

Effective Public Health Interventions in the Prevention of Obesity in Children from Birth to Six Years: A Rapid Review of the Evidence

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Key Take Home Messages

- The ‘early years’ presents a window of opportunity to intervene in the lives of infants and children to encourage healthy growth and development, including the prevention of overweight and obesity.
- Although strong evidence for specific public health interventions that have a significant effect in the prevention of obesity in children from birth to six years is limited, the evidence identified the early years as a key time for shaping lifelong attitudes and behaviours.
- The evidence demonstrated the following characteristics of successful interventions in the prevention of childhood obesity: sustained physical activity/limited sedentary activity, healthy eating, cultural and socioeconomic sensitivity, active engagement of parents and caregivers, and a multi-pronged approach.
- The evidence recommendations were determined to be appropriate objectives for Peel Public Health and the Family Health Division will incorporate them into a cohesive and integrated strategy to ensure a life cycle approach is taken to address the complex issue of obesity.

Executive Summary

The purpose of this paper is to explore population level interventions in the early years that could prevent childhood obesity.

Research Question

“What are effective public health interventions to prevent obesity in children from birth to six years?”

Issue and Context

The early years represents a key population for intervention in the promotion of healthy weights. Peel Public Health requires a focused and collaborative approach to healthy weights promotion that is supported by the best available evidence. It is necessary that this approach also be appropriate for the political and social environment in Peel and also feasible for Peel Public Health.

Methods

A systematic review of related literature was conducted through a library search of the Medline, PsycINFO, and CINAHL databases. Hand searching of relevant grey literature documents and pulled articles was completed. A search was also completed on basic Google and Google Scholar. The articles that were found to be most relevant, recent, and critically appraised as moderate to strong quality were summarized and utilized to inform the evidence recommendations.

Synthesis of Key Findings and Applicability and Transferability

Overall, the evidence demonstrated the following components to be essential in successful interventions for the prevention of childhood obesity: sustained physical activity/limited

sedentary activity, healthy eating, cultural and socioeconomic sensitivity, active engagement of parents and caregivers, and include a multi-pronged approach. The evidence recommendations were presented to a group from Peel Public Health to assess the applicability and transferability of the recommendations. Following the acceptance and support of these recommendations and determination that the recommendations were feasible for Peel Public Health, further recommendations specific to an action plan for Family Health were developed.

Conclusions

Addressing the early years with a cohesive and integrated strategy ensures a life cycle approach will be taken to tackle the complex issue of obesity. The Family Health Division will develop a comprehensive plan for addressing the recommendations put forth from the research and supported through the applicability and transferability discussion. Key actions for the Family Health Division will include a review of existing programs to assess for the inclusion of the key characteristics of successful interventions, an environmental scan, and a policy review. Furthermore, additional rapid reviews on related topics will be completed and the realignment and leveraging of existing resources will ensure the Family Health Division is sufficiently resourced to move forward with the recommendations.

1 Issue

Obesity is a problem in the Region of Peel, affecting people of diverse ethnic and socioeconomic backgroundsⁱ. According to the Student Health Survey 2004 conducted by Peel Public Healthⁱ, 31% of the boys and 26% of the girls in grades 7-12 were classified as overweight or obese using the Body Mass Index scale (BMI). In Canada, from 1978 to 2004, the rates of overweight and obesity rose dramatically among children aged 2-17 years (from 15% to 26%)ⁱⁱ. Given that the Region of Peel has a higher proportion of children and young families in comparison to Ontarioⁱ, it is a priority for Peel Public Health to address the issue of overweight in this population.

The early years present a window of opportunity to intervene in the lives of infants and children to encourage healthy growth and development and the prevention of overweight and obesity. An ecological approach to population weight status calls for a collaborative strategy that considers multiple factors that affect weight and health outcomes (see Appendix A-1: Concept Model). The purpose of this paper is to explore population level interventions in the early years that could prevent childhood obesity.

2 Context

Peel Public Health identified in its 10-year strategic plan *Supportive Environments, Healthy Weight* as a program priority. The goal of this priority is to reduce the prevalence of obesity by:

- 1) focusing on prevention, as opposed to treatment, slowing the rise in the rate of obesity, and then reversing its trajectory;
- 2) developing a multi-pronged approach based on solid evidence of effectiveness; and
- 3) influencing physical activity and dietary practices by emphasizing policy change, especially in the built environment, food environment, school environment and active transportation.ⁱⁱⁱ

The Chronic Disease and Injury Prevention Division is leading this initiative through focused efforts on what can be done to encourage healthy weights through modification of the environment. As the population served by the Family Health Division is children aged 0-6 years, their parents and their care providers, devoting efforts to childhood obesity prevention is an appropriate area of focus. A federal report, *Curbing Childhood Obesity: A Federal, Provincial and Territorial Framework for Action to Promote Healthy Weights* (2010), confirmed the importance of the early years:

For most children, parents provide the first opportunity for creating the social, physical and cultural environments that promote healthy growth and development in all aspects of a child's life, including both physical and mental health. Therefore engaging and supporting families early in children's lifespan is also a key area for addressing this issue (obesity).^{iv}

2.1 Impact on Public Health Staff and the Community

Staff of the Family Health Division are often presented with opportunities to influence key factors that affect childhood obesity. Whether staff are answering individual questions or

participating in a population-based program on how families can encourage a healthy weight for their child, there needs to be confidence that they are addressing the issue with the most promising approaches.

Current strategies at Peel Public Health include:

- the promotion of exclusive breastfeeding;
- Baby Friendly Initiative (BFI) designation (BFI is a global campaign of the World Health Organization (WHO) and the United Nations Children's Fund (UNICEF) that was initiated in 1991 to protect, promote and support breastfeeding);
- educational presentations to parents (e.g., Healthy Mealtimes, Feeding Your Baby);
- print resources (e.g., Cooking Up Some Fun); and
- website materials (www.parentinginpeel.ca and www.peel-obesity.ca).

Although these various approaches to healthy lifestyle and healthy weights promotion are positive, the actual impact on the incidence of childhood obesity in the Region of Peel is unknown. A review of all effective public health interventions to address the prevention of obesity is necessary in providing direction to the Family Health Division.

3 Literature Review

3.1 Research Question

“What are effective public health interventions to prevent obesity in children from birth to six years?”

Population (P) =	Birth to six years
Intervention (I) =	Effective public health interventions
Control/Comparison (C) =	No intervention
Outcome (O) =	Healthy weight

3.2 Conceptual Models

Following the completion of a literature search and brainstorming by a committee comprised of representatives from all three program areas in the Family Health Division (Child Health, Healthy Babies Healthy Children, and Reproductive Health), a conceptual model of the factors impacting the weight status of children (birth to six years) was developed (see Appendix A-1). Additionally, the committee developed a second conceptual model summarizing the key settings identified for public health interventions for the prevention of obesity in children (see Appendix A-2).

3.3 Search Strategy (see Appendix B and C)

The literature search was initially conducted using the OVID search engine and MEDLINE database. Subsequent searches included PsycINFO and CINAHL databases. Medical Subject Heading (MeSH) terms included: child, preschool, intervention, obesity, prevention, and strategies (see Appendix B for complete search strategy). All three databases were searched from 2004 until November 2010 (MEDLINE) or March 2011 (PsycINFO and CINAHL).

Grey literature was searched via the: Canadian Evaluation Society, Canadian Theses, Grey Literature of the New York Academy of Medicine, Government of Canada Publications, World Health Organization, Canadian Obesity Network, and the United States Centers for Disease Control. A general Google and Google Scholar search were conducted using the terms: “interventions”, “prevention”, “children”, and “obesity”. Hand searching was also completed for relevant article reference lists and government and policy related papers.

3.4 Inclusion and Exclusion Criteria

Systematic reviews, meta-analyses, and guidelines were included in this rapid review. Articles were to be available in English, include a focus on the birth to 6 years of age population, public health based interventions, prevention of childhood obesity, and include a measurement outcome of weight or an anthropometric measure or behaviour associated with weight (e.g., Body Mass Index , waist circumference, physical activity).

Exclusion criteria were single studies, narrative reviews, opinion papers, editorials, studies focused on the treatment of obesity, senior elementary or high school-based interventions, articles focused on the treatment of a disease state rather than obesity, and articles that did not report on any weight related outcome.

All titles and abstracts were reviewed for relevance by two or three reviewers and a total of 37 articles were retrieved for full text review. After full text review, 29 articles were excluded and eight articles were found to be relevant and required critical appraisal.

4 Critical Appraisal Tools and Results

Critical appraisal of the included systematic reviews and guidelines was completed independently by two to three reviewers. One systematic review was rated as weak and excluded and one relevant guideline was rated as moderate (*2006 Canadian clinical practice guidelines on the management and prevention of obesity in adults and children*). The final three systematic reviews were rated as strong using the HealthEvidence.ca tool and the final three guidelines were appraised as strong using the AGREE II appraisal tool.

5 Data Synthesis (Refer to Appendix D – Data Extraction Tables for more details)

Although a total of seven articles were rated as moderate to strong in the critical appraisal stage, the final number of articles referred to in the data synthesis stage was reduced to four due to data duplication:

- One relevant systematic review (Hesketh and Campbell, 2007) was updated in a later 2010 systematic review by the same authors and therefore removed.
- One systematic review and one guideline were removed due to the discovery of data duplication (all included articles were summarized in more recent reviews).

Therefore in the final synthesis of data, one systematic review, one overview of reviews (synthesis), and two guidelines were utilized. See Appendix D for critical appraisal ratings included in the Data Extraction Tables.

Following the completion of the initial draft of this report, the Institute of Medicine released the consensus report entitled *Early Childhood Obesity Prevention Policies (June 2011)*. Critical appraisal of the pre-publication version of this report was completed by three separate reviewers with the AGREE II tool and it was rated weak, as details of the methods were not provided.

Therefore, the recommendations from this consensus report were not included in this report.

However, this report was the only reference to identify a possible link between sleep patterns in childhood with weight gain; this is a potential area for future review.

5.1 Systematic Review # 1: Hesketh and Campbell (2010)^v

In 2010, Hesketh and Campbell updated their 2007 systematic review^{vi} on strategies aimed at positively impacting weight, physical activity, diet, and sedentary behaviours in children from

zero to five years. This review was rated as strong with the Health-evidence.ca quality assessment tool. This review appraised peer-reviewed literature reporting interventions to support parents and caregivers in positively influencing young children's body weight and/or other obesity related behaviours.

In the discussion that follows, single study ratings provided are those of Hesketh and Campbell (2010). The included primary study description and results are summarized below according to setting:

Preschool/childcare settings (n=9)

Of the nine studies conducted in this setting, three were methodologically strong, six were rated moderate.

Key components of the interventions in the preschool/childcare setting:

- 1) interactive education sessions, resources, and activities,
- 2) focus on decreasing sedentary behaviour, increasing physical activity and improving diet,
- 3) delivery to parents and children delivered by staff,
- 4) delivered at child care centres, preschools, home setting, and connecting with existing programs,
- 5) education sessions were provided weekly or monthly for periods ranging from two days to two years.

Although three of the studies included in the preschool/childcare based settings showed a significantly positive impact on obesity-prevention related outcomes, many did not show any evidence of an effect on behaviours that contribute to obesity despite the strong study designs. There may be a number of factors that could explain the lack of findings, such as small sample

sizes that might not detect small but meaningful changes. The researchers note that most of the studies in the preschool/childcare setting lacked a parental component.

Home-based settings (n=8)

Of the eight studies conducted in homes, five were rated moderate and three were rated weak. The interventions that were included in the home setting focused on weekly or monthly home visits over four to nine months by peer support volunteers. The topics of focus included assistance with infant feeding practices and improving parenting skills to encourage the development of healthy physical activity and eating behaviours in children. For five of the studies (both moderate and weak), the intervention was beneficial; one intervention had no effect and two had unclear results (beneficial for some, but not all outcomes or participants).

Group-settings (n=2)

Both studies utilized existing settings to introduce their interventions, allowing for the group members to have a familiarity with one another. The intervention involved promoting healthful eating behaviours by teaching parents and caregivers basic nutrition, food selection, menu planning, and food preparation skills. Both studies demonstrated some level of effectiveness, however they were not statistically significant and were rated as moderate and weak.

Primary care settings (n=2)

One study focused on counselling by a nutritionist at one to three month intervals up until the child was two years of age and then twice per year with letters to the children up to seven years of age. Both studies showed some evidence of positive impact on the outcomes of interest; however they were both rated as methodologically weak.

Mixed setting (n=2)

Both studies were nonrandomized controlled trials rated moderate with some evidence of success focusing on methods of improving diet and reducing television viewing. The researchers noted that changes in knowledge did not necessarily result in changes in targeted behaviours, therefore reinforcing the need for emphasis on skills and development.

Main Conclusions of Hesketh and Campbell (2010):

- Interventions which showed evidence of success were designed to not only impact knowledge, but also skills and competencies, suggesting a social behavioural theory underpinning.
- Most studies employed multiple modes of intervention delivery and the majority of studies were conducted in either the home or preschool/childcare settings.
- Many of the studies implemented in the preschool/childcare environment had a focus on increasing physical activity, and given the very low levels of physical activity typically observed in preschool settings, there appears to be great potential for improving physical activity in these settings.
- While a number of factors may help to explain the lack of findings in the preschool/childcare studies, including insufficient sample sizes, a notable observation is that most of these preschool/childcare-based studies lacked a parental component. It is possible that during these early childhood years, parental involvement is important and perhaps vital for observable and lasting changes to be effected in childhood behavior.
- Approximately half of the studies targeted socioeconomically disadvantaged families, primarily through existing infrastructures. The authors found little evidence of attempts to test generalizability of program success to different population groups.
- The review noted that workers engaged with socioeconomically disadvantaged groups and those providing childcare and early education services were willing to implement obesity-prevention programs.
- The review concluded that parents and caregivers, even those most at risk of rearing children who will become overweight or obese, are receptive to intervention programs and in some cases can be supported by positive changes to dietary, physical activity, and sedentary behaviours of their young children.

5.2 Synthesis #1: Bond, Wyatt, Lloyd, Welch, and Taylor (2009)^{vii}

The synthesis by Bond et al. includes reviews and syntheses of the effectiveness and cost-effectiveness of weight management schemes for the under fives. This review was rated strong using the health-evidence.ca tool for quality assessment. Thirteen different databases were

searched from 1990 to February 2009. Twenty-two articles were included in the synthesis: 16 were systematic reviews or meta-analyses (only two focused on 0-5 y olds) and six were reports of three randomized controlled trials.

Only one systematic review, by Bluford et al., rated moderate by Bond et al., was not included by Hesketh and Campbell (2010) as summarized above.

Bluford et al. found that four studies showed positive change in weight status or body fat; and self-report measures showed both significant and non-significant results. Overall, Bluford et al. concluded that multi-component programmes were most successful, particularly if parents were involved; this conclusion appears to be largely based on the strength of one intervention study (Hip-Hop Jr RCT). Conclusions should be treated with caution as they included uncontrolled studies and self-report measures. The overall conclusions of the Bond et al. synthesis are based on only three heterogeneous studies, two in low-income ethnic minority groups, in different contexts and settings, thereby making the drawing of firm conclusions difficult.

Main Conclusions of Bond et al. (2009):

The review concluded that controlled trial evidence of weight management schemes and interventions aimed at the prevention of obesity for the under fives is scarce. Bond et al. suggest that future interventions should consider:

- Effective training of the staff delivering the intervention,
- Cultural sensitivity,
- Sustained moderate to vigorous physical activity and nutritional advice components for children,
- Active engagement of parents/carers in reinforcing the messages to the children, combined with education about healthy diets and exercise.

5.3 Guideline #1: 2006 Canadian clinical practice guidelines on the management and prevention of obesity in adults and children (2007)^{viii}

These Canadian guidelines address a broad range of populations and patients who are overweight or obese, or have an increased waist circumference. The guidelines were rated as moderate using the AGREE II tool.

Chapter 22, *Individual approaches to the prevention of paediatric obesity using physical activity* and Chapter 23, *Prevention of childhood obesity through nutrition: Review of effectiveness* were deemed to be relevant for the current review. The chapter on physical activity included summaries of relevance which are all included in Hesketh and Campbell (2010); similar conclusions were made by Hesketh and Campbell (2010).

The guideline cited data from the US Centers for Disease Control and Prevention's Pediatric Nutrition Surveillance System suggesting that breast feeding is protective against paediatric overweight. Specifically, the data suggests that breastfeeding leads to improved self regulation for babies and that breastfed babies adapt more readily to new foods. Further support of breastfeeding for the prevention of childhood obesity by the American Academy of Pediatrics and Health Canada^{viii} was also noted. The guidelines cited a meta-analysis by Owen et al (2005) of 29 studies on the effect of infant feeding on the risk of obesity across the life course which concluded that initial breast feeding protects against obesity in later life.

Main Conclusions of the Canadian Medical Association (CMA) (2007) guidelines:

The following were the overall CMA recommendations for physical activity and nutrition interventions for the prevention of childhood obesity:

Physical Activity:

- a. Suggest limiting “screen time” (i.e., television watching, playing video or computer games) to no more than 2 hours a day to encourage more activity and less food consumption, and to limit exposure to food advertising.
- b. The role of schools as pivotal settings for the promotion of healthy active living and school-based prevention programs to reduce the risk of childhood obesity is encouraged, as are interventions to increase daily physical activity through physical education class time and opportunities for active recreation.
- c. The development of programs in multiple settings targeting behaviour change with parental and family involvement is encouraged.

Nutrition:

- a. Discussion of the prevention of childhood obesity with the pregnant mother is encouraged.
- b. Exclusive breast feeding of infants is encouraged until at least 6 months of age to prevent later obesity.

The evidence related to the prevention of childhood obesity included in the CMAJ guidelines is rated as weak overall by the authors.

5.4 Guideline #2: NICE (2006) National Institute for Health and Clinical Excellence Clinical Guideline 43 – Obesity: Guidance on the prevention, identification, assessment and management of overweight and obesity in adults and children^{ix}

The National Institute for Health and Clinical Excellence (NICE) guidance aims to both stem the rising prevalence of obesity and diseases associated with it and increase the effectiveness of interventions to prevent overweight and obesity. The guidelines were rated strong using the AGREE II tool. The guidelines include a summary of RCTs related to interventions among children aged 2-5 years and families in Chapter 8, *Prevention evidence summary: Interventions for pre-school children and family-based interventions* (‘early years’).

The key priorities for implementation in public health identified that managers and health professionals in all primary care settings should ensure that preventing and managing obesity is a priority, at both strategic and delivery levels. The guidelines further emphasized that dedicated resources should be allocated for action.

Main Conclusions of the NICE (2006) guidelines:

Recommendations for parents and carers

Diet

- Encourage children and young adults to eat regular meals, including breakfast, in a pleasant, sociable environment without distractions (such as watching television).
- Eat with children – with all family members eating the same foods

Activity

- Encourage active play
- Try to be more active as a family
- Gradually reduce sedentary activities
- Encourage children to participate in sport or other active recreation, and make the most of opportunities for exercise at school

Delivery for health professionals working with preschool, childcare and family settings

Any programme to prevent obesity in preschool, childcare or family settings should incorporate a range of components (rather than focusing on parental education alone), such as:

Diet – interactive cookery demonstrations, videos and group discussions on practical issues such as meal planning and shopping for food and drink

Physical activity – interactive demonstrations, videos and group discussions on practical issues such as ideas for activities, opportunities for active play, safety and local facilities.

- Family programmes to prevent obesity, improve diet (and reduce energy intake) and/or increase physical activity levels should provide ongoing, tailored support and incorporate a range of behaviour change techniques.

Early years settings (the preschool years – ages 2-5)

- All nurseries and childcare facilities should ensure that preventing excess weight gain and improving children's diet and activity levels are priorities.
- All action aimed at preventing excess weight gain, improving diet (and reducing energy intake) and increasing activity levels in children should involve parents and carers.
- Nurseries and other childcare facilities should minimise sedentary activities during play time, and provide regular opportunities for enjoyable active play and structured physical activity sessions.
- Staff should ensure that children eat regular, healthy meals in a pleasant, sociable environment free from other distractions (such as television). Children should be supervised at mealtimes and, if possible, staff should eat with children.

* The guidelines also included a summary of evidence related to *Interventions aimed at black, minority ethnic groups (BMEGs), vulnerable groups and vulnerable life stages*. There was a lack of evidence on the effectiveness of interventions among BMEGs in the United Kingdom. All identified RCTs were undertaken in the United States, the majority among African/black Americans.

5.5 Overall Synthesis

The compilation of findings from reviews and the recommendations from the guidelines indicate that research has been completed on public health interventions that can assist in preventing obesity in children from birth to six years. Studies included in this review that have demonstrated some positive effects on the outcome of weight may have had a significant effect due to certain circumstances that may make the results ungeneralizable. Many of the interventions cited had positive outcomes on the weight status of children receiving the intervention, but the effects were not large enough to be statistically significant. The high number of recent studies indicates that this area of research is developing.

In comparison to school-aged settings, there is a scarcity of published evaluations on obesity prevention programs directed specifically to the birth to six years of age population. Directing programs to focus on the early years can create opportunities to prevent obesity later in life. As there have been so few programs directed at the early years, there still remains a lack of evidence for the effectiveness of community and home settings for interventions. Further research is required in these settings with the birth to six years of age population.

In summary, although strong evidence for specific public health interventions that have a significant effect in the prevention of obesity in children from birth to six years is limited, all of the reviews and guidelines synthesized identified the early years as a key time for shaping lifelong attitudes and behaviours. Parents and childcare providers can create opportunities for children to be active and develop healthy eating habits, and can be positive role models.

Interventions to prevent obesity in preschool, childcare or family settings should incorporate a variety of components (rather than focusing on parental education alone), such as child education and involvement, and support services by informed educators.

6 Key Evidence Findings

Overall the evidence demonstrated the following principal conclusions related to successful interventions in the prevention of childhood obesity:

- 1) Sustained physical activity/limited sedentary activity is fundamental.
 - a. Integrate more regular physical activity into daily routines in preschool/childcare settings (e.g., implement policy at regional childcare centres).
 - b. Promote limited “screen time” (i.e., television watching, playing video or computer games) to no more than 2 hours a day to encourage more activity and less food consumption, and to limit exposure to food advertising (e.g., social marketing encouraging less screen time).
 - c. Encourage active play at home and preschool/childcare.
 - d. Promote being active as a family.
- 2) Healthy eating for children is fundamental.
 - a. Promote breastfeeding until at least six months of age.
 - b. Encourage children to eat regular, healthy meals, including breakfast, in a pleasant, sociable environment with the parents and caregivers without distractions (such as watching television).
- 3) Cultural sensitivity is necessary.
- 4) Awareness of the impact of socioeconomic status is necessary.
- 5) Active engagement of parents/care providers is essential in reinforcing and role modelling the messages to children about healthy eating and active living.
 - a. Food skills promotion for parents and child care staff, including cooks and caterers (e.g., food preparation, cooking skills, and food choices).
- 6) Any program to prevent obesity in preschool, childcare or family settings should incorporate a range of components (rather than focusing on parental education alone), such as:
 - a. diet – interactive cookery demonstrations, videos and group discussions on practical issues such as meal planning and shopping for food and drink.
 - b. physical activity – interactive demonstrations, videos and group discussions on practical issues such as ideas for activities, opportunities for active play, safety and local facilities.

7 Summary of Applicability and Transferability Discussion

A meeting was held with representatives from the Family Health Division at Peel Public Health to discuss the applicability (feasibility) and transferability (generalizability) of the recommendations that were synthesized from the evidence. The meeting was also attended by staff involved in healthy weights from the Chronic Disease and Injury Prevention Division. The group came to a consensus in support of pursuing the evidence recommendations in the development of interventions to prevent childhood obesity from birth to six years.

The recommendations were determined to be both politically and socially acceptable. Politically, there is support at the federal and provincial levels that has been indicated with the release of a joint 2010 call to action, *Curbing Childhood Obesity: A Federal, Provincial and Territorial Framework for Action to Promote Healthy Weights*. There are also existing policies in place that encourage physical activity through incentives (e.g., tax credits). Connecting with regional systems and policies that support child care, active modes of transportation (e.g., increased walkability), and parks and recreational groups was proposed to increase political leverage. A large focus of the discussion was on policy work with child care centres. This setting was seen as having possible outcomes in affecting a larger population and also was seen positively for its ability to share the responsibility with the individual care providers.

In terms of social acceptability, the group anticipates that parents and care providers will be supportive of initiatives that benefit the health of children in the early years. The group felt that there is a need to obtain a better understanding of the population of interest [i.e., how Peel families are structured (multi-generational), food preparation habits of parents and child care staff, time stressors related to being a working parent]. The group noted that a large proportion of the population may already be educated on what is healthy, but that they need the environmental

supports to make healthy changes. Body image and sensitive messaging around the topic of healthy weights was discussed and utilizing the term “healthy growth” versus “obesity prevention” was mentioned for potential future communications with the public. Furthermore, the Region of Peel has many existing relationships with networks linked to the early years (e.g., Success By 6, Child Development Resource Connection Peel).

The personnel and financial requirements to implement the recommendations were seen as feasible. Seeking additional sources of funding through research grants was proposed. Potential changes in the roles and responsibilities of staff within the Family Health Division were discussed. Although many skills required are already held by the current staff of the Family Health Division, some additional supports in terms of policy development may be required.

There may be a possibility to utilize skill sets available in other divisions within Public Health.

An environmental scan was recommended as something that would provide a better understanding of programs currently existing in, for example, child care settings, food banks, and recreational facilities.

Overall, there is support and excitement for the pursuit of the recommendations in the area of healthy weights promotion in the early years in the Region of Peel. This rapid review brought attention to the diverse factors that impact childhood healthy weights, and many subsequent related research questions will arise (e.g., fetal weight gain, self regulation, gestational weight gain, screen time, sleep). There are also many possible approaches to addressing the issue of healthy weights promotion that were encouraged, including using media applications or directly influencing policy in child care settings. The group felt that although there are a large number of factors affecting childhood obesity, these recommendations provide a broad and solid framework from which to begin a planned, evidence-informed approach to

improve the healthy weights in the early years. The group concluded with encouraging statements about the excitement, energy, and enthusiasm towards embarking on this venture.

8 Recommendations and Next Steps

As part of Peel Public Health's Supportive Environments, Healthy Weight strategic priority, the Family Health Division has focused on the early years population. Addressing the early years with a cohesive and integrated strategy will ensure a life cycle approach will be taken to tackle the complex issue of obesity. The Family Health Division will develop a comprehensive plan for addressing the recommendations put forth from the research and supported through the applicability and transferability discussion.

Peel Public Health will ensure the key components of successful interventions in the prevention of childhood obesity will be included in all promoted or developed interventions; these components being sustained physical activity/limited sedentary activity, healthy eating, cultural and socioeconomic sensitivity, active engagement of parents and caregivers, and multi-dimensional.

Specific tasks that are recommended in order to further progress on the path to stopping the rise in childhood obesity include:

- Review existing programs in breastfeeding, healthy eating, and physical activity to see that they include the key components of effective interventions for the prevention of childhood obesity.
- Conduct an environmental scan to assess the cultural and structural components of families in Peel that will inform future programming.
- Conduct a policy review focusing on child care and home settings (linking with the NTNG strategic priority) to inform policy options for implementation (e.g., Day Nurseries Act).

- Undertake further rapid reviews on key topic areas, including – mother’s diet and environmental toxins, gestational weight gain, engagement of parents in healthy eating and physical activity, and emerging research (e.g., child’s sleep) to inform further work.
- *Investigate opportunities for collaboration with the National Collaborating Centre for Healthy Public Policy (NCCHPP);*
- Realign and leverage existing resources (both fiscal and human) to ensure these recommendations are appropriately resourced in order to move forward in regards to the early years focus within the Supportive Environments, Healthy Weight (SEHW) strategic priority.

Peel Public Health SEHW strategic priority will be strengthened through integrated approaches with partners across the life cycle. These partners include CDIP, the work of NTNG, and that of key community partners.

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- ^{vii} Bond, M., Wyatt, K., Lloyd, J., Welch, K., and Taylor, R. (2009). Systematic review of the effectiveness and cost-effectiveness of weight management schemes for the under fives: a short report. *Health Technology Assessment*, 13 (61).
- ^{viii} Canadian Medical Association. (2007). 2006 Canadian clinical practice guidelines on the management and prevention of obesity in adults and children. *Canadian Medical Association Journal*, 176 (8), 1-117.
- ^{ix} National Institute for Health and Clinical Excellence – National Collaborating Centre for Primary Care. (2006). Obesity: the prevention, identification, assessment and management of overweight and obesity in adults and children. Retrieved March 12, 2011 from <http://www.nice.org.uk/nicemedia/pdf/CG43NICEGuideline.pdf>

Appendices

Appendix A-1: Socio-ecological Model of Factors Impacting Weight Status of Children (birth to six years)

Appendix A-2: Socio-ecological Model Identifying Settings for Interventions Impacting the Weight Status of Children (birth to six years)

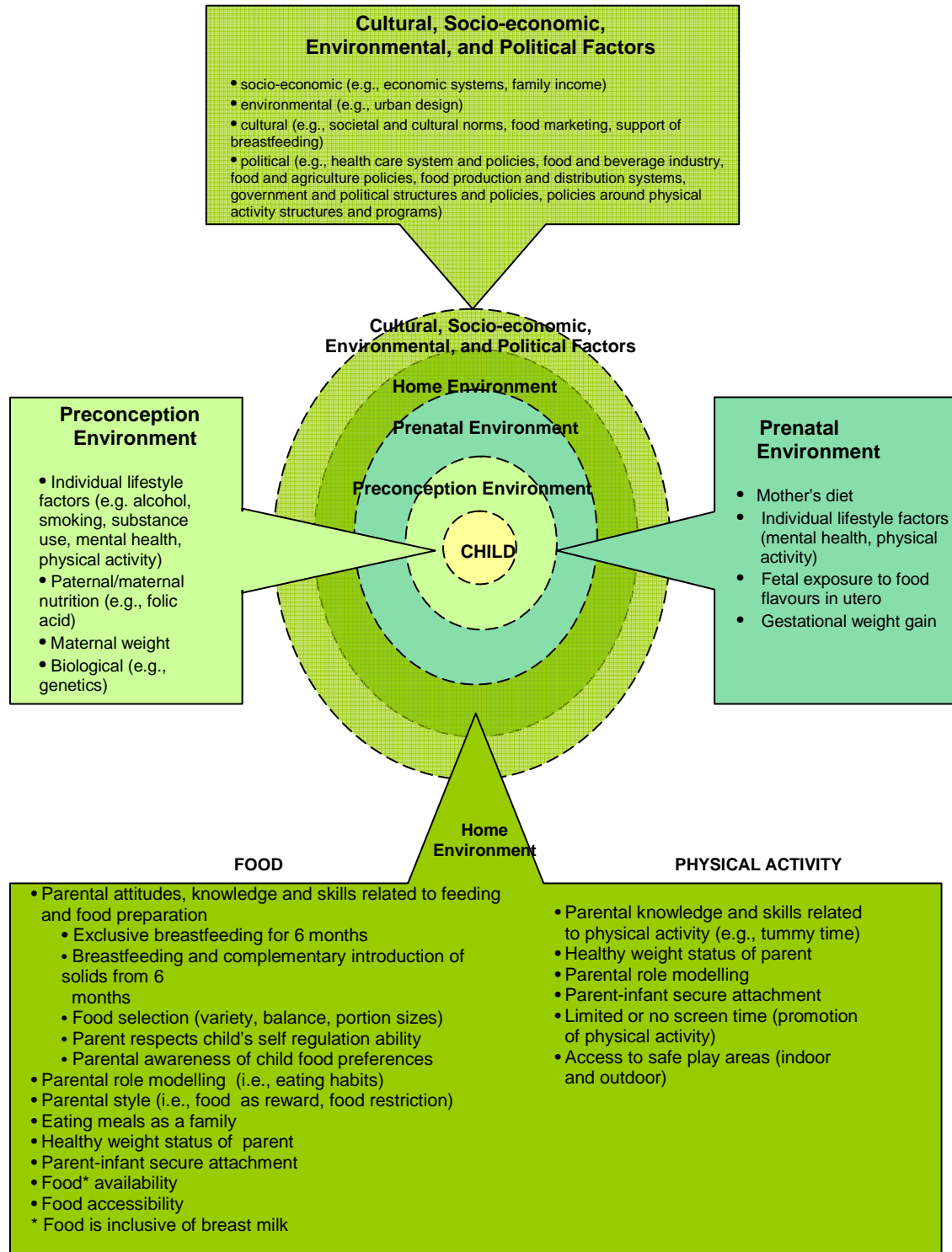
Appendix B: Search Strategy

Appendix C: Overview of Search Process

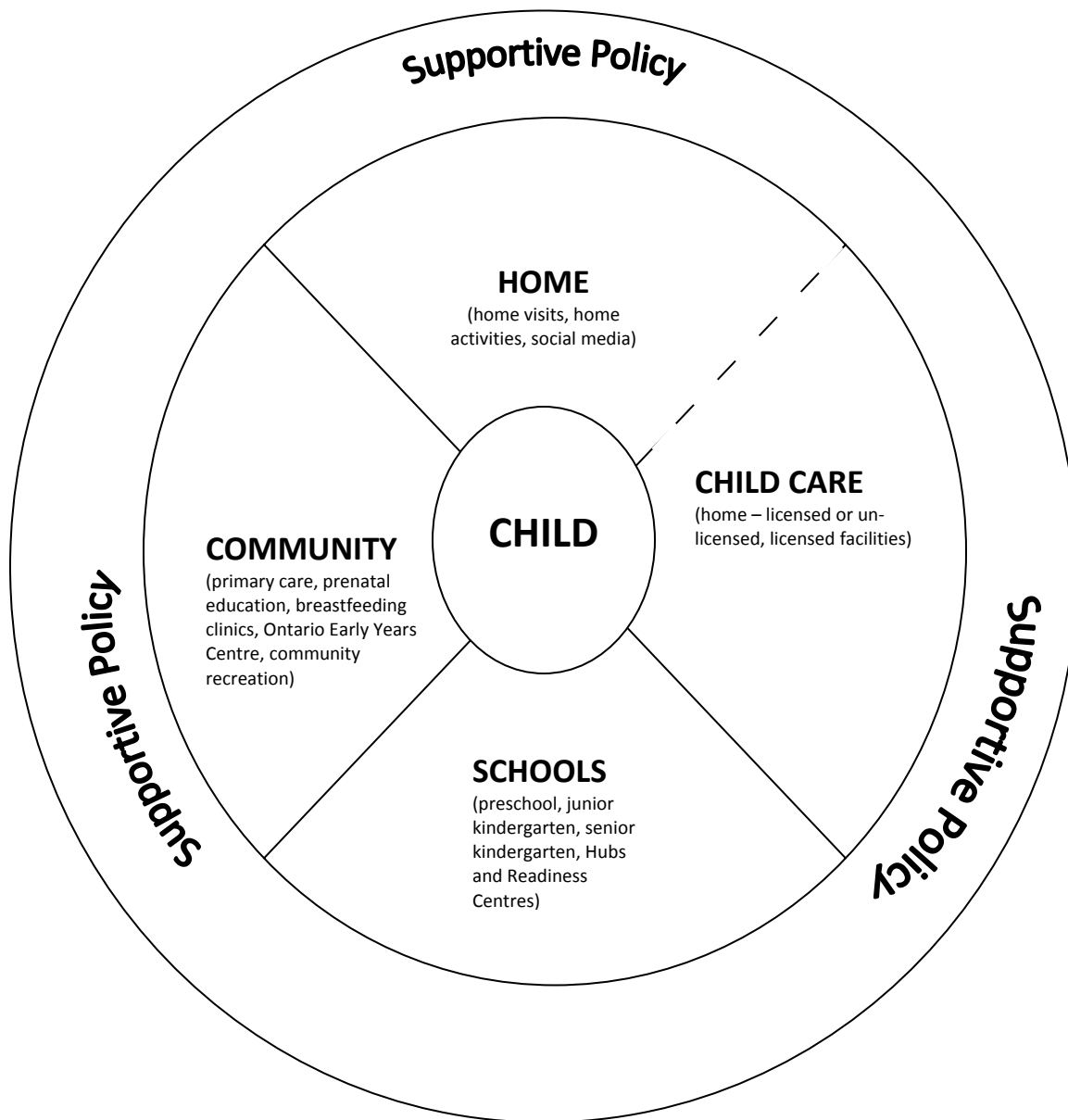
Appendix D: Data Extraction Tables

Appendix A: Concept Model

Appendix A-1: Socio-ecological Model of Factors Impacting Weight Status of Children (birth to six years)



Appendix A-2 Socio-Ecological Model Identifying Settings for Interventions Impacting the Weight Status of Children (birth to six years)



Appendix B: Search Strategy

MEDLINE Search Strategy:

-
- 1 exp child/ or child, preschool/ (1370402)
 - 2 exp Obesity/ep, pc [Epidemiology, Prevention & Control] (22295)
 - 3 intervention\$.tw. (374481)
 - 4 prevent\$.tw. (727845)
 - 5 strateg\$.tw. (383847)
 - 6 3 or 4 or 5 (1336659)
 - 7 Food Habits/ (16073)
 - 8 risk factors/ (440642)
 - 9 Feeding Behavior/ (31789)
 - 10 Health Knowledge, Attitudes, Practice/ (52964)
 - 11 exp Diet/ (161425)
 - 12 polic\$.tw. (114855)
 - 13 exp Health Promotion/ (41272)
 - 14 Program Evaluation/ (37093)
 - 15 risk reduction behavior/ (4287)
 - 16 exp Parents/ed, px [Education, Psychology] (29783)
 - 17 exp Parent-Child Relations/ (39495)
 - 18 exp Preventive Health Services/ (362340)
 - 19 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 (1155328)
 - 20 1 and 2 and 6 and 19 (1756)
 - 21 meta-analysis.mp.pt. (44254)
 - 22 (search or systematic review or medline).tw. (141778)
 - 23 cochrane database of systematic reviews.jn. (7458)
 - 24 21 or 22 or 23 (169137)
 - 25 20 and 24 (81)
 - 26 limit 25 to yr="2004 -Current" (68)

Search terms

Databases used

Database: Ovid MEDLINE(R) <1950 to November Week 3 2010>

Database: PsycINFO <2002 to March Week 2 2011>

Search Strategy:

-
- 1 intervention\$.tw. (102436)
 - 2 prevent\$.tw. (61412)
 - 3 strateg\$.tw. (93442)
 - 4 1 or 2 or 3 (216680)
 - 5 risk factors/ (24850)
 - 6 polic\$.tw. (54617)
 - 7 exp Health Promotion/ (7244)
 - 8 Program Evaluation/ (4040)
 - 9 exp Parent-Child Relations/ (16353)
 - 10 (search or systematic review or medline).tw. (23375)
 - 11 exp obesity/ or exp overweight/ (7237)
 - 12 exp School Based Intervention/ or exp Early Intervention/ or exp Intervention/ (30022)
 - 13 exp Eating Behavior/ or exp Food Intake/ or exp Eating Attitudes/ (9641)
 - 14 exp health attitudes/ (3071)
 - 15 exp harm reduction/ (1227)
 - 16 exp prevention/ (18118)
 - 17 exp parents/ (24310)
 - 18 exp Preventive Medicine/ (663)
 - 19 4 or 12 or 16 (219288)
 - 20 7 or 19 (221926)
 - 21 5 or 6 or 8 or 9 or 13 or 14 or 15 or 17 or 18 (125121)
 - 22 guideline\$.tw. (17671)
 - 23 meta-analysis.mp,tw. (6062)
 - 24 10 or 22 or 23 (44855)
 - 25 11 and 20 and 21 and 24 (79)
 - 26 limit 25 to ((100 childhood <birth to age 12 yrs> or 140 infancy <age 2 to 23 mo> or 160 preschool age <age 2 to 5 yrs> or 180 school age <age 6 to 12 yrs>) and yr="2004 -Current") (26)

CINAHL Search Strategy

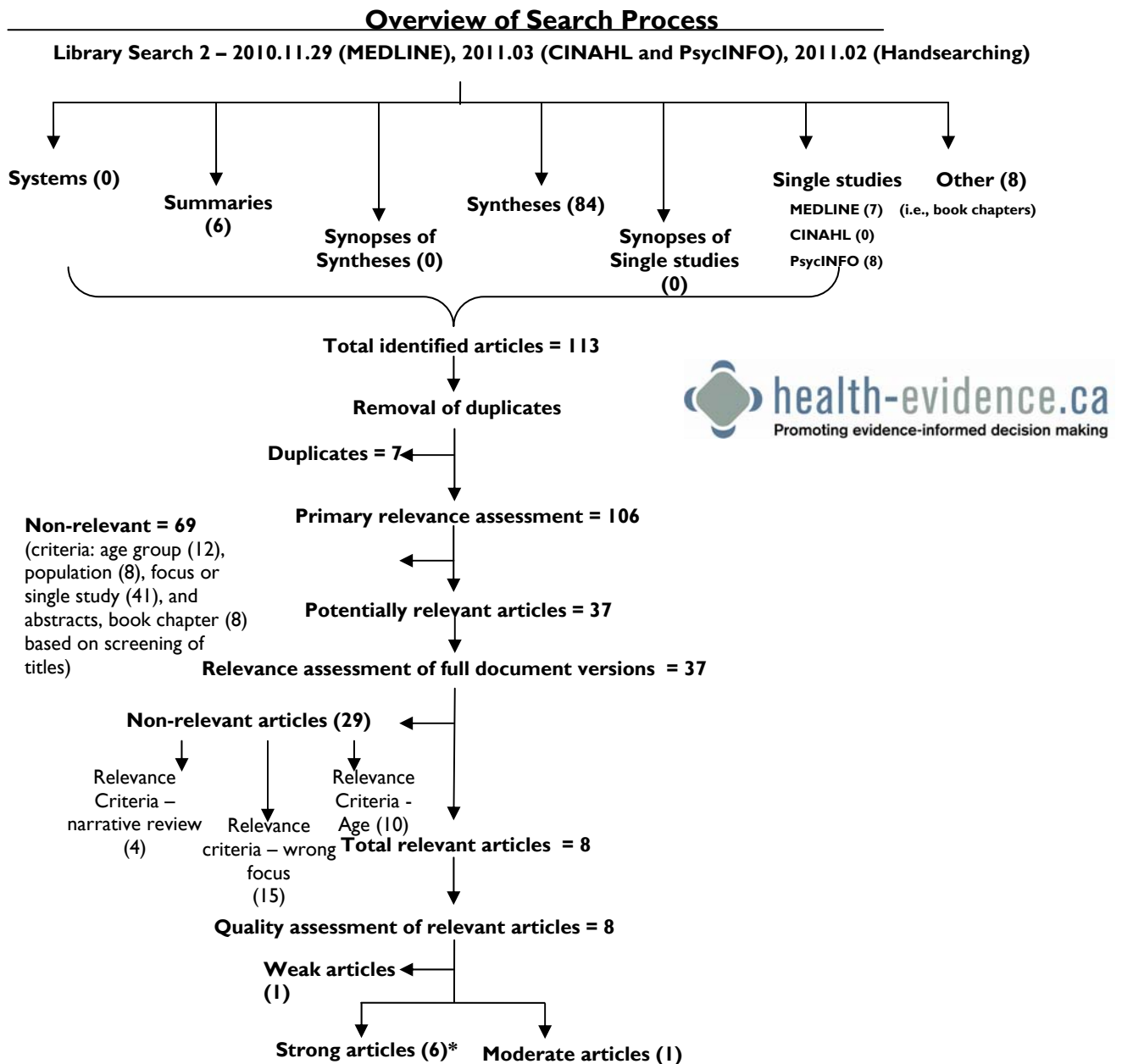
S29	s28	Limiters - Published Date from: 20040101-20111231 Search modes - Boolean/Phrase	Interface - EBSCOhost Search Screen - Advanced Search Database - CINAHL with Full Text	13	Edit S29
S28	s27 and s23	Search modes - Boolean/Phrase	Interface - EBSCOhost Search Screen - Advanced Search Database - CINAHL with Full Text	13	Edit S28
S27	s26 or s25 or s24	Search modes - Boolean/Phrase	Interface - EBSCOhost Search Screen - Advanced Search Database - CINAHL with Full Text	31497	Edit S27
S26	TI guideline*	Search modes - Boolean/Phrase	Interface - EBSCOhost Search Screen - Advanced Search Database - CINAHL with Full Text	15666	Edit S26
S25	MH meta analysis	Search modes - Boolean/Phrase	Interface - EBSCOhost Search Screen - Advanced Search Database - CINAHL with Full Text	10149	Edit S25
S24	MH systematic review	Search modes - Boolean/Phrase	Interface - EBSCOhost Search Screen - Advanced Search Database - CINAHL with Full Text	7711	Edit S24
S23	s22 and s21 and s20	Search modes - Boolean/Phrase	Interface - EBSCOhost Search Screen - Advanced Search Database - CINAHL with Full Text	601	Edit S23
S22	s10 or s11	Search modes - Boolean/Phrase	Interface - EBSCOhost Search Screen -	1548	Edit S22

			Advanced Search Database - CINAHL with Full Text		
S21	s5 or s6 or s8 or s9 or s13 or s14 or s15 or s16 or s17 or s18 or s19	Search modes - Boolean/Phrase	Interface - EBSCOhost Search Screen - Advanced Search Database - CINAHL with Full Text	451667	Edit S21
S20	s4 or s7 or s12	Search modes - Boolean/Phrase	Interface - EBSCOhost Search Screen - Advanced Search Database - CINAHL with Full Text	645103	Edit S20
S19	MH preventive health care	Search modes - Boolean/Phrase	Interface - EBSCOhost Search Screen - Advanced Search Database - CINAHL with Full Text	6778	Edit S19
S18	MW parents	Search modes - Boolean/Phrase	Interface - EBSCOhost Search Screen - Advanced Search Database - CINAHL with Full Text	19329	Edit S18
S17	MJ prevention	Search modes - Boolean/Phrase	Interface - EBSCOhost Search Screen - Advanced Search Database - CINAHL with Full Text	141414	Edit S17
S16	MW harm reduction	Search modes - Boolean/Phrase	Interface - EBSCOhost Search Screen - Advanced Search Database - CINAHL with Full Text	704	Edit S16
S15	MW health attitude	Search modes - SmartText Searching	Interface - EBSCOhost Search Screen - Advanced Search Database - CINAHL with Full Text	68	Edit S15

S14	MW food intake	Search modes - Boolean/Phrase	Interface - EBSCOhost Search Screen - Advanced Search Database - CINAHL with Full Text	2570	Edit S14
S13	MW eating behavior	Search modes - Boolean/Phrase	Interface - EBSCOhost Search Screen - Advanced Search Database - CINAHL with Full Text	3837	Edit S13
S12	MW intervention	Search modes - Boolean/Phrase	Interface - EBSCOhost Search Screen - Advanced Search Database - CINAHL with Full Text	11277	Edit S12
S11	TX overweight	Limiters - Age Groups: Infant: 1-23 months, Child, Preschool: 2-5 years Search modes - Boolean/Phrase	Interface - EBSCOhost Search Screen - Advanced Search Database - CINAHL with Full Text	1032	Edit S11
S10	MM "Obesity In Infancy and Childhood"	Search modes - Boolean/Phrase	Interface - EBSCOhost Search Screen - Advanced Search Database - CINAHL with Full Text	613	Edit S10
S9	MW parent child relations	Search modes - Boolean/Phrase	Interface - EBSCOhost Search Screen - Advanced Search Database - CINAHL with Full Text	5695	Edit S9
S8	MW program evaluation	Search modes - Boolean/Phrase	Interface - EBSCOhost Search Screen - Advanced Search Database - CINAHL with Full Text	14330	Edit S8
S7	MW health promotion	Search modes - Boolean/Phrase	Interface - EBSCOhost Search Screen - Advanced Search	22006	Edit S7

			Database - CINAHL with Full Text		
S6	TX polic*	Search modes - Boolean/Phrase	Interface - EBSCOhost Search Screen - Advanced Search Database - CINAHL with Full Text	205851	Edit S6
S5	MW risk factors	Search modes - Boolean/Phrase	Interface - EBSCOhost Search Screen - Advanced Search Database - CINAHL with Full Text	104117	Edit S5
S4	s1 or s2 or s3	Search modes - Boolean/Phrase	Interface - EBSCOhost Search Screen - Advanced Search Database - CINAHL with Full Text	635379	Edit S4
S3	TX strateg*	Search modes - Boolean/Phrase	Interface - EBSCOhost Search Screen - Advanced Search Database - CINAHL with Full Text	209084	Edit S3
S2	TX prevent*	Search modes - Boolean/Phrase	Interface - EBSCOhost Search Screen - Advanced Search Database - CINAHL with Full Text	424793	Edit S2
S1	TX intervention*	Search modes - Boolean/Phrase	Interface - EBSCOhost Search Screen - Advanced Search Database - CINAHL with Full Text	226634	

Appendix C: Overview of Search Process



* 1 relevant systematic review (Hesketh and Campbell (2007) was updated in a later 2010 systematic review by the same authors and therefore removed in the data synthesis stage.

** Note: During the process of data synthesis, one additional systematic review and one additional guideline were removed due to the discovery of data duplication. Therefore, one systematic review, one overview of reviews, and two guidelines were utilized in the final data synthesis.

Health-evidence.ca. (2009, November 25). *Keeping Track of Search Results: A Flowchart*. Retrieved [July 8, 2010], http://www.health-evidence.ca/public/tools/10/Keeping_Track_of_Search_Results_-_A_Flowchart.ppt.

Appendix D: Data Extraction Tables

Includes Guidelines, reviews & single study data extraction as relevant to this question

Items Reviewed	Review #1: Interventions to Prevent Obesity in 0-5 Year Olds: An Updated Systematic Review of the Literature
General Information & Quality Rating for Review	
Author(s) and Date	Hesketh and Campbell (2010) (Inclusive of Campbell and Hesketh, 2007)
Country	Australia
Quality Rating	Strong Rating of 10 using health-evidence.ca Quality Assessment Tool for Review Articles
Objectives of Review and Generalisability	Conducted to provide an update of the emerging evidence in the area of obesity prevention during early childhood. The studies included were delivered in a variety of settings: preschool/childcare, home, group, primary care, and mixed settings. Approximately two-thirds involved multi-faceted interventions and were conducted in the United States.
Details of Review	
Number of primary Studies Included	23 papers were included in this review (9 of 23 studies were summarized in 2007 previous review paper).
Types of Studies	A variety of study types were included: [8 Randomized Controlled Trials (RCTs), 1 Pilot- RCT, 6 Cluster - RCTs, 6 Controlled Clinical Trial (CCTs), 1 Interrupted time series, and 1 pre/post test]. Approximately half of the studies targeted socioeconomically disadvantaged children.
Search Period	Searches were limited to articles published between January 1995 and August 2008 (regardless of when intervention itself was conducted). Three quarters of the included studies were published from 2003 onward (n=17).
Number of databases searched	Reviews were hand searched to identify relevant publications and identify key researchers and research programs from which additional publications were identified; key informants were contacted to identify any new or emerging literature; systematic searches of 10 electronic databases were conducted: Academic Search Premier, Cumulative Index to Nursing and Allied Health literature, Cochrane central Register of controlled Trials, Communication, Global Health, Health Source: Nursing/Academic, Medline, Psycarticles, PsycINFO, Psychology, and Behavioral Sciences Collection.
Inclusion and Exclusion Criteria	<p>Inclusion criteria:</p> <ul style="list-style-type: none"> • Peer reviewed • English-language • Published January 1995-August 2008 • Reporting an intervention aiming to positively impact weight and/or behaviours that contribute to obesity • Reporting child anthropometric, diet, physical activity, or sedentary behaviour outcomes • Intervention targeting children aged 0-5 years of age <p>Exclusion criteria:</p> <ul style="list-style-type: none"> • Focusing on breastfeeding, eating disorders, obesity treatment, malnutrition, or elementary school-based interventions
Details of Interventions included in review	

Description of interventions	Studies were delivered through a variety of settings (family/home, group, primary care, pre-school/childcare and mixed settings)			
Outcome Measurements	child anthropometric, diet, physical activity, or sedentary behaviour outcomes			
Details of Interventions				
Primary Prevention Studies				
Authors, Year	Population	Intervention	Comparator	Outcomes
Preschool/childcare settings (with weight as an outcome, 6/9)				
Dennison et al. (2004) USA	<ul style="list-style-type: none"> • n= 176 • RCT Cluster – daycare • 12 week long intervention in 2.5-5.5 year olds – randomly assigned daycare children to intervention and control groups. • Part of ‘Brocodile the Crocodile’ program • Sixteen preschool and day care centres in rural upstate New York • Demographics: Predominantly Caucasian families with highly educated and employed parents. • Retention: 44%: 34 control and 43 intervention. 	<p>Focus: Children were encouraged to read instead of watching television.</p> <p>Intervention group: Seven educational sessions (over 10 weeks) that included a party to celebrate not watching TV for a week. Information sent home for parents, children encouraged to read rather than watch TV.</p> <p>N = 93</p>	<p>Control group: 20-min monthly interactive education sessions for 8 months and complementary staff and parental materials on general health and safety.</p> <p>N = 83</p>	<ul style="list-style-type: none"> • Anthropometrics and weight • Interventions were not effective in preventing unhealthy weight gain. • The programme appeared to be effective in reducing children’s television viewing time and increasing the number of children meeting recommended viewing limits. • Predominantly high SES. • Strengths: It was delivered within an existing infrastructure using a single external interventionist • Weakness: Part of a broader health promotion programme so unclear whether

				other aspects of the programme may have impacted results. There was a small sample and poor retention.
Fitzgibbon et al. (2002, 2006) Stolley (2003) Hip-Hop to Health Jr USA	(n = 409) Cluster RCT Target groups: 24 preschools children aged 3-5 years, mean 30.8 months, plus parents Retention: 71% n = 289 at 1 year follow up, n = 300 at 2-year follow-up Demographics: Predominantly low-income African American families. Inclusion criteria: child enrolled in Head Start program	Description of interventions: - Diet and physical activity in preschool plus educational component at home. 14 week (3 times weekly) programme – 20 min nutrition activity and 20 min of moderate to vigorous PA and parent weekly newsletter and 12 homework assignments (requiring 15-35 min per week) with small monetary reward. - hands-on learning about go and grow foods vs slow foods, using puppets of characters from each of the food groups. - Parents had weekly newsletter, homework (compensated US\$5 if completed), and twice weekly 30-minute low impact aerobic classes at children’s Head Start sites. - Reduction in fat, increase in fibre, increase in PA and inclusion of family are main elements of intervention. - 2 years follow-up Intervention providers: - Preschool staff (ECEs) Intervention settings: - Preschool and home (12 Head Start preschools for low income families) Theoretical frameworks: - Social learning theory, self-determination theory and the transtheoretical model. Implicit – obesity can be prevented by reducing dietary fat,	Control had 20-min class once per week for 14 weeks spent on general health activity. Parents had weekly newsletter.	Hip-Hop Jr – African American sites – significant differences in BMI at 1- and 2-year follow-up in favour of the intervention. Latino sites may not have shown a positive impact due to low cultural integration. Hip Hop to Health Jr – Ethnic minority children from Head Start programmes in Chicago that received a 14-week diet and physical activity intervention had significantly smaller increases in BMI compared with control children at 1 year follow up. Outcome – Intervention children had significantly smaller increases in BMI compared with control children at 1 year follow up.

		and increasing dietary fibre, and by an increase in physical activity and inclusion of family.		
Mo-Suwan et al. (1998)	Increasing physical activity - 30 week (1 year) long term study with female kindergarten students taking part in an aerobic exercise program - Cluster RCT involved 2 nd year kindergarten classes from two preschools.	N = 147 received an additional 15-min walking and 20-min aerobic dance three times per week for ~30 weeks	N = 145 received their regular physical activity program	Outcomes were assessed at baseline, twice during the intervention, and at the conclusion of the intervention. The prevalence of obesity assessed from two measures of triceps skin-fold thickness decreased in the intervention group. No group differences were found in BMI or weight/height The likelihood of having an increased BMI slope was lower in intervention than control group girls (odds ratio = 0.32, 95% confidence interval = 0.18, 0.56), but not boys.
Reilly et al. (2006) MAGIC (Movement and Activity Glasgow Intervention in Children) trial Cluster RCT	(n=545) Target groups: 36 nurseries children in preschool year – mean age 4.2, plus parents	Description of interventions: Physical activity at nursery (three 30 minute sessions of PA each week for 24 weeks) plus home-based health education (resource pack), posters on increasing PA through walking and play were displayed in preschool centres for 6 weeks. Intervention providers: Nursery staff (two staff from each intervention preschool attended three training sessions on the enhanced PA		No between group differences in BMI were observed at 6 months (before end of intervention) or 12 months (5-6 months post intervention).

		<p>sessions.</p> <p>Intervention settings: Nursery and home</p> <p>Theoretical frameworks: Not explicit – increasing physical activity in very young children will have a preventative effect on obesity</p>		
Specker and Binkley (2001, 2003, 2004)	3- 5 year olds	<p>Intervention: Involved four arms: (1) calcium supplement plus physical activity (n= 43), (2) calcium supplement plus fine motor activity control (n=45), (3) placebo plus physical activity (n=45), and (4) placebo plus fine motor activity control (n=45).</p> <p>The physical activity intervention consisted of 30-min of gross motor activity 5 days/week for 12 months involving a 5-min warm up, 20-min jumping, hopping, and skipping activities, and 5-min cool down</p>	Five days a week for 12 months, children in the control group received 30-min of fine motor activity designed to keep them sitting quietly.	Children in the intervention group recorded significantly higher physical activity levels, assessed by accelerometry, than control children mid- and post-intervention which persisted 6 months post intervention but was not observed 12 months post intervention. No differences in body weight or percent body fat, assessed by dual energy X-ray absorptiometry, were observed at any time point.
Healthy Start (USA) (2004) - Williams (1998a, b, 2004), Bollelle (1999a, b), Spark (1998), D’Agostino (1999) CCT	787 enrolled Nine Head Start preschools in upstate New York that served minority children (2 to 5 year olds) from families with annual income below national poverty line.	<p>Intervention: 3 year</p> <p>Modification of preschool food service to reduce saturated fat content 30% or less total energy from fat and 10% or less total saturated fatty acid intake.</p> <p>Group A: Food service and supplementary nutrition education (skills based, lessons on healthy eating) – in school and family</p>	Usual care condition.	Anthropometric testing – no significant difference found between food service and food service plus nutrition education group on outcomes. Neither intervention had a significant effect on gain in weight-to height

		based. Group B: Food service (education component focused on safety on accident prevention) – in school and family based. Group C: Control (no food modification and education component focused on safety and accident prevention) in school and family based – this group was not randomized.		ratio. – There was a significant difference in weight to height ratio for white participants but not African American or Hispanic.
Home-based settings (with weight as an outcome, 2/8)				
Harvey-Berino and Rourke (2003)	N = 43 Retention = 93% Target groups: Children 9 months – 3 years, mean 22 months, plus mothers Demographics: Native American families, average of 13 years' maternal education Inclusion criteria: Mother BMI over 25 kg/m ²	16 week intervention with Preschool First Nations people (US) Description of interventions: Evaluated the effects of home visiting on preschool Native American children. Indigenous peers taught 2 groups of mothers over 16 weeks through home parenting classes. Lessons focussed on healthy diet and exercise or provided typical parenting support. Parenting support programme focusing on how improved parenting skills could facilitate the development of appropriate eating and physical activity behaviours in the children. Intervention providers: Indigenous peers Intervention settings: Home Theoretical frameworks: Not explicit – Implicit – that involving mothers in a home-based educational intervention to improve eating and exercise would have a preventative effect to reduce obesity in young children	Control: Weekly home visits by indigenous peer educator. Parenting support programme focusing on general parenting skills.	The home visiting model was shown to be a feasible means of delivering interventions. Evidence of effectiveness for modifying relative weight and caloric intake in children but appeared to have no impact on children's fat intake or physical activity, or on maternal measures. Strength: Good compliance (all but two mothers completed all 16 sessions)
Watt et al. (2006)	RCT Aimed to improve infant feeding practices in a consecutive birth cohort by providing peer support to low-income mothers.	Intervention group mothers (n= 157) received monthly home visits from matched peer support volunteers, commencing when their baby was 3 months old until their baby was 12 months of age. Volunteers provided nonjudgmental advice	Control group mother received usual care (n=155)	No differences between groups were observed in child anthropometric measurements.

		and support and practical assistance on infant feeding practices, particularly weaning.		
Primary care settings (1/2)				
Lagstrom (1997), Niinikoski (1997), Rask-Nissila (2000), Talvia (2004) RCT STRIP (Special Turku Coronary Risk factor Intervention Project)	8 months to 4 years N = 1062 children from 1054 families. Demographics: General population sample.	Families received individualized counselling by a nutritionist at 1-3 month intervals from child aged 7 months to 2 years, then twice per year to age 7 years, letters sent home to children between visit to increase interest in food and nutrition. When child aged 7 years separate counselling sessions given to child and parents. Counselling based on constructivist theory of learning.	Control: Families were seen biannually and did not routinely receive any detailed counselling focused on the risk factors of atherosclerosis.	No growth differences. Girls (but not boys) that received the intervention gained slightly less weight between the ages of 2 and 3 years compared with controls. Well designed study shows that individualized infancy-onset dietary counselling directed at parents (and later children) favourably influenced children's diet, with reductions in total fat intake and maintenance of recommended dietary intakes of other nutrients.
Results of Review				
Meta-analysis?	No (small number of trials included and high heterogeneity in the interventions, participants, and outcome measures).			
Main Results of Review	<p><u>Preschool/childcare settings</u> There were 9 studies conducted in this setting. 3 had strong quality ratings and 6 had moderate ratings. One third achieved clear success (reduced fat intake, increased physical activity and reduced sedentary behaviour). A further third showed some evidence of success on some outcomes Many of the studies reported in the preschool/childcare setting showed no evidence of effect on behaviours that contribute to obesity</p> <p><u>Home-based settings</u> There were 8 studies conducted in this setting. 5 had moderate quality ratings and 3 had weak ratings. For 5 of the studies, the intervention was beneficial, 1 intervention had no effect and two had unclear results (beneficial for some but not all outcomes or participants)</p> <ul style="list-style-type: none"> The evidence base remains relatively sparse, particularly when compared to interventions that focus on school-aged 			

	<p>children. As obesity and behaviours that contribute to obesity are present in early childhood and continue throughout childhood, the importance of early intervention is emphasized.</p> <ul style="list-style-type: none"> • In general, studies conducted in the preschool/childcare setting received the highest quality ratings (all rated as strong or moderate, no studies rated as weak). • Many of the studies reported in the preschool/childcare setting showed no evidence of effect on behaviours that contribute to obesity despite, in many cases, strong study design. • There may have been insufficient sample sizes to detect what may be small but meaningful changes. • Parental involvement lacked in many of these studies and it may be vital for observable and lasting changes to be effected in childhood behaviour. • Interventions which showed evidence of success were designed to impact not only on knowledge but also on skills and competencies suggesting a social behavioural theory underpinning.
<p>Comments/Limitations</p>	<p>Only 3 studies received a strong methodological rating, all conducted within the preschool/childcare setting. 14 were rated as moderate and 6 were rated as methodologically weak.</p> <ul style="list-style-type: none"> • Differences in demographic characteristics of participants and settings of studies reported in this review are likely to limit the generalizability of the studies reported. 2/3 of identified studies were conducted in the United States and may not be generalizable to other countries. • Many studies included did not report data on cost effectiveness of the intervention programs reported on. • Only one objective measure, BMI, showed a positive significant result in one study. All studies showed some effectiveness on some self-report measures. • May not have been as great a difference between the activity levels of the control and intervention group.

Items Reviewed	
Review # 2: Systematic review of the effectiveness and cost-effectiveness of weight management schemes for the under fives: a short report	
General Information & Quality Rating for Review	
Author(s) and Date	Bond, M., Wyatt, K., Lloyd, J., Welch, K., and Taylor, R. 2009
Country	United Kingdom
Quality Rating	Rating: 9 strong using health-evidence.ca tool for reviews
Objectives of Review and Generalisability	To search for, review and synthesize studies of the effectiveness and cost-effectiveness of weight management schemes for the under fives. Population of focus is the under fives in Organization for Economic Cooperation and Development (OECD) countries.
Details of Review	
Number of primary Studies Included	22 articles included in systematic review following exclusion due to relevance criteria – 16 were systematic reviews or meta-analyses (only 2 focussed on 0-5 y olds) and six were RCT papers (reporting on three trials)
Types of Studies	Study designs included are randomised controlled trials (RCTs) and other non-randomised controlled designs.
Search Period	Databases searched from 1990 to February 2009. Supplementary internet searches were additionally conducted.
Number of databases searched	Searched 13 databases, including: MEDLINE, MEDLINE In-Process, EMBASE, CAB, Health Management Information Consortium, The Cochrane Database of Systematic Reviews, Cochrane Register of Controlled Trials, Science Citation Index Expanded, Conference Proceedings Citation Index, database of Abstract reviews, HTA, PsycINFO, NHS CRD.
Inclusion and Exclusion Criteria	Inclusion criteria: <ul style="list-style-type: none"> • Systematic reviews of RCTs, RCTs and non-randomized controlled designs Exclusion criteria: <ul style="list-style-type: none"> • Uncontrolled studies • Animal models • Narrative reviews, editorials, opinions • Studies of children with morbidities that have a causal association with overweight and obesity, e.g. Prader-Willi syndrome • Non-English language papers Systematic reviews: 14 out of 16 systematic reviews or meta-analyses included children up to 18 years, with most of children 5 years or older; only 2 of 16 included preschool children – both included uncontrolled studies and self-reported outcomes. Both systematic reviews included only 2 studies that met inclusion criteria (Hip-Hop Jr and Harvey-Berino and Rourke) – included fully in RCT trials.
Details of Interventions included in review	
Description of interventions	Physical activity and nutritional strategies or reduce sedentary behaviour. Intervention settings:

	Home, group, primary care, preschool/childcare and mixed settings Target groups: 2-<6 and 0-5 year olds
Outcome Measurements	Weight status, BMI or body fat and self-report Unspecified, included self-report Accelerometry, weight, height
Results of Review	
Meta-analysis?	No
Main Results of Review	<p><u>Systematic Reviews</u></p> <ul style="list-style-type: none"> Included Bluford et al. and Campbell and Hesketh (2007) (included in above, Hesketh and Campbell, 2010) <p>Bluford</p> <ul style="list-style-type: none"> Moderately rated 4 studies showed positive change in weight status or body fat. Self-report measures showed both significant and non-significant results. Overall, concluded that multi-component programmes were most successful, particularly if parents were involved; this conclusion appears to be largely based on the strength of the Hip-Hop Jr RCT. <p><u>Overall RCTs</u> (only three studies included and summarized in Hesketh and Campbell, 2010) – Reilly et al, Hip-Hop to Health Jr, and Harvey-Berino and Rourke)</p> <ul style="list-style-type: none"> Included RCTs were of good to moderate quality. Only significant difference found in Hip-Hop Jr study – no other significant differences in BMI were found, however, there was some evidence of positive trends for BMI and weight. Trends in BMI and weight favoured the intervention groups Trends in accelerometry favoured the control groups. Hip Hop Jr provided financial reward to mothers completing homework may have increased incentive to stay in study and engage in messages. Conclusions are based on three dissimilar studies, thereby making the drawing of firm conclusions difficult. No adverse effects noted from any of the trials. <p>Bond et al. suggest that future interventions should consider:</p> <ul style="list-style-type: none"> Effective training of the staff delivering the intervention Cultural sensitivity Sustained moderate to vigorous physical activity and nutritional advice components for children Active engagement of parents/carers in reinforcing the messages to the children, combined with education about healthy diets and exercise.
Comments/Limitations	<ul style="list-style-type: none"> Conclusions should be treated with caution as they included uncontrolled studies and self-report measures. Strengths of this assessment are that it is comprehensive, systematic and up-to-date, used objectively assessed outcome measures and was conducted by an independent research team.

	<ul style="list-style-type: none">• Limitations include limited to English and back only to 1990, however, Bluford and colleagues were not restricted in this way and did not find any additional includable studies. These conclusions are based on only three dissimilar studies, two in low-income ethnic minority groups, in different contexts and settings, thereby making the drawing of firm conclusions difficult.• Controlled trial evidence of weight management schemes and interventions aimed at the prevention of obesity for the under fives is scarce.
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Items Reviewed		Guideline #1: 2006 Canadian clinical practice guidelines on the management and prevention of obesity in adults and children		
General Information & Quality Rating for Review				
Author(s) and Date	Lau, D.C.W, Douketis, J.D., Morrison, K.M., Hramiak, I.M., Sharma, A.M., Ur, E. for the members of the Obesity Canada Clinical Practice Guidelines Expert Panel			
Country	Canada			
Quality Rating	Moderate rating with the AGREE II Guideline Appraisal Tool			
Objectives of Review and Generalisability	<p>Guidelines aimed to address a broad range of populations and patients, encompassing all age groups and subgroups: children, adolescents and adults who are overweight or obese, or with an increased waist circumference Population subgroups included as well.</p> <p>Two relevant chapters include:</p> <ol style="list-style-type: none"> 1) Chapter 22: Individual approaches to the prevention of pediatric obesity using physical activity Authors: LeBlanc, C.M.A., Irving, A., and Tremblay, M. 2) Chapter 23: Prevention of childhood obesity through nutrition: review of effectiveness 			
Details of Review				
Number of primary Studies Included	Not stated			
Types of Studies	Randomized Controlled trials (RCTs), prospective cohort studies, case-control studies or retrospective cohort studies			
Search Period	Time of inception of databases until the end of the review period (2003), English and non-English included.			
Number of databases searched	<p>Varied for each chapter. Electronic databases (MEDLINE, EMBASE, Cochrane Controlled Clinical Trials Register and HealthSTAR) were searched and a manual review of systematic reviews or meta-analyses to identify additional studies.</p> <p>Chapter 22: RCTs Systematic search of MEDLINE, EMBASE, Cochrane Controlled Clinical Trials Register, HealthSTAR, CINAHL, Eric, PsycINFO, BIOSIS and SportsDiscus was conducted – restricted to studies of increased physical activity (with or without modifying diet) or reduced physical inactivity.</p> <p>Chapter 23: Systematic review of RCTS showing changes in prevalence of obesity or behaviour. Databases searched: MEDLINE, EMBASE and the Cochrane Controlled Clinical Trials Register. *Some studies other than RCTs were included to highlight specific concepts or in the absence of relevant RCTs.</p>			
Details of Interventions				
Primary Prevention Studies				
Authors, Year	Population	Intervention	Comparator	Outcomes
Chapter 23:		Chapter 23:		Owen et al. (2005)

		<p>Nutrition in utero RCT studies are not performed in utero – not enough evidence to base a conclusion Evolving evidence – small- or large- for gestational age are at risk of later obesity (Hediger et al. and Kokkoris et al.)</p> <p>Nutrition in infancy Data from the US Centers for Disease Control and Prevention’s Pediatric Nutrition Surveillance System suggest that breast-feeding is protective against pediatric overweight – improved self regulation, adapt more readily to new foods. Further support acknowledged from the American Academy of Pediatrics and Health Canada.</p>		<p>– Effect of infant feeding on the risk of obesity across the life course: a quantitative review of published evidence – a meta-analysis of 29 studies – concluded that initial breast-feeding protects against obesity in later life.</p>
Results of Review				
Meta-analysis?	No			
Main Results of Review	<p>Recommendations:</p> <p>Chapter 22:</p> <ol style="list-style-type: none"> a. Suggest limiting “screen time” (i.e., television watching, playing video or computer games) to no more than 2 hours a day to encourage more activity and less food consumption, and to limit exposure to food advertising [grade B, Level 3]. b. The role of schools as pivotal settings for the promotion of healthy active living and school-based prevention programs to reduce the risk of childhood obesity is encouraged, as are interventions to increase daily physical activity through physical education class time and opportunities for active recreation [grade C, level 4]. <ul style="list-style-type: none"> • The development of programs in multiple settings targeting behaviour change with parental and family involvement is encouraged [grade C, level 4]. <p>Chapter 23:</p> <ol style="list-style-type: none"> c. Discussion of the prevention of childhood obesity with the pregnant mother is encouraged [grade C, level 4]. d. Exclusive breast-feeding of infants is encouraged until at least 6 months of age to prevent late obesity [grade C, level 4]. <p>Discussion of limiting consumption of energy-dense snack foods high in sugar and fat during childhood and adolescence is encouraged [grade C, level 4].</p>			
Comments/Limitations	<p>Passive dissemination has not had an effect on clinical practice in the short-term. Furthermore, the publication of guidelines as a stand-alone exercise produces little change in clinical practice and no change in health outcomes. However, the literature does suggest that a multi-faceted set of interventions may affect practice and help in the implementation of evidence-based recommendations. More research is warranted to understand the mechanism of implementation.</p>			

Items Reviewed	Guideline #2: National Institute for Health and Clinical Excellence Clinical Guideline 43 – Obesity: Guidance on the prevention, identification, assessment and management of overweight and obesity in adults and children
General Information & Quality Rating for Review	
Author(s) and Date	NICE, 2006
Country	United Kingdom
Quality Rating	Rating: High rating with the AGREE II Guideline Appraisal Tool
Objectives of Review and Generalisability	The guidance aimed to: <ul style="list-style-type: none"> • Stem the rising prevalence of obesity and diseases associated with it • Increase the effectiveness of interventions to prevent overweight and obesity • Improve the care provided to adults and children with obesity, particularly in primary care. Complementary clinical and public health guidance are essential to address the hazy divisions between prevention and management of obesity.
Details of Review	
Number of primary Studies Included	Chapter 8. Prevention evidence summary: Interventions for pre-school children and family-based interventions ('early years') 13 papers Database searches were carried out in December 2004 for papers published from 1990 onwards (1995 onwards for systematic review level evidence). A final update search was completed on Dec 1 2005 on a reduced number of databases.
Types of Studies	<i>Study year and type</i> <ul style="list-style-type: none"> • Rapid review to include search for interventions and evaluations and also cohort, qualitative and survey studies for corroborative evidence. To ensure that any key data published pre-1990 was not overlooked, an additional search of the Cochrane Trial database 1966-89 was undertaken and any relevant RCTs were included.
Search Period	<i>Evidence of effectiveness</i> <ul style="list-style-type: none"> • Weight outcomes – include all RCTs and all controlled clinical (nonrandomised) trials (CCTs) from 1990. To ensure that any key data published pre 1990 is not overlooked, an additional search of the Cochrane Trial database 1966–89 to be undertaken and any relevant RCTs included. Where systematic reviews (published 1995 onwards) are identified, any included RCTs published before 1990 to be considered in rapid review.
Number of databases searched	Not available
Inclusion and Exclusion Criteria	Adhered to the standard public health review parameters. <ul style="list-style-type: none"> • English language papers only included. • Papers not held at the British Library excluded. For topic areas with limited or no RCT/CCT evidence used the best available evidence. <ul style="list-style-type: none"> • Intermediate outcomes (i.e. physical activity and diet) – include systematic review evidence from 1995 plus more recent

	<p>RCTs and CCTs where available.</p> <p><i>Cohort studies</i></p> <ul style="list-style-type: none"> • Prospective cohorts of at least 12 months duration that assessed factors potentially associated with weight gain or weight control in adults and/or children who were not all obese at baseline and reported a weight outcome at baseline and follow-up included. • There are no structured reporting requirements for observational longitudinal studies. Tooth et al. (2005) have recently developed and tested a checklist. <p><i>Corroborative evidence</i></p> <ul style="list-style-type: none"> • Evidence from UK to be included in all reviews. Relevance of evidence from outside UK to be considered by question though ability to include constrained by time limitations. <p><i>Length of follow-up</i></p> <ul style="list-style-type: none"> • Minimum requirement for studies of effectiveness is at least one data point before and one after the intervention. • Minimum time period of 3 months between baseline and repeat measures for interventions.
Details of Interventions included in review	
Description of interventions	<p>An evidence review was conducted in each of the following topic areas:</p> <ul style="list-style-type: none"> • Identification of children and adults at risk of obesity • Raising awareness of weight, diet and activity • Determinants of energy balance • Interventions among children aged 2-5 years and families • School-based interventions • Workplace-based interventions • Community-based interventions led by health professionals • Broader community-based interventions • Interventions among black and minority ethnic groups, vulnerable groups and at life stages with increased risk for weight gain • Management of obesity in non-clinical settings
Outcome Measurements	Studies which had outcome measures of weight, diet and/or physical activity.
Results of Review	
Meta-analysis?	No
Main Results of Review	<p>8.3 weight outcomes</p> <p>8.3.1 2-5 year olds</p> <p>Five interventions were identified among 2-5 year old children and their families which reported a weight outcome. Five of the six studies were/are being conducted in a nursery or childcare setting, but all have some degree of family involvement. The He paper was excluded in data extraction as the children were overweight at baseline.</p> <p>The majority of interventions took place in daycare or clinic settings. Studies suggest that interventions work best where they are focused on preventing obesity (rather than simply improving diet and levels of physical activity) and delivered by researchers. The evidence suggested that the best mode of delivery was intensive interventions and that education alone is</p>

	<p>ineffective.</p> <p>3 of the 5 studies included found some evidence that the intervention prevented unhealthy weight gain leading to obesity, compared with controls. Two US-based studies reported no significant differences in weight between intervention and control children. (p. 292)</p> <p>Key Priorities for Implementation: Public health – Managers and health professionals in all primary care settings should ensure that preventing and managing obesity is a priority, at both strategic and delivery levels. Dedicated resources should be allocated for action.</p> <p>Early years settings Nurseries and other childcare facilities should: - minimise sedentary activities during play time, and provide regular opportunities for enjoyable active play and structured physical activity sessions</p> <p>Recommendations for parents and carers (1.1.1.6) Helping children maintain or work towards a healthy weight: Diet - children and young adults should eat regular meals, including breakfast, in a pleasant, sociable environment without distractions (such as watching television). - Parents and carers should eat with children – with all family members eating the same foods Activity - Encourage active play - Try to be more active as a family Gradually reduce sedentary activities – such as watching television or playing video games - encourage children to participate in sport or other active recreation, and make the most of opportunities for exercise at school</p> <p>Delivery for health professionals working with preschool, childcare and family settings 1.1.2.17 Any programme to prevent obesity in preschool, childcare or family settings should incorporate a range of components (rather than focusing on parental education alone), such as: a) diet – interactive cookery demonstrations, videos and group discussions on practical issues such as meal planning and shopping for food and drink b) physical activity – interactive demonstrations, videos and group discussions on practical issues such as ideas for activities, opportunities for active play, safety and local facilities. 1.1.2.18 Family programmes to prevent obesity, improve diet (and reduce energy intake) and/or increase physical activity levels should provide ongoing, tailored support and incorporate a range of behaviour change techniques. 1.1.4 Early years settings The preschool years (ages 2-5) – p. 26 – 1.1.4.1 All nurseries and childcare facilities should ensure that preventing excess weight gain and improving children’s diet and activity levels are priorities. 1.1.4.2 All action aimed at preventing excess weight gain, improving diet (and reducing energy intake) and increasing</p>
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	<p>activity levels in children should involve parents and carers.</p> <p>1.1.4.3 Nurseries and other childcare facilities should: - minimise sedentary activities during play time, and provide regular opportunities for enjoyable active play and structured physical activity sessions.</p> <p>1.1.4.4 Staff should ensure that children eat regular, healthy meals in a pleasant, sociable environment free from other distractions (such as television). Children should be advised at mealtimes and, if possible, staff should eat with children.</p> <p>Note on evidence related to “Interventions aimed at black, minority ethnic groups, vulnerable groups and vulnerable life stages”</p> <ul style="list-style-type: none"> • There is a lack of evidence on the effectiveness of interventions among BMEGs in the UK. All identified RCTs were undertaken in the USA, the majority among African/black Americans. • There is evidence (1+) that school-based interventions are effective in preventing excess weight gain among black American children.
Comments/Limitations	There is a lack of controlled studies that met the inclusion criteria for this review.