Spring), 2008. 16(9): p. 2074-80.</td>
<td>Community</td>
<td>RCT</td>
<td>60</td>
<td>7 - 8</td>
<td>2.5 mo: families in the intervention group were provided with all equipment necessary to play DDR in the home (PlayStation2 game console, DDR MAX2 game, and two padded dance mats). Children were given a written physician prescription to play 120 minutes per week of DDR, preferably divided over four sessions.</td>
<td>4.5</td>
<td>BMI, BMI z-score</td>
<td>Across all groups, BMI z-scores were stable from baseline to week 10</td>
<td>Not significant</td>
<td>No</td>
<td>Gatorade Foundation via the UNC at Chapel Hill, School of Public Health. Research support was provided in part by the NIH grants T32, MH19011 and T32, HD 40127.</td>
</tr>
<tr>
<td>Marcus et al. 2009</td>
<td>Marcus, C., et al., A 4-year, cluster-randomized, controlled childhood obesity prevention study: STOPP. Int J Obes (Lon), 2009. 33(4): p. 408-17.</td>
<td>School</td>
<td>C-RCT</td>
<td>3135</td>
<td>6 - 10</td>
<td>46 mo: IG: modification of school meals; promotion of low fat dairy products and whole-grain bread; elimination of all sweets and sweetened drinks in intervention schools; restriction of sedentary behaviour during after school care time; increase of PA during school hours. CG: normal curriculum</td>
<td>No follow up</td>
<td>BMI SD, Overweight and obesity prevalence</td>
<td>O&amp;O prevalence: -6% (-10.0% to -1.3%); P = &lt;0.05); BMI SD: no change</td>
<td>Significant (for overweight and obesity prevalence only)</td>
<td>Yes</td>
<td>Stockholm County Council, Swedish Council for working life and social research, Swedish Research Council, Freemason’s in Stockholm Foundation for Children’s Welfare and Signhild Engkvist Foundation</td>
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<tr>
<td>Author date</td>
<td>URL</td>
<td>Setting</td>
<td>Study design*</td>
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<td>Age range (years)</td>
<td>Intervention Time: Elements included in intervention</td>
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<td>Anthropometric outcome **</td>
<td>Difference in change from baseline for intervention vs control (95% CI)</td>
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<tr>
<td>Martinez Vizcaino et al. 2008</td>
<td>174</td>
<td>School</td>
<td>C-RCT</td>
<td>1044</td>
<td>9-10</td>
<td>6 mo: IG: free PA sessions after school (three 90-min sessions per week). CG: usual curriculum</td>
<td>3</td>
<td>% overweight and obese, BMI, % BF, SFT</td>
<td>Boys: % overweight and obese: OR 0.72 (CI: 0.39 to 1.31; P = 0.28); BMI: -0.13 (CI: -0.41 to 0.16; P = 0.38); SFT: -1.87mm (CI: -3.43 to -0.32; P = 0.01); % BF -0.67 (CI: -1.32 to -0.01; P = 0.05)</td>
<td>Significant</td>
<td>Yes</td>
<td>La Consejeria de Sanidad de Castilla-La Mancha (grant GC03060-00). Additional funding was obtained from the Ministerio de Sanidad y Consumo, Instituto de Salud Carlos III, Red de Investigacion en Actividades Preventivas y de Promocion de Salud (grant RD06/0018/0038)</td>
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<tr>
<td>Millar et al. 2011</td>
<td>175</td>
<td>Community</td>
<td>QE</td>
<td>3040</td>
<td>12-18</td>
<td>36 mo: Community consultation and engagement processes were conducted with school staff and students. In addition to media strategies, a range of initiatives were implemented, predominately in schools, including training for students and staff; water bottles; installation of drinking fountains; removal of soft drink from vending machines; lunch time physical activity opportunities, sports excursions and walking groups. No follow up</td>
<td>BMI, BMI z-score, % BF, % overweight and obese</td>
<td>BMI z-score: −0.07 (p = 0.03); No significant differences in proportion of participants who are overweight or obese (0.75 OR; p = 0.12), BMI (−0.22; p = 0.06) and % BF (−0.23, p = 0.58).</td>
<td>Significant (for BMI z-score only)</td>
<td>Yes</td>
<td>Victorian Department of Health, the National Health and Medical Research Council in conjunction with the Health Research Council (NZ) and the Wellcome Trust (UK) as part of the International Collaborative Research Grant Scheme, AusAID.</td>
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<td>Author date</td>
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<tr>
<td>2009</td>
<td></td>
<td>School</td>
<td>RCT</td>
<td>2950</td>
<td>8</td>
<td>11 mo: Water fountains and water bottles provided in schools plus educational programme of four 45-min lessons on water</td>
<td>No follow up</td>
<td>BMI SD score</td>
<td>BMI SDS: -0.004 (-0.045 to 0.036; P = 0.829); risk of being overweight was reduced by 31% (P = 0.04) in the intervention group</td>
<td>Significant</td>
<td>Yes</td>
<td>Grant 05HS026 from the German Federal Ministry of Food, Agriculture and Consumer Protection; Intervention materials provided by the Association of German Gas and Water Industries.</td>
</tr>
<tr>
<td>1999</td>
<td></td>
<td>School</td>
<td>RCT</td>
<td>3714</td>
<td>11 - 15</td>
<td>36mo: The Child and Adolescent Trial for Cardiovascular Health (CATCH) involved (i) Diet and physical activity patterns classroom lessons; (ii) Physical activity intervention; (iii) Family involvement; (iv) School food service modification; (v) Control schools—usual PE, food service, and health education</td>
<td>36</td>
<td>BMI, SFT</td>
<td>BMI at 36 mo: 0.0 (P = 0.88); SFT at 36mo: -0.1 (P = 0.83)</td>
<td>Not significant</td>
<td>No</td>
<td>NHLBI Grants U01-HL-39880, U01-HL-39906, U01-HL-39852, U01-HL-39927, and U01-HL39870</td>
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<tr>
<td>2008</td>
<td></td>
<td>Community</td>
<td>RCT</td>
<td>20</td>
<td>12</td>
<td>3 mo: intervention group received an active video game upgrade package consisting of an EyeToy® camera, EyeToy® active games, and dance mat. Participants and their parents or guardians were instructed to substitute usual non-active video game play with active video games at home</td>
<td>No follow up</td>
<td>Weight, WC</td>
<td>Body weight: -0.13 kg (CI: -1.97 to 1.7; P = 0.95); WC: -1.4 cm (CI: -2.68 to -0.04; P = 0.04)</td>
<td>Not significant (insufficient study power)</td>
<td>No</td>
<td>Health Research Council of New Zealand (05/228). Sony Computer Entertainment New Zealand provided the gaming software for the study</td>
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<tr>
<td>Author date</td>
<td>URL</td>
<td>Setting</td>
<td>Study design*</td>
<td>Sample size</td>
<td>Age range (years)</td>
<td>Intervention Time: Elements included in intervention</td>
<td>Follow up period from end of intervention (months)</td>
<td>Anthropometric outcome **</td>
<td>Difference in change from baseline for intervention vs control (95% CI)</td>
<td>Significance</td>
<td>Desirable Effect</td>
<td>Funding</td>
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<td>Ni Mhurchu et al. 2009</td>
<td><a href="#">179</a></td>
<td>Home</td>
<td>RCT</td>
<td>29</td>
<td>9 - 12</td>
<td>1.5 mo: Intervention group received an electronic TV time monitor (Time Machine) designed to reduce access to TV by controlling the TV signal, using tokens administered by parents which activate the TV for 30 min per token, and advice to restrict TV watching to 1 h per day or less. TV signal was interrupted after the allotted time period thus limiting further TV viewing. Parents received advice on how to manage time allotted by providing a weekly or daily ‘allowance’ with the tokens, such as by creating rules around household TV viewing (e.g. no TV during meal times, TV free days, and recording programmes to skip adverts) and moving the TV to a less accessible location. The control group was given verbal advice to restrict TV watching</td>
<td>No follow up</td>
<td>BMI</td>
<td>BMI: +0.05 (P = 0.83)</td>
<td>Not significant</td>
<td>No</td>
<td>Health Research Council of New Zealand (07/384) and the New Zealand National Heart Foundation (Grant 1303)</td>
</tr>
<tr>
<td>Owens et al. 2011</td>
<td><a href="#">180</a></td>
<td>Community</td>
<td>PPT</td>
<td>21 (12 children)</td>
<td>8 - 13</td>
<td>3 mo: Four Wii Fit units were loaned to 8 families enrolled in the study in pairs such that 1 family from each pair was randomly selected and loaned a Wii Fit for use in the home during the first 3 months of the study, with the other family scheduled to use the Wii Fit during the second 3 months</td>
<td>3</td>
<td>BMI, % BF</td>
<td>No change in BMI or % BF</td>
<td>Not significant</td>
<td>No</td>
<td>School of Applied Sciences, the University of Mississippi</td>
</tr>
<tr>
<td>Author date</td>
<td>Author(s)</td>
<td>Setting</td>
<td>Sample size</td>
<td>Age range (years)</td>
<td>Intervention Time: Elements included in intervention</td>
<td>Follow up period from end of intervention (months)</td>
<td>Anthropometric outcome **</td>
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<tr>
<td>Paradis et al. 2005</td>
<td>Paradis, G., et al., Impact of a diabetes prevention program on body size, physical activity, and diet among Kanien’ke:ha:ka (Mohawk) children 6 to 11 years old: 8-year results from the Kahnawake Schools Diabetes Prevention Project. Pediatrics, 2005. 115(2): p. 333-9.</td>
<td>Community, school</td>
<td>nRCT</td>
<td>1622</td>
<td>6 - 12</td>
<td>96 mo: Health education curriculum involving diet and physical activity delivered in grades 1-6 in community's elementary schools. Establishment of a school nutrition policy and modification of school canteen. Community activities and creation of supportive environments including recreational pathways.</td>
<td>96</td>
<td>SFT, BMI</td>
<td>Some early positive effects on SFT but not BMI. Benefits not maintained at 8 years, as repeat cross-sectional measures from 1994 to 2002 showed increases in skinfold thickness and BMI.</td>
<td>Not significant</td>
<td>No</td>
<td>Health Canada through the National Health Research and Development Program (grants 6605-4188-ND and 6605-4187-ND) and the Canadian Institutes for Health Research, the Kahnawake community, and private foundations.</td>
</tr>
<tr>
<td>Pate et al. 2005</td>
<td>Pate, R.R., et al., Promotion of physical activity among high-school girls: a randomized controlled trial. Am J Public Health, 2005. 95(9): p. 1582-7.</td>
<td>School</td>
<td>RCT</td>
<td>2744</td>
<td>15 - 16</td>
<td>12 mo: LEAP approach including enhanced physical activity during school hours; environmental change to create a supportive environment included role modelling and promotion of PA by school staff, and family and community-based activities</td>
<td>No follow up</td>
<td>% overweight and obese</td>
<td>% ≥ 85th percentile: +1.1% (P = 0.5); % ≥95th percentile: +0.1% (P = 0.97)</td>
<td>Not significant</td>
<td>No</td>
<td>NHLBI Grant R01HL057775</td>
</tr>
<tr>
<td>Ramirez-Lopez et al. 2005</td>
<td>Ramirez-Lopez, E., et al., [Effect of a School Breakfast Program on the prevalence of obesity and cardiovascular risk factors in children]. Salud Publica de Mexico, 2005. 47(2): p. 126-33.</td>
<td>School</td>
<td>QE-prospective</td>
<td>360</td>
<td>6 - 10</td>
<td>9 mo: the intervention group consisted of 254 children participating in a School Breakfast Program</td>
<td>No follow up</td>
<td>BMI</td>
<td>BMI: 0.0 (P = 0.05)</td>
<td>Not significant</td>
<td>No</td>
<td>Not reported</td>
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<tr>
<td>Author date</td>
<td>URL</td>
<td>Setting</td>
<td>Study design*</td>
<td>Sample size</td>
<td>Age range (years)</td>
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<td>1992 Resnicow, K., et al., A three-year evaluation of the know your body program in inner-city schoolchildren. Health Educ Q, 1992, 19(4): p. 463-80.</td>
<td>School Cohort 1209 5 - 12</td>
<td>31 mo: (i) 30-45 minute weekly health education curriculum; (ii) School food service intervention; (iii) Poster and essay contests, student aerobics, and special health lectures; (iv) Student health committees, peer leader training, and food-tasting parties; (v) Control schools—usual PE, food service, and health education</td>
<td>No follow up</td>
<td>BMI</td>
<td>BMI: -0.3 (P = &gt; 0.05)</td>
<td>Not significant</td>
<td>No</td>
<td>The Ford Foundation and the Cancer Research Foundation of America</td>
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<tr>
<td>1999 Robinson, T.N., Reducing children's television viewing to prevent obesity: a randomized controlled trial. Jama, 1999. 282(16): p. 1561-7.</td>
<td>School, Home RCT 192 8 - 10</td>
<td>7 mo: IG: Intervention consisted of: (i) 18 sessions curricular education to teach students to ‘budget’ television viewing time to 7 hours/week; (ii) challenge to watch no television for 10 days at the end of the curriculum; (iii) Electronic television time manager device placed in homes of intervention group students. CG: standard curriculum</td>
<td>No follow up</td>
<td>BMI, SFT, WC, WHR</td>
<td>BMI: -0.45 (CI: -0.73 to -0.17; P = 0.002); SFT: -1.47 (CI: -2.41 to -0.54; P = 0.002); WC: -2.3 (CI: -3.27 to -1.33; P = &lt;0.001); WHR: -0.02 (CI: -0.03 to -0.01; P = &lt;0.001)</td>
<td>Significant</td>
<td>Yes</td>
<td>American Heart Association; NHLBI (grant RO1 HL54102)</td>
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<tr>
<td>2003 Robinson, T.N., et al., Dance and reducing television viewing to prevent weight gain in African-American girls: the Stanford GEMS pilot study. Ethn Dis, 2003. 13(1 Suppl 1): p. S65-77.</td>
<td>Community, Home RCT 61 8 - 10</td>
<td>3 mo: (i) After-school dance classes with healthy snack, homework period and discussion of increased physical activity (dance) and reduced TV screen time, (ii) family intervention, (iii) newsletters</td>
<td>No follow up</td>
<td>BMI, WC</td>
<td>BMI: -0.32 (CI: -0.77 to 0.12; P = 0.16); WC: -0.63 (CI: -1.92 to 0.67; P = 0.35)</td>
<td>Not significant</td>
<td>Yes</td>
<td>NHLBI (Cooperative agreement UO1 HL62663) and a Robert Wood Johnson Foundation Generalist Physician Faculty Scholar Award</td>
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<td>2010 Robinson, T.N., et al., A randomized controlled trial of culturally tailored dance and reducing screen time to prevent weight gain in low-income African American girls: Stanford GEMS. Arch Pediatr Adolesc Med, 2010. 164(11): p. 995-1004.</td>
<td>Community, Home RCT 284 8 - 10</td>
<td>24 mo: Community-based intervention including (i) provision of small snack, (ii) 45-60 minutes of dance, (iii) education component to reduce screen time (iv) health education component</td>
<td>No follow up</td>
<td>BMI</td>
<td>BMI: +0.04 (CI: -0.18 to 0.27)</td>
<td>Not significant</td>
<td>No</td>
<td>NHLBI (Cooperative agreement UO1 HL62663)</td>
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<td>Author date</td>
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<td>Anthropometric outcome **</td>
<td>Difference in change from baseline for intervention vs control (95% CI)</td>
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<td>Desirable Effect</td>
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<td>Sahota et al. 2001</td>
<td>189</td>
<td>Sahota, P., et al., Randomised controlled trial of primary school based intervention to reduce risk factors for obesity. Bmj, 2001. 323(7320): p. 1029-32.</td>
<td>School</td>
<td>RCT</td>
<td>634</td>
<td>7 - 11</td>
<td>10 mo: Active Programme Promoting Lifestyle in Schools (APPLES): an intervention consisting of school lunch modifications and school action plans designed to promote healthy nutrition and physical activity</td>
<td>No follow up</td>
<td>BMI SD score</td>
<td>BMI SD score: 0.00 (CI: -0.1 to 0.1)</td>
<td>Not significant</td>
<td>No</td>
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<tr>
<td>Saksvig et al. 2005</td>
<td>190</td>
<td>Saksvig, B.I., et al., A pilot school-based healthy eating and physical activity intervention improves diet, food knowledge, and self-efficacy for native Canadian children. J Nutr, 2005. 135(10): p. 2392-8.</td>
<td>School</td>
<td>PPT</td>
<td>122</td>
<td>8 - 12</td>
<td>9 mo: multicomponent intervention including nutrition education; students as role models; family component; implementation of a school-wide policy banning high-fat an high-sugar snack foods in schools; implementation of a healthy breakfast snack program</td>
<td>No follow up</td>
<td>BMI, % BF</td>
<td>BMI: +0.95 (P = &lt;0.001); % BF: +1.18 (P = &lt;0.001)</td>
<td>Significant</td>
<td>No</td>
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<tr>
<td>Sallis et al. 2003</td>
<td>192</td>
<td>Sallis, J.F., et al., Environmental interventions for eating and physical activity: a randomized controlled trial in middle schools. Am J Prev Med, 2003. 24(3): p. 209-17.</td>
<td>School</td>
<td>RCT</td>
<td>1678</td>
<td>11 - 14</td>
<td>24 mo: IG: PA component included environmental changes to increase physical activity before, during and after school (e.g. increased supervision, purchased PA and kitchen equipment, organized activities, increased accessibility of activity areas, promotion of PA outside of PE); Nutrition component included changes to school food service; reduced fat in school diet, student restaurants. CG: no change</td>
<td>No follow up</td>
<td>BMI</td>
<td>BMI: Girls: -0.09 (P = 0.77); Boys: -0.64 (P = 0.044)</td>
<td>Significant (for boys only)</td>
<td>Yes (among boys only)</td>
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<tr>
<td>Author date</td>
<td>URL</td>
<td>Setting</td>
<td>Study design^</td>
<td>Sample size</td>
<td>Age range (years)</td>
<td>Intervention Time: Elements included in intervention</td>
<td>Follow up period from end of intervention (months)</td>
<td>Anthropometric outcome **</td>
<td>Difference in change from baseline for intervention vs control (95% CI)</td>
<td>Significance</td>
<td>Desirable Effect</td>
<td>Funding</td>
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<tr>
<td>Sanchezn-Vaznaugh et al. 2010</td>
<td>Sanchez-Vaznaugh, E.V., et al., 'Competitive' food and beverage policies: are they influencing childhood overweight trends? Health Aff (Millwood), 2010. 29(3): p. 436-46.</td>
<td>School</td>
<td>NE</td>
<td>5,389.81</td>
<td>10 - 12</td>
<td>NA: Implementation of new school policies in the state of California restricting sales of competitive foods and beverages and setting stricter nutrition standards for certain food and beverages sold to students (implementation started in 2004)</td>
<td>36</td>
<td>% overweight and obese</td>
<td>% change in the odds of overweight and obese per year after 2004: 5th grade girls: -53.9% (P = 0.111); 5th grade boys: -93.5% (P = 0.001); 7th grade girls: -87.5% (P&lt;0.001); 7th grade boys: -112.1% (P&lt;0.001)</td>
<td>Significant</td>
<td>Yes</td>
<td>Robert Wood Johnson Foundation’s Healthy Eating Research, New Connections Program, and the W.K. Kellogg Health Scholars Program</td>
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<tr>
<td>Sanigorski et al. 2008</td>
<td>Sanigorski, A.M., et al., Reducing unhealthy weight gain in children through community capacity-building: results of a quasi-experimental intervention program, Be Active Eat Well. Int J Obes (Lond), 2008. 32(7): p. 1060-7.</td>
<td>School</td>
<td>QE-prospective</td>
<td>4 - 12</td>
<td>36 mo: IG: Nutrition strategies included improved school nutrition policies, canteen menu changes, healthy breakfast days, community garden and educational material. PA strategies included after-school activities, walking school buses, walk to school days and new equipment. CG: no change</td>
<td>No follow up</td>
<td>BMI z-score, WHR, WC</td>
<td>BMI z-score: -0.11 (CI: -0.21 to -0.01; P = 0.04); WHR: -0.02 (CI: -0.03 to -0.01; P = 0.01); WC: -3.4cm (CI: -5.07 to -1.22; P = 0.01)</td>
<td>Significant</td>
<td>Yes</td>
<td>Commonwealth Department of Health and Aging, Victorian Department of Human Services, VicHealth</td>
<td></td>
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<tr>
<td>Sichieri et al. 2009</td>
<td>Sichieri, R., et al., School randomised trial on prevention of excessive weight gain by discouraging students from drinking sodas. Public Health Nutr, 2009. 12(2): p. 197-202.</td>
<td>School</td>
<td>RCT</td>
<td>1140</td>
<td>9-12</td>
<td>7 mo: implementation of a healthy lifestyle education programme encouraging water consumption instead of SSB; banners hung promoting water consumption; water bottles with campaign logo were distributed</td>
<td>No follow up</td>
<td>BMI, overweight and obesity prevalence</td>
<td>BMI: +0.1 (CI: 0.06 to 0.10)</td>
<td>Not significant</td>
<td>No</td>
<td>Brazilian National Research Council (CNPq) Grant number: 500404/2003-8, CNPq</td>
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<tr>
<td>Author date</td>
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<td>Siegrist et al. 2013</td>
<td>Siegrist, M., et al., Effects of a physical education program on physical activity, fitness, and health in children: the JuvenTUM project. Scand J Med Sci Sports, 2013. 23(3): p. 323-30.</td>
<td>School</td>
<td>RCT</td>
<td>427</td>
<td>8.4 (mean)</td>
<td>12 mo: Multi-component JuvenTUM intervention was on directly educating and encouraging children, teachers, and parents to live active and healthy lifestyles. Additionally, school environmental settings were altered to promote more physical activity (classrooms, the halls and the playgrounds at school were modified so that more physical activity was encouraged). Measures were taken to improve the quality of food sold at school snack bars and/or at school stores. These changes were designed to increase physical movement, promote healthier food availability and choices, and reduce media consumption.</td>
<td>No follow up</td>
<td>WC, BMI, BMI z-score</td>
<td>WC: -1.7 (CI: 1.2 to 2.3; P &lt; 0.001)</td>
<td>Significant (for WC only)</td>
<td>Yes</td>
<td>Unclear</td>
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<tr>
<td>Simon et al. 2004; Simon et al. 2008</td>
<td>Simon, C., et al., Intervention centred on adolescents’ physical activity and sedentary behaviour (ICAPS): concept and 6-month results. Int J Obes Relat Metab Disord, 2004. 28 Suppl 3: p. S96-S103. Simon, C., et al., Successful overweight prevention in adolescents by increasing physical activity: a 4-year randomized controlled intervention. Int J Obes (Lond), 2008. 32(10): p. 1489-98.</td>
<td>School</td>
<td>RCT</td>
<td>954</td>
<td>12</td>
<td>48 mo: IG: multilevel intervention involving (i) educational component; (ii) new opportunities for physical activity at lunchtime, during breaks and after-school hours; (iii) Sporting events, free transfers to PA areas and ‘cycling to school’ days were organized. CG: no change</td>
<td>No follow up</td>
<td>BMI, FMI, % overweight</td>
<td>BMI: -0.36 (CI: -0.6 to -0.11, P &lt;0.001); FMI: -0.2 (CI: -0.39 to -0.01) at 4 years; 5.6 fewer children who were initially normal weight were overweight in the intervention schools (OR: 0.41; CI: 0.22 to 0.75)</td>
<td>Significant (in initially normal weight students only)</td>
<td>Yes</td>
<td>The Regional Health Insurance of Alsace-Moselle; National Program of Research in Human Nutrition (INSERM and INRA); French Public Authorities within the National Nutritional Health Program; Conseil General du Bas-Rhin; Municipalities of Freibergenhein, Illkirch-Graffenstaden, Obernai and Schiltigheim and The International Longevi</td>
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<td>Singh et al. 2007 199, Singh et al. 2009 200 (FU study)</td>
<td></td>
<td></td>
<td>Commuity, school</td>
<td>C-RCT</td>
<td>1108</td>
<td>12.7 (mean)</td>
<td>8 mo: education in biology and physical activity, environmental change options for schools (physical education classes, changes to school cafeteria)</td>
<td>20</td>
<td>BMI; SFT (sum)</td>
<td>Girls: BMI: +0.2 (CI: -0.1 to 0.5); SFT (sum): -2.0 (CI: -3.9 to -0.1); WC: -0.9 (CI: -1.1 to 0.6); Boys: BMI: +0.2 (CI: -0.1 to 0.4); SFT (sum): -1.1 (CI: -4.4 to 0.2); WC: +1.1 (CI: 0.1 to 2.0)</td>
<td>Significant (for sum of SFT only in girls and boys; undesirable effect on BMI and WC in both genders)</td>
<td>Unclear (undesirable effect on WC in boys)</td>
</tr>
<tr>
<td>Singh et al. 2010 201</td>
<td></td>
<td></td>
<td>School</td>
<td>RCT</td>
<td>201</td>
<td>15 - 17</td>
<td>6 mo: IG: multi-component intervention including: (i) educational component (ii) policy-level changes in school such as modification of school canteen menu and banning the sale of soft drinks and high calorie foods (iii) parental involvement. CG: no change</td>
<td>No follow up</td>
<td>BMI, WC, WHR</td>
<td>BMI: -0.01 (CI: -0.18 to 0.34); WC: -1.2 (CI: -2.43 to -0.017; P = 0.02); WHR: -0.022 (CI: -0.03 to -0.004; P = 0.02)</td>
<td>Significant (for WC and WHR only)</td>
<td>Yes (for WC only)</td>
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<tr>
<td>Story et al. 2003 202</td>
<td></td>
<td></td>
<td>School, Home</td>
<td>RCT</td>
<td>54</td>
<td>8 - 10</td>
<td>3 mo: after-school multi-component intervention with (i) PA programme offering a variety of activities (ii) club meetings with educational/behavioural themes (iii) weekly food packets sent to families</td>
<td>No follow up</td>
<td>BMI, WC</td>
<td>BMI: +0.2 (P = 0.35); WC: +1.4 (P = 0.08)</td>
<td>Significant (for WC only)</td>
<td>No</td>
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<td>Author date</td>
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<td>Taber et al. 2012</td>
<td>203</td>
<td>Taber, D.R., et al., Weight status among adolescents in States that govern competitive food nutrition content. Pediatrics, 2012. 130(3): p. 437-44.</td>
<td>State-wide</td>
<td>NE</td>
<td>6300</td>
<td>10 - 15</td>
<td>36 mo: Introduction of food and beverage state laws in 40 states between 2003 and 2006</td>
<td>No follow up</td>
<td>BMI</td>
<td>BMI: -0.25 (CI: -0.54 to 0.03)</td>
<td>Significant (for strong laws)</td>
<td>Yes</td>
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<tr>
<td>Taylor et al. 2007</td>
<td>204, Taylor et al. 2008</td>
<td>Taylor, R.W., et al., APPLE Project: 2-y findings of a community-based obesity prevention program in primary school age children. Am J Clin Nutr, 2007. 86(3): p. 735-42. (2007 article); Taylor, R.W., et al., Two-year follow-up of an obesity prevention initiative in children: the APPLE project. Am J Clin Nutr, 2008. 88(5): p. 1371-7. (2008 article)</td>
<td>Community, School</td>
<td>nRCT</td>
<td>730</td>
<td>5 - 12</td>
<td>24 mo: IG: APPLE components involved: (i) nutrition education; (ii) employment of activity coordinators to manage an activity program that focused on non-curricular lifestyle-based activities during and after school (e.g. community walks); (ii) some environmental modification including provision of cooled water filters, provision of free fruit for 6 months, and increased promotion and availability of sport and play equipment to enhance ‘free play’. CG: No change</td>
<td>24</td>
<td>BMI z-score, RR of being overweight (overweight prevalence)</td>
<td>At end of intervention: BMI z-score: -0.30 (CI: -0.36 to -0.25); RR overweight: 0.70 (CI: 0.54 to 0.9); At 2 year follow-up: BMI z-score: -0.21 (CI: -0.29 to -0.14); RR overweight: 0.81 (CI: 0.69 to 0.94)</td>
<td>Significant</td>
<td>Yes</td>
</tr>
<tr>
<td>Tian et al. 2006</td>
<td>206</td>
<td>Tian, B., et al., Impact evaluation on obesity control among primary school students in 4 cities in China. Chin J School Health, 2006. 27: p. 869-871.</td>
<td>School</td>
<td>C-RCT</td>
<td>Unclear</td>
<td>8 - 11</td>
<td>12 mo: health education including dissemination through notice boards; Family involvement; improvement to school environment by providing sports facilities in intervention schools</td>
<td>No follow up</td>
<td>Prevalence of Overweight and obesity: -3.1% (P = &lt;0.01)</td>
<td>Significant</td>
<td>Yes</td>
<td>Unclear</td>
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<tr>
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<td>Setting</td>
<td>Study design*</td>
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<tr>
<td>Todd et al. 2008</td>
<td>Todd, M.K., et al., Effect of a family-based intervention on electronic media use and body composition among boys aged 8--11 years: a pilot study. J Child Health Care, 2008. 12(4): p. 344-58.</td>
<td>Home</td>
<td>RCT</td>
<td>22</td>
<td>8 - 11</td>
<td>5 mo: Children and parents attended family-centred interactive session designed to reduce TV-viewing time and increase awareness to minimize electronic media use. TV and computer-locking devices were installed to help monitoring and limiting children’s TV and computer use.</td>
<td>No follow up</td>
<td>BMI</td>
<td>No significant change</td>
<td>Not significant</td>
<td>No</td>
<td>Unclear</td>
</tr>
<tr>
<td>Utter et al. 2011</td>
<td>Utter, J., et al., Evaluation of the Living 4 Life project: a youth-led, school-based obesity prevention study. Obesity reviews: an official journal of the International Association for the Study of Obesity, 2011. 12 Suppl 2: p. 51-60.</td>
<td>Commuinity, School</td>
<td>QE with repeated XS</td>
<td>1634</td>
<td>12 - 18</td>
<td>36 mo: Community consultation and engagement processes were conducted with government health departments, school staff and students, local health providers, non-government organisations and other community stakeholders to develop community actions plans. A range of initiatives were implemented in schools, including breakfast clubs, lunch time activities, after school dance, improvements in school food quality, installation of water fountains, distribution of drink bottles, and provision of physical activity equipment.</td>
<td>No follow up</td>
<td>BMI, BMI z-score, % BF</td>
<td>BMI: +0.34 (P = 0.18); BMI z-score: +0.14 (P = 0.13); % BF: +1.07 (P = 0.16)</td>
<td>Not significant</td>
<td>No</td>
<td>The Wellcome Trust (UK), the National Health and Medical Research Council (Australia) and the Health Research Council (New Zealand) through the International Collaborative Research Grant Scheme</td>
</tr>
<tr>
<td>Wang et al. 2008</td>
<td>Wang, L.Y., et al., Cost-effectiveness of a school-based obesity prevention program. J Sch Health, 2008. 78(12): p. 619-24.</td>
<td>School</td>
<td>RCT</td>
<td>601</td>
<td>8.5</td>
<td>36 mo: IG: FitKid after-school program offered 2-hour after-school intervention sessions daily. Sessions started with a 40-min period during which the youths were provided with a healthy snack and academic enrichment activities, followed by 80 min of physical activity included a variety of activities designed to improve sport skills, aerobic fitness, strength, and flexibility (40 min were devoted to vigorous physical activity)</td>
<td>No follow up</td>
<td>% BF</td>
<td>% BF: -0.76 (CI: -1.42 to -0.09)</td>
<td>Significant</td>
<td>Yes</td>
<td>NIH DK63391</td>
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<td>Webber et al. 2008 210</td>
<td>Webber, L.S., et al., Promoting physical activity in middle school girls: Trial of Activity for Adolescent Girls. Am J Prev Med, 2008. 34(3): p. 173-84.</td>
<td>Community, School</td>
<td>RCT</td>
<td>8727</td>
<td>11 - 15</td>
<td>24 mo: intervention consisted of (a) cues, messages and incentives to be more physically active; (b) environmental and organizational changes supportive of PA were introduced, including lunch-time dance sessions, after-school step-aerobics classes, before-school open gym. Aimed at girls.</td>
<td>12</td>
<td>BMI, %BF</td>
<td>BMI: +0.1 (CI: -0.4 to 0.7); %BF: +0.2 (CI: -0.6 to 1.1)</td>
<td>Not significant</td>
<td>No</td>
<td>NHLBI grants U01 HL066855 (Tulane University); U01HL066845 (University of Minnesota); U01HL066852 (University of South Carolina); U01HL066853 (University of North Carolina at Chapel Hill); U01HL066856 (San Diego State University); U01HL066857 (University of Maryland); U01HL066858 (University of Arizona)</td>
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<tr>
<td>Williamson et al. 2007 211</td>
<td>Williamson, D.A., et al., Wise Mind project: a school-based environmental approach for preventing weight gain in children. Obesity (Silver Spring), 2007. 15(4): p. 906-17.</td>
<td>School</td>
<td>RCT</td>
<td>586</td>
<td>7 - 12</td>
<td>18 mo: Wise Mind Project: an environmental intervention focusing on changing the school ecology through policy and physical changes including cafeteria menu modification, poster and boards promoting healthy eating, purchase of equipment to encourage PA, staff development etc., and educational components</td>
<td>No follow up</td>
<td>BMI z-score</td>
<td>BMI z-score: -0.03 (P = 0.55)</td>
<td>Not significant</td>
<td>Yes</td>
<td>NIH Grant R01DK063453-01</td>
</tr>
<tr>
<td>Williamson et al. 2012 212</td>
<td>Williamson, D.A., et al., Effect of an environmental school-based obesity prevention program on changes in body fat and body weight: a randomized trial. Obesity (Silver Spring), 2012. 20(8): p. 1653-61.</td>
<td>School</td>
<td>C-RCT</td>
<td>325</td>
<td>9 - 11</td>
<td>28 mo: Multi-component intervention: PP + SP — the PP program modified the school environment to promote healthy nutrition and physical activity with three primary objectives: modify environmental cues related to healthy eating and activity, modify the cafeteria food service program, and modify the physical education programs. The SP program employed a classroom instruction component combined with an internet-based approach</td>
<td>No follow up</td>
<td>%BF, BMI</td>
<td>Environmental modification decreased% BF for boys compared to control (-1.7% ± 0.38% versus −0.14% ± 0.69%) and attenuated fat gain for girls (2.9% ± 0.22% versus 3.93% ± 0.37%), but standardized effect sizes were relatively small (&lt; 0.30)</td>
<td>Not significant</td>
<td>Yes</td>
<td>National Institute for Child Health and Human Development grant R01 HD048483, the U.S. Department of Agriculture grant 58-6435-4-90, the NORC Center grant #1P30 DK072476 and NIH grant K23 DK068052</td>
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<td>Yin et al. 2006</td>
<td>Yin, Z., et al., An environmental approach to obesity prevention in children: Medical College of Georgia FitKid Project year 1 results. Obesity Research, 2005. 13(12): p. 2153-61.</td>
<td>School</td>
<td>RCT</td>
<td>601</td>
<td>8 - 9</td>
<td>8 mo: a 2 hour after-school programme consisting of 40 minutes of academic activity, a healthy snack, followed by an 80-minute period of PA that provided 20 minutes of warm-up and skills instruction, 40 minutes of continuous MVPA, and 10 minutes of calisthenics and cool-down, delivered by professionals.</td>
<td>No follow up</td>
<td>BMI, % BF, WC</td>
<td>BMI: -0.16 (CI: -0.40 to -0.07; P = 0.18); % BF: -0.76 (CI: -1.42 to -0.09; P = 0.027); WC: -0.4 (CI: -1.1 to 0.4; P = 0.32)</td>
<td>Significant (for % BF only)</td>
<td>Yes (for % BF only)</td>
<td>NIH grant RO1 DK63391</td>
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* Study design: CT (Controlled Trial, with or without randomisation), CCT (Controlled Clinical Trial), RCT (Randomized controlled trial), nRCT (non-RCT), Q-RCT (Quasi-RCT); Q-nRCT (Quasi-experimental nRCT), NRNCT (Non-Randomised Non-Controlled Trials) C-RCT (Cluster RCT), CBA (Controlled before-and-after study), PCS (Prospective cohort study), RCS (Retrospective cohort study), PCCS (Prospective controlled cohort studies), HCT (Historically controlled trial), NCC (Nested case-control study), CC (Case-control study), XS (Cross-sectional study), CR/CS (Case report/Case series), ITS (Interrupted Time Series), NE (Natural experiments), QE (Quasi-experimental study), PPT (Pre- and Post-test repeated measures design), QE-PPT (Quasi-experimental Pre- and Post-test evaluation), PA (Physical activity)  
** % BF (Percentage Body Fat), BMI (Body Mass Index), FFST (fat-free soft tissue), FMI (Fat Mass Index) RR (Relative Risk), SFT (Skin Fold Testing), TSF (Triceps Skin Fold), WC (Waist Circumference), WHR (Waist-to-Hip Ratio)
### Appendix S7. Overlap of primary studies across systematic reviews

| Primary Studies | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 |
|-----------------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Angelopoulos 2009 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Ask 2006  | T |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Ask 2010  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Barbeau 2007  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Caballero 2005  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Chomet 2010  | T |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Coffield 2011  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Coleman 2005  | T |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Comea 2012  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Da Ruyter 2012  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Donnelly 1996  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Duhaeghe 2010  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Ebolaing 2006  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Economos 2007  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Fælgh 2003  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Foster 2000  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Foster 2010  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Faye 2011  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Ferrus 2013  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Qiu and Xiang 2014  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Greenal 2007  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Gieras 2010  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Giusing 2011  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Gius 2006  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Hanra 2006  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Hanra 2006  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Authors                  | Primary Studies | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 |
|-------------------------|-----------------|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Hafash 2006            |                 |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Hu 2004                 |                 | x |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Hafash 2010            |                 |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Helier 2010a           |                 | x |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Helier 2010b           |                 |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Howe 2011              |                 | x |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Jawar 2011             |                 |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Jordan 2008            |                 | x |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Kam 2004               |                 |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Keener 2012            |                 | x |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Luepker 1996           |                 | x |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Maloney 2008           |                 | x |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Manza 2009             |                 | x |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Martinez Viestenz 2008 |                 | x |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Millar 2011            |                 | x |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Mischuthaer 2009       |                 | x |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Nakie 1999             |                 | x |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Nishio 2004            |                 |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Nishio 2006            |                 |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Owusu 2011             |                 | x |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Pampaka 2005           |                 | x |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Paz 2005               |                 |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Razzykowski 2009       |                 | x |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Rezaei-Lorat 2005      |                 |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Resnicuk 1992          |                 |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Robinson 1999          |                 | x |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Robinson 2003          |                 | x |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
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| Primary Studies | Robinson 2010 | 8 |
|                 | Sahota 2001     |   |
|                 | Nakagig 2005    |   |
|                 | Sahainve 2009   | 8 |
|                 | Asko 2009       |   |
|                 | Kandhar-Vennugop 2010 |   |
|                 | Samperaki 2008  |   |
|                 | Kuchari 2008    |   |
|                 | Slagrat 2013    |   |
|                 | Simon 2006      |   |
|                 | Simon 2006      |   |
|                 | Singh 2007      |   |
|                 | Singh 2009      |   |
|                 | Singh 2016      |   |
|                 | Story 2005      |   |
|                 | Taber 2012      |   |
|                 | Taylor 2007     |   |
|                 | Taylor 2008     |   |
|                 | Viss 2006       |   |
|                 | Viss 2006       |   |
|                 | Ular 2011       |   |
|                 | Wang 2008       |   |
|                 | Webber 2008     |   |
|                 | Williamson 2007 |   |
|                 | Williamson 2012 |   |
|                 | Yin 2006        |   |

*SRs* ➔ the top row of this table contains numbered references to eligible systematic reviews that have been included in this overview.
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