



Canadian Physical Activity Guidelines for the Early Years (aged 0-4 years) Clinical Practice Guideline Development Report

Canadian Society for Exercise Physiology

MOST RECENT LITERATURE SEARCH: May 2011
GUIDELINE RELEASE DATE: March 2012

SUMMARY

Guideline question

What is the frequency, intensity, time and type of physical activity, as measured by direct and indirect methods, associated with improved health indicators (i.e. adiposity, bone and skeletal health, motor skill development, psychosocial health, cognitive development and cardio-metabolic indicators) in infants (1 month-1.0 years), toddlers (1.1-3.0 years) preschoolers (3.1-4.99 years)?

The target population

These guidelines are relevant to all apparently healthy infants (aged less than 1 year), toddlers (aged 1.0-3.0 years) and preschoolers (aged 3.0-4.99 years), irrespective of gender, race, ethnicity or socio-economic status of the family.

The target users

The intended audience for these guidelines is parents, teachers, caregivers and health care providers responsible for children in the early years.

Methods

Relevant evidence was identified by a systematic search of the following electronic bibliographic databases: Ovid MEDLINE(R) (1948 to May 11, 2011), Ovid EMBASE (1947 to 2011 May 11), and Ovid psychINFO (1806 to May Week 2 2011), EBSCO SPORTDiscus (1985-May 11, 2011) and Cochrane Central Database (up to May 2011). The six eligible health indicators were: adiposity, bone and skeletal health, psychosocial health, motor skill development, cognitive development and cardio-metabolic health indicators. This review was registered with the PROSPERO network (registration number: CRD42011001243).

Government documents were obtained through correspondence with content experts and through government websites. Bibliographies of key studies and review papers were scanned to identify additional studies. Evidence presented in the systematic review was reviewed and interpreted by national and international content experts. A consensus meeting was convened to discuss and debate the information presented in the systematic review and to draft recommendations for the Canadian Physical Activity Guidelines for the Early Years (aged 0-4 years).

External review of the draft guidelines was sought through stakeholders via an online survey. The survey was sent to health care professionals, academics, international content experts, governmental and non-governmental organizations and community members. Stakeholders were also encouraged to share the survey

with their peers and colleagues. Feedback was provided by 932 stakeholders (858 in English and 74 in French). The Physical Activity Measurement and Guidelines Steering Committee (PAMG) re-convened to address the concerns and comments identified through the consultations and to adjust the guidelines accordingly. Stakeholders from every province and territory responded to the survey. The majority of respondents (40%) self-identified as a health professional (nurse, health promoter, dietician, physiotherapist etc.) or as an early child educator (21%). Further details can be found in the online survey results.

Key Evidence

Key evidence to inform these guidelines comes from a systematic review examining the relationship between physical activity and 6 health indicators (adiposity, bone and skeletal health, motor skill development, psychosocial health, cognitive development, cardio-metabolic health indicators) in the early years (aged 0-4 years). This review has been submitted for publication in a peer review journal.

The preliminary search of electronic databases, reference lists, and documents provided by International consultants identified 11,335 potentially relevant articles. After de-duplication, 7,872 relevant articles remained. Eighteen unique studies, representing 22 papers met inclusion criteria.

In total, 12,742 enrolled participants were included in this review. In brief, 5 reported results in infants, 2 in toddlers and 11 in preschoolers. Of these, included studies reported on the following health indicators: adiposity (n=11), bone and skeletal health (n=2), motor development (n=4), psychosocial health (n=3), cognitive development (n=1) and cardio-metabolic health indicators (n=3).

Overall, in infants there was low to moderate quality evidence to suggest increased or higher physical activity is positively associated with improved measures of adiposity, motor skill development, and cognitive development. In toddlers, there was moderate quality evidence to suggest increased or higher physical activity was positively associated with bone and skeletal health. In preschoolers, there was low to high quality evidence on the relationship between increased or higher physical activity and improved measures of adiposity, motor skill development, psychosocial health, and cardio-metabolic health indicators.

Future Research

Areas for future research have been identified within the published guidelines paper (Tremblay et al. 2012), the systematic review (Timmons et al. *submitted*) as well as through the stakeholder consultations. Despite a recent call to action by many funding bodies, the research examining physical activity in the early years is still in its infancy and there is a need for larger studies using direct and consistent measurements (i.e. larger and more diverse sample sizes, direct measures of physical activity, intent-to-treat analyses, reporting of adverse events). These larger studies should then be able to speak to the impact of dose (i.e. frequency, intensity, time and type) of physical activity needed for good health. Finally, future research should focus on standardizing methods for data collection and analysis and work toward implementing direct (i.e. accelerometers) and indirect (i.e. questionnaires for context) measures of physical activity.

The information captured in the systematic review, supplemented by similar reviews from Australia and the United Kingdom and the input of the consensus panel, allowed the PAMG Steering Committee to develop evidence-informed guidelines on the amount of time that children should engage in physical activities. Future work needs to focus on successfully messaging these guidelines so this information can be effectively disseminated to the public.

GUIDELINE RECOMMENDATIONS

Preamble

These guidelines are relevant to all apparently healthy infants (aged <1 year), toddlers (aged 1–2 years), and preschoolers (aged 3–4 years), irrespective of gender, race, ethnicity, or socio-economic status of the family. Parents and caregivers should encourage infants, toddlers, and preschoolers to participate in a variety of physical activities that support their healthy growth and development, are age-appropriate, enjoyable and safe, and occur in the context of family, child care, school, and community.

Infants should be physically active daily as a part of supervised indoor and outdoor experiences. Activities could include tummy time, reaching and grasping, pushing and pulling, and crawling. Children in the early years should be physically active daily as part of play, games, sports, transportation, recreation, and physical education. For those who are physically inactive, increasing daily activity towards the recommended levels can provide some health benefits.

Following these physical activity guidelines may improve motor skills, body composition, and aspects of metabolic health and social development. These potential benefits far exceed the potential risks associated with physical activity. These guidelines may be appropriate for infants, toddlers, and preschoolers with a disability or medical condition; however, their parents or caregiver should consult a health professional to understand the types and amounts of physical activity appropriate for them.

This recommendation places a high value on the advantages and benefits of physical activity that accrue throughout life. It also takes into consideration the preferences of practitioners to have guidance in this area for young children and the importance of setting targets for surveillance. Expert opinion and other international guidelines were used to complement the evidence upon which these guidelines were developed.

For guidance on decreasing sedentary behaviour, please refer to the Canadian Sedentary Behaviour Guidelines (www.csep.ca/guidelines).

Guidelines

For healthy growth and development:

- Infants (aged <1 year) should be physically active several times daily – particularly through interactive floor-based play.
- Toddlers (aged 1–2 years) and preschoolers (aged 3–4 years) should accumulate at least 180 min of physical activity at any intensity spread throughout the day, including
 - A variety of activities in different environments.
 - Activities that develop movement skills.
 - Progression toward at least 60 min of energetic play by 5 years of age.

More daily physical activity provides greater benefits.

Copyright

These guidelines are copyrighted by the Canadian Society for Exercise Physiology (CSEP); the guidelines herein may not be reproduced except in their entirety, without the express written permission of CSEP. CSEP reserves the right at any time, to change or revoke authorization.

Disclaimer

Care has been taken in the preparation of information contained in this document. Nonetheless, any person seeking to apply or consult these guidelines is expected to use independent judgment, or if they are not qualified to do so, to seek the advice of a qualified health professional. The Canadian Society for Exercise Physiology makes no warranties of any kind with respect to these guidelines and takes no responsibility for

their application in any way. The Canadian Society for Exercise Physiology, in partnership with the Healthy Active Living and Obesity Research Group (HALO) funded the development of these guidelines. The systematic review that informed the guidelines was funded by a Knowledge Synthesis Grant from the Canadian Institutes of Health Research (grant #PAC-111612). The views of the funding agencies had no influence on the content or recommendations included in this document.

FULL REPORT

Guideline Question

What is the frequency, intensity, time and type of physical activity, as measured by direct and indirect methods, associated with improved health indicators (i.e. adiposity, bone and skeletal health, motor skill development, psychosocial health, cognitive development and cardio-metabolic indicators) in infants (1 month-1.0 years), toddlers (1.1-3.0 years) preschoolers (3.1-4.99 years)?

INTRODUCTION AND BACKGROUND

Even though the early years are a critical period for the development of healthy living behaviours, we have yet to synthesize the evidence to suggest minimal and optimal amounts of physical activity needed. The health benefits of physical activity for school-aged children are well established (Strong et al. 2005; Janssen and LeBlanc 2010); however there is a gap in this knowledge for the early years (Timmons et al. 2007). In 2010, the World Health Organization estimated that more than 42 million children under the age of 5 years were overweight worldwide (World Health Organization, 2011) and that young children engage in low levels of physical activity and very high levels of sedentary time (Pate et al. 2004; Timmons et al. 2007a; Oliver et al. 2007; Hinkley et al. 2008).

Until recently, only one set of physical activity guidelines was available for children under the age of 5 years (National Association for Sport and Physical Education, 2009). These guidelines were useful recommendations for parents and caregivers with advice on healthy living, but were informed largely on expert consensus and not by the rigor of a systematic review. Australia and the United Kingdom (UK) recently released evidence-based guidelines, which recommend that preschoolers be physically active for at least 180 minutes per day (Department of Health and Ageing, Australia 2011; Start Active, Stay Active, United Kingdom, 2011). Unfortunately, the scientific reviews used to inform those guidelines have not been published, and so the nature of the relationship between physical activity and health during the early years remains unclear.

Since 1995, the Canadian Society for Exercise Physiology (CSEP) and Health Canada / Public Health Agency of Canada (PHAC) have worked together on the development of Canadian Physical Activity Guidelines to promote healthy active living in the Canadian population. This began with the publication of Canada's Physical Activity Guide for Adults (20-55 years of age) in 1998 (Health Canada and the Canadian Society for Exercise Physiology 1998), Older Adults (>55 years of age) in 1999 (Health Canada and the Canadian Society for Exercise Physiology 1999), Children (6-9 years of age) in 2002 (Health Canada and the Canadian Society for Exercise Physiology 2002a), and Youth (10-14 years of age) in 2002 (Health Canada and the Canadian Society for Exercise Physiology 2002b). These guides have been the PHAC's most requested resource (Tremblay et al. 2007a). In 2011, updated physical activity guidelines for children and youth, adults and older adults were released (Tremblay et al. 2011a) as well as sedentary behaviour guidelines for children and youth (Tremblay et al. 2011b); however, a systematic review was still not available to inform guidelines for the early years.

In Canada, the demand for guidance on physical activity for the early years is clearly evident from a foundation paper by Timmons et al. (2007); based on journal access records, the preschool paper was downloaded 2-5 times more frequently (nearly 6,000 downloads) than other foundation papers used to inform updated guidelines for school-aged children, youth, adults, and older adults. Further, stakeholder consultations by the Canadian Society for Exercise Physiology (Canadian Society for Exercise Physiology 2011) and the Public Health Agency of Canada revealed a strong demand for physical activity guidelines for the early years. In March of 2011, we embarked on a rigorous and transparent process of guideline development following the framework explained in detail by Tremblay and Haskell (Tremblay and Haskell 2012).

This report outlines the steps that were taken to arrive at the Canadian Physical Activity Guidelines for the Early Years (aged 0-4 years). These guidelines are presented through a partnership between CSEP, the Healthy

Active Living and Obesity Research Group (HALO) and ParticipACTION, with financial support from the Canadian Institutes of Health Research (CIHR), and made available to all Canadians. The following guidelines were informed by a rigorous scientific process, and are based on a systematic review of the scientific evidence. The CSEP Physical Activity Measurement and Guideline (PAMG) Steering Committee has worked to make this process as rigorous and as transparent as possible.

METHODS

Guideline Development

Figure 1 outlines the process that the PAMG Steering Committee has undergone to develop the physical activity guidelines. The framework to develop the Canadian Physical Activity Guidelines for the Early Years was similar to that used to update the Canadian Physical Activity Guidelines for other age groups. Details on this process can be found elsewhere (Tremblay et al. 2007a, 2010b, 2011a, 2012 *in press*). As with the development of other physical activity guidelines, these guidelines aimed to adhere to the rigorous process outlined in the Appraisal of Guidelines Research and Evaluation (AGREE) II instrument. Details on the AGREE II instrument can be found elsewhere (Brouwers et al. 2010a; Brouwers et al. 2010b; Brouwers 2010c). The AGREE II instrument can be found [here](#). The guidelines were informed by a systematic review on physical activity and health indicators in the early years (Timmons et al. 2012 *Submitted*). Evidence from the systematic review was assessed using the GRADE framework and used to help inform the appropriate wording for the proposed guidelines.

Consensus Meeting

In December 2011, the PAMG Committee convened for a 1.5 day consensus meeting where the draft guidelines were written (see participant list in Appendix A). The guideline recommendations were informed by evidence from the systematic review (described in further detail below). Participants also received background materials including documents that helped inform similar guidelines in the U.K. and Australia, previous Canadian physical activity guideline papers, and information explaining the GRADE and AGREE II processes. The resulting product of the consensus meeting was a preamble to explain the guidelines, followed by the guidelines themselves. The draft guidelines were then sent to stakeholders for comment and input.

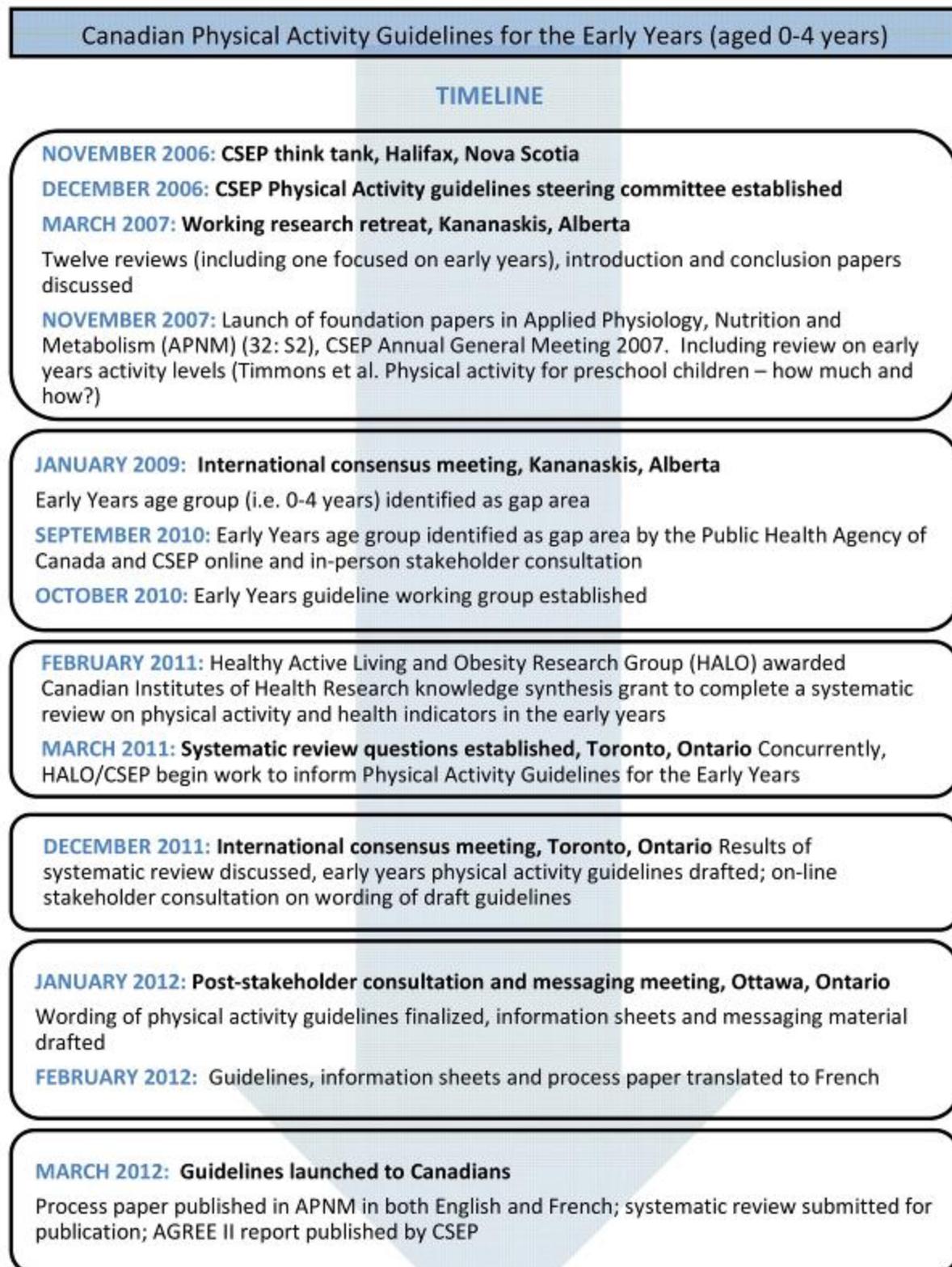
Stakeholder Involvement

Throughout the guideline development process, there was substantial stakeholder involvement, including scientists, guideline developers, and end users. The scientific stakeholders were engaged in formulating the research questions, completing the systematic review, interpreting the evidence, drafting the guidelines, participating in the stakeholder consultation, and writing this paper. The PAMG Steering Committee also included representatives involved in physical activity guidelines development for the early years in Australia and the United Kingdom. Based on the evidence summarized in the systematic review and the draft guidelines prepared at the December 2011 consensus meeting, we also sought feedback from a wide range of stakeholders interested in physical activity and health promotion for the early years, including national and international content experts, health professionals, government and non-governmental organizations, teachers, caregivers and parents. A list of stakeholder groups can be found in Appendix B. Stakeholders were encouraged to share the CSEP survey with their peers and colleagues to further expand the consultation base.

Consultations were completed through an on-line survey conducted in December 2011 asking 6 questions directly related to the proposed physical activity guidelines for the early years and 6 questions directly related to proposed sedentary behaviour guidelines for the early years (Tremblay et al. 2012b). Questions asked about the wording of, and agreement with, the proposed physical activity guidelines and their associated preamble. Written comments were invited and respondents were told they would receive updated and refined guidelines when the survey process was completed. Nine-hundred and thirty-two stakeholders responded to the English (n=858) and French (n=74) surveys with 212 stakeholders providing additional written comments and

suggestions. Overall, there was a high level of agreement with the draft guidelines. See details on the draft guidelines below. A summary of the survey results can be found in English [here](#) and in French [here](#). In January 2012, the PAMG Steering Committee re-convened to address the concerns and comments identified from the stakeholder consultations and revised the guidelines and preamble accordingly. The final guidelines are presented in this report.

Figure 1. Timeline and key events for developing Canadian Physical Activity Guidelines for the Early Years (aged 0-4 years)



SYSTEMATIC REVIEW

Reference

Timmons BW, LeBlanc AG, Carson V, Connor Gorber S, Dillman C, Janssen I, Kho ME, Spence JC, Stearns JAS, Tremblay MS. Systematic review of physical activity and health in the early years (aged 0-4 years). *Submitted*.

Question to be answered in the systematic review

What is the frequency, intensity, time and type of physical activity, as measured by direct and indirect methods, associated with improved health indicators (i.e. adiposity, bone and skeletal health, motor skill development, psychosocial health, cognitive development and cardio-metabolic indicators) in infants (1 month-1.0 years), toddlers (1.1-3.0 years) preschoolers (3.1-4.99 years)?

METHODS

Evidence Synthesis and quality assessment

The GRADE (Grading of Recommendations Assessment, Development and Evaluation) framework was used to guide our evaluation of the evidence from this systematic review including *a-priori* ranking of health indicators and risks of harm for increasing physical activity, and quality assessment of the evidence. Included studies were divided by age group and then by health indicator. Quality of evidence for each health indicator was assessed based on study design, risk of bias, consistency of results, directness of the intervention, precision of results, and possible dose-response gradient. Details on GRADE methodology can be found elsewhere (Balshem et al. 2011; Guyatt et al. 2011a; Guyatt et al. 2011c; Guyatt et al. 2011e; Guyatt et al. 2011f; Guyatt et al. 2011d; Guyatt et al. 2011g; Guyatt et al. 2011h; Guyatt et al. 2011b).

Literature search strategy

To be included, studies were required to have a measure of physical activity as an exposure variable and at least one of six identified health indicators as an outcome of interest. The search strategy can be found in Appendix C. Both British and American spelling for measures of physical activity and measured health outcomes were searched. The six eligible health indicators and search terms (in parentheses) included in this review were:

1. Adiposity (e.g., overweight/obesity measured by body mass index (BMI), waist circumference, skinfolds, bio-impedance analysis (BIA), dual-energy x-ray absorptiometry (DXA or DEXA));
2. Bone and skeletal health (e.g., determined with measurements such as bone mineral density (BMD) or bone mass (i.e. bone mineral content (BMC)) or related measure;
3. Motor skill development (e.g., motor proficiency, gross motor skills, and/or locomotor and object control);
4. Psychosocial health (e.g., self-concept, self-esteem, emotions, happiness, social/peer interaction and acceptance, aggression and temperament);
5. Cognitive development (e.g., language development and attention);
6. Cardio-metabolic indicators (e.g., blood pressure, plasma lipids and lipoprotein concentrations (e.g. HDL-cholesterol, triglycerides), fasting glucose, insulin resistance and inflammatory markers (e.g. C-reactive protein)).

Databases searched included:

- Ovid MEDLINE(R) (1948 to May 11, 2011)
- Ovid EMBASE (1947 to 2011 May 11)
- Ovid psycINFO (1806 to May Week 2 2011)
- EBSCO SPORTDiscus (1985-May 11, 2011)
- Cochrane Central Database (up to May 2011)

Studies were included if they were published and peer reviewed, and employed one of the following designs: randomized controlled trial, quasi-experimental, prospective cohort or any study that had either a comparison group or a follow-up period. Longitudinal studies were included if the data presented in the article were consistent with established age limits (i.e., the study was required to have at least one measurement from the 0-4.9 year old period).

Inclusion Criteria

Using *a-priori* inclusion and exclusion criteria, authors identified potentially relevant citations by title and abstract, and retrieved full-text articles for detailed review. Studies were included only if there was a measurement of physical activity. No language or date limits were imposed in the search; however, due to issues of feasibility, potential papers published in languages other than English or French ($n = 9$) were excluded.

Statistical Analysis

Data extraction

Standardized data extraction tables were used and information was extracted regarding study characteristics (i.e. year, study design, number of participants, age), type and measurement of physical activity, intervention and health indicators. Reviewers were not blinded to the authors or journals when extracting data.

Risk of bias assessment

Risk of bias assessment was completed for all included studies as part of the GRADE assessment of evidence quality. Briefly, the risk of bias assessment identifies methodological features of each study that impact our confidence in the overall estimate of effect for an outcome (e.g., allocation concealment, blinding, loss to follow-up, intention-to-treat principle (Guyatt et al. 2011h)). Due to the nature of physical activity interventions, it is very difficult to blind participants to their group allocation. Furthermore, since the majority of studies used parental report methods for assessing levels of physical activity, there was some inherent self-report bias. However, if it was determined that blinding of treatment allocation or parental report was the only potential source of bias, the quality of evidence was not downgraded.

Analysis

By age group (i.e. infants, toddlers or preschoolers), we identified all studies contributing to each health indicator. By health indicator, meta-analysis was planned for data that were sufficiently homogeneous in terms of statistical, clinical, and methodological characteristics using Review Manager Software 5.0 (The Cochrane Collaboration, Copenhagen Denmark). Otherwise, qualitative synthesis was conducted for remaining studies. *A priori* comparisons for subgroup analysis were planned as follows; by direct (e.g., accelerometer or direct observation) and indirect (e.g., self-report, parent/teacher/caregiver proxy) measurement; by different frequencies, intensities, times, or types of physical activity (i.e. dose of physical activity); finally, by study quality (if sufficient homogeneity existed, through risk of bias assessment).

Harms of Increased Physical Activity

To ensure that both benefits and harms of interventions to increase physical activity were considered, potential risks associated with increased physical activity were discussed *a priori* and ranked by priority by four reviewers. Musculoskeletal injury was the only risk ranked as 'critical' and an Ovid MEDLINE search was performed to assess the evidence. To maximize the search, all study designs were included (see search strategy in Appendix D).

RESULTS

The preliminary search of electronic databases, reference lists, and documents provided by International consultants identified 11,222 potentially relevant articles (Figure 2). Of these, 4534 were identified in MEDLINE,

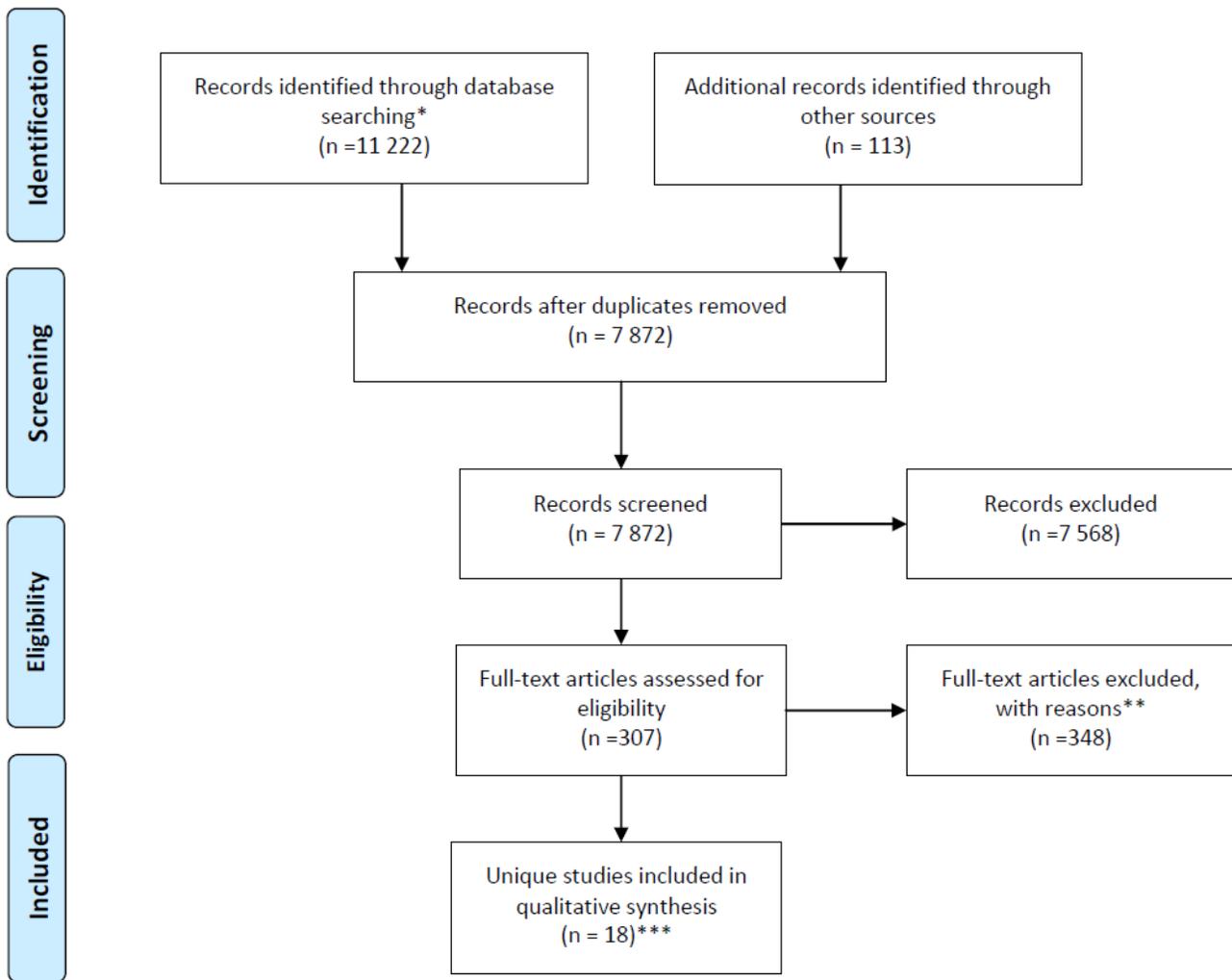
3845 in EMBASE, 828 in psycINFO, 874 through SportDiscus, 1141 through Cochrane Central Database; an additional 113 through key informants, government documents, and bibliographies. After de-duplication, 7872 relevant articles remained. After a preliminary review of titles and abstracts, 307 articles were included for detailed assessment of the full text article. Of these, 18 unique studies, representing 22 papers and 12,742 participants met inclusion criteria. Studies ranged from 31 (Li et al. 1995) to 9674 (Sugimori et al. 2004) participants. Articles were published over a 39 year period from 1972 (Porter 1972) to 2011 (Jones et al. 2011), and follow-up duration, where applicable, ranged from 2 months to 8 years. Included studies involved participants from 8 countries. Reasons for excluding studies included: ineligible age (n = 119), ineligible exposure (e.g. diet) (n = 87), ineligible outcome (n = 54), ineligible analysis (e.g. review article, cross-sectional design or analysis) (n = 87); many studies were excluded for multiple reasons.

Further details on results of the systematic review are outlined in the systematic review; however, the GRADE tables have been reproduced in this report (Tables 1-3). In brief, 5 studies reported results in infants, 2 in toddlers and 11 in preschoolers. The outcomes of interest represented in these unique studies were adiposity (n=11), bone and skeletal health (n=2), motor development (n=4), psychosocial health (n=3), cognitive development (n=1) and cardio-metabolic health indicators (n=3). Parent-report was the most common indirect measure used to assess physical activity. Other studies used either accelerometry or a measure of direct observation to quantify time spent participating in physical activity. Some studies included results for more than one age category and were presented accordingly. Quality of evidence by age group and across outcomes can be found in Tables 1-3. Due to the heterogeneity of measurement tools, interventions and outcomes, meta-analysis was not possible for any health indicator. Subgroup analysis was not possible for measurement type, dose, or study quality. For more information on each indicator see the systematic review (Timmons et al. submitted).

SUMMARY

Overall, in infants there was low to moderate quality evidence to suggest increased or higher physical activity is positively associated with improved measures of adiposity, motor skill development, and cognitive development. In toddlers, there was moderate quality evidence to suggest that increased or higher physical activity was positively associated with bone and skeletal health. In preschoolers, there was low to high quality evidence on the relationship between increased or higher physical activity and improved measures of adiposity, motor skill development, psychosocial health, and cardio-metabolic health indicators.

Figure 2: Screening of potentially relevant articles



*Databases included the following: Medline (n=4534), Embase (n=3845), PsycINFO (n=828), SportDiscus (n=874), Cochrane central database (n=1141)

**some full text articles were excluded for multiple reasons

*** data from 18 unique studies is represented in 22 papers included in the review

Table 1: Is physical activity associated with better health outcomes in infants (1 month–1.0 years)?

Bibliography: Adiposity - Ku 1981, Li 1995, Shapiro 1984, Wells 2001; Bone and skeletal health- Specker, 1999; Motor development – Porter 1972; Psychosocial health - Porter 1972; Cognitive development - Porter 1972

Quality assessment							Increased physical activity	Absolute effect (confidence interval, standard error)	Quality	Importance
No of unique studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations				
Adiposity (infants; observational; follow-up 6 to 84 months; intervention is activity levels at 6-12 months, energy expenditure over 8 days at 9-12 months; outcomes are % body fat; skinfolds, fat –free mass, and Dual-energy x-ray absorptiometry)										
3	Observational studies ^{1,2,3}	No serious risk of bias	No serious inconsistency	No serious indirectness	No serious imprecision	None	571 ⁴	B=-0.6 (p=0.028) ⁵ No effect ⁶	☹☹☹☹ LOW	CRITICAL
Bone (infants; follow-up 12 months; intervention is gross motor activity program for 15-20 daily, 5 days a week for 1 year; outcome is bone mineral content)										
1	RCT ⁷	Serious ^{8,9}	No serious inconsistency	No serious indirectness	No serious imprecision	None	Intervention = 34 Control = 35	No effect ¹⁰	☹☹☹☹ MODERATE	NOT IMPORTANT
Motor Development (infants; follow-up 2 months; intervention is passive cycling at 4 to 40 months; outcome is motor development score on Gesell Development Schedule, higher scores are better)										
1	RCT ¹¹	Serious ¹²	No serious inconsistency	No serious indirectness	No serious imprecision	None	Intervention = 62 Control = 68	MD 17.0 units higher ¹³	☹☹☹☹ MODERATE	CRITICAL
Psychosocial Health (infants; follow-up 2 months; intervention is passive cycling at 4 to 40 months; outcome is personal and social development score on Gesell Development Schedule, higher scores are better)										
1	RCT ¹¹	Serious ¹²	No serious inconsistency	No serious indirectness	No serious imprecision	None	Intervention = 62 Control = 68	MD 23.7 units higher ¹⁴	☹☹☹☹ MODERATE	NOT IMPORTANT
Cognitive Development (infants; follow-up 2 months; intervention is passive cycling at 4 to 40 months; outcome is cognitive development score on Gesell Development Schedule, higher scores are better)										
1	RCT ¹¹	Serious ¹²	No serious inconsistency	No serious indirectness	No serious imprecision	None	Intervention = 62 Control = 68	MD 16.3 units higher ¹⁵	☹☹☹☹ MODERATE	IMPORTANT

¹ Includes 4 prospective cohort studies (Ku 1981; Li 1995; Shapiro 1984; Wells 2001)

² Shapiro (1984) and Ku (1981) are both reports of the same longitudinal cohort of 450 infants. Shapiro reports obesity defined by sum of skinfolds measures, and Ku reports sum of skinfolds and underwater weighing measures.

³ Did not present longitudinal analysis of physical activity and skinfolds and therefore excluded from further analysis (Shapiro 1984)

⁴ Ku n=170; Li n=31; Wells n=38.

⁵ For each 15 minute interval child spent active, skinfolds decreased by 0.6 mm; no effect on fat-free mass (Wells 2001).

⁶ No effect of physical activity levels at 6 months and 1 year on percent body fat at 8 years (Ku 1981); No effect of activity at 6 months and fat mass at 12 months (Li 1995)

⁷ Includes one randomized control trial (Specker 1999).

⁸ Authors reported 72 infants randomized, however did not report number of infants initially randomized to each group, only number analyzed at 9 months of age

⁹ Randomization method not reported; allocation concealment not reported; randomization stratified according to childcare center and gender. Not reported if parents or childcare providers were blinded to physical activity intervention (gross vs. fine motor). Unlikely that infants' knowledge of assignment would affect intervention.

¹⁰ No beneficial effect of physical activity levels at 6, 9 and 12 months on BMC at 18 months (Specker 1999).

¹¹ Includes one randomized controlled trial (Porter 1972).

¹² Parents and caregivers were not blinded to treatment allocation; unsure if outcomes assessors were blinded to treatment allocation; no intention-to-treat analysis; excluded those who did not carry out the management plan for the group and those who became sick during the study and had exercise interrupted.

¹³ Intervention group had mean motor development quotient scores on the Gesell Development Schedule that were 17 units higher than the control group ($p < 0.01$) (Porter 1972).

¹⁴ Intervention group had mean personal social development quotient scores on the Gesell Development Schedule that were 24 units higher than the control group ($p < 0.01$) (Porter 1972).

¹⁵ Intervention group had mean language quotient scores on the Gesell Development Schedule that were 16 units higher than the control group ($p < 0.01$) (Porter 1972).

Table 2: Is physical activity associated with better health outcomes in toddlers (1.1-3.0 years)?

Bibliography: Adiposity - Sugimori 2004; Bone and skeletal health - Specker 1999 (RCT)

Quality assessment							Increased physical activity	Absolute Estimate (confidence intervals, standard error)	Quality	Importance
No of unique studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations				
Adiposity: (RCT, follow-up mean 1 year; intervention is physical activity program at age 4-5 years, 3x30 min sessions over 24 weeks; outcome is BMI)										
Adiposity: (prospective cohort) follow-up mean 3 years; measured with BMI										
1	Observational study ¹	No serious risk of bias	No serious inconsistency	No serious indirectness	No serious imprecision	None	8170	N/A	⊕⊕⊕⊕ VERY LOW	CRITICAL
Bone: follow-up mean 3 months; measured with bone mineral content										
1	RCT ^{2,3}	Serious ⁴	No serious inconsistency	No serious indirectness	No serious imprecision	None	Intervention = 34 Control = 35	No numeric data ⁵	⊕⊕⊕ MODERATE	NOT IMPORTANT

¹ Includes one prospective cohort study (Sugimori 2004); although measurements of physical activity were collected at more age 3 and age 6, data were only presented for level of physical activity at age 6 and therefore this study was excluded from further analysis. Quality of evidence has been downgraded accordingly.

² Includes one randomized trial (Specker 1999).

³ Toddlers were randomized to a gross motor or fine motor program. The gross motor program included activities that focused on loading the skeleton and were performed for 15–20 min/day, 5 days/week supervised by study personnel. The fine motor program included a similar number of activities but focused on fine motor and cognitive skills.

⁴ Randomization method not reported; allocation concealment not reported; randomization stratified according to childcare center and gender. Not reported if parents or childcare providers were blinded to physical activity intervention (gross vs. fine motor). Unlikely that infants' knowledge of assignment would affect intervention.

⁵ At no age was total body BMC correlated with average 48-h sensor readings, activity scores, or percentage time bearing weight on the legs. Specific results not reported (Specker 1999).

Table 3: Is physical activity associated with better health outcomes in preschoolers (3.1-4.99 years)?

Bibliography: Adiposity - Jones 2011 (RCT), Reilly 2006 (RCT), Specker 2003 (RCT), Klesges 1995, Moore 1995, Moore 2009, Saakslanti 2004; Bone health - Specker 2003; Binkley 2004; Motor development – Jones 2011 (RCT), Venetsanou 2004; Psychosocial health – Lobo 2006 (RCT), Buss 1980; Cardio-metabolic health indicators - Metcalfe 2008, Metcalfe 2009, Saakslanti 2004, Wilson 1992.

Quality assessment							No of participants	Absolute Estimate (confidence intervals, standard error)	Quality	Importance
No of unique studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations				
Adiposity: (RCT) measured with BMI, total body fat (kg)										
Adiposity: (Prospective cohorts) follow-up 3-8 years; measured with: BMI, BMI z-score, BMI percentile, skinfold, sum of skinfold										
4	RCT ¹	No serious risk of bias	No serious inconsistency ²	No serious indirectness	No serious imprecision	None	Intervention = 591 Control = 571 ³	-0.8(-0.33, 0.17) ⁴ No effect ⁵	???? HIGH	CRITICAL
3	Observational studies ⁶	No serious risk of bias	No serious inconsistency	No serious indirectness	No serious imprecision	Dose response gradient ⁷	252 ⁸	-0.316, p=0.03 ⁹ OR: 2.6 (1.0-6.4) ¹⁰ 18.6±0.6, p=0.05; 15.1±1.1, p=0.03; 74.1±7.0, p=0.05 ¹¹	???? MODERATE	CRITICAL
Bone: (RCT) follow-up 12 months, measured with total body bone mineral content										
1	RCT ¹²	Serious ¹³	No serious inconsistency	No serious indirectness	No serious imprecision	None	Intervention = 142 Control = 138 ¹⁴	49.9±0.7, p=0.03 ^{15a} ; 41.7±0.9, p=0.05 ^{15b}	???? MODERATE	CRITICAL
Motor Development: (RCT) follow-up mean 20 weeks-1 year; measured with: Test of Gross Motor Development (2nd edition); range of scores: 0-40, better indicated by higher values (Jones 2011); fundamental movement skills score; range of scores: 0-15 (Reilly 2006).										
Motor Development: (Non-randomized trial) measured with Test for children 4-6 years of age; range of scores: 0-34, better indicated by higher values										
2	RCT ¹⁶	No serious risk of bias	No serious inconsistency ²	No serious indirectness	No serious imprecision	None	Intervention = 320 Control = 322 ¹⁷	2.08 (0.76, 3.40) p=0.00 ¹⁸ MD=0.7 (0.3, 1.1) ¹⁹	???? HIGH	CRITICAL
1	Observational studies ²⁰	No serious risk of bias	No serious inconsistency	No serious indirectness	No serious imprecision	None	Intervention = 28 Control = 38	Mean Difference = 3.74 p < 0.001 ²¹	???? LOW	CRITICAL
Psychosocial Health: (RCT) follow-up mean 1-4 years; measured with: California Child Q set										
1	RCT ²²	No serious risk of bias	No serious inconsistency	No serious indirectness	No serious imprecision	None	Intervention = 21 Control = 19	F[1,38] = 16.25, p<.001 F[1,38] = 11.28, p<.001 F[1,38] = 14.75, p<.001 ²³	???? HIGH	CRITICAL
1	Observational studies ²⁴	No serious risk of bias	No serious inconsistency	No serious indirectness	No serious imprecision	None	129	P<0.05-<0.001 ²⁵	???? LOW	CRITICAL
Cardio-metabolic health indicators: (Prospective cohorts) follow-up 1-3 years; measured with: blood pressure, insulin resistance, blood lipids; Better indicated by lower values)										
3	Observational studies ²⁶	No serious risk of bias	No serious inconsistency	No serious indirectness	No serious imprecision	None	543 ^{27,28}	r=-0.33, P<0.01; r=-0.13, P=0.21 ²⁹ -0.10, p = 0.02 ^{30a} -0.17, p = 0.06 ^{30b} No numeric data ³¹	???? LOW	IMPORTANT

- ¹ Includes four randomized control trials (Jones 2011; Mo-Suwan 1998; Reilly 2006; Specker 2003).
- ² There was no difference in physical activity levels between the intervention and control group, therefore, it is difficult to draw inferences on the effectiveness of the intervention. Authors conclude dose of intervention was not strong enough to have an overall impact on physical activity levels (Reilly 2006). This was not enough evidence to warrant downgrading the overall study quality.
- ³ Intervention: $n=52$, control: $n=45$ (Jones 2011); Intervention: $n=147$, control: $n=145$ (Mo-Suwan 1998); Intervention: $n=268$, control: $n=277$ (Reilly 2006); intervention (gross motor): $n=88$ analyzed, $n=124$ enrolled; control (fine motor) $n=90$ analyzed, $n=114$ enrolled (Specker 2003).
- ⁴ Adjusted mean difference between BMI of experimental and control group from baseline to follow-up (Jones 2011).
- ⁵ Exercise intervention did not significantly reduce weight (Mo-Suwan 1998); gross motor physical activity intervention had no effect on total body lean or fat mass (Specker 2003); No effect of intervention of BMI (Reilly 2006).
- ⁶ Includes three prospective cohort studies (Klesges 1995; Moore 1995; Moore 2009; Saakslanti 2004). Moore and Moore report follow-ups of the same study - one at 1st grade (Moore 1995) and one at 11 years of age (Moore 2009). Saakslanti reported on BMI cross-sectionally (although did control for it during longitudinal analysis) and was excluded from further analysis.
- ⁷ Higher baseline aerobic activity and increased leisure activity from year 2 to 3 were associated with smaller gains in BMI (Klesges 1995; Moore 2009) those in the highest tertile of physical activity had lower BMI, triceps skinfolds and sum of 5 skinfolds at each year of follow-up.
- ⁸ Klesges $n=146$; Moore (Framingham children's study) $n=106$; $n=97$ analyzed at first grade (1995); $n=103$ analyzed at 8 year follow-up (2009).
- ⁹ Regression coefficients of baseline activity as a predictor of BMI 2 years later; higher baseline activity was associated with smaller gains in BMI (Klesges 1995).
- ¹⁰ Odds ratio for skinfold measurement in active vs. inactive participants (as measured by Caltrac counts per day); differences in subscapular skinfolds and BMI were not significant between groups (Moore 1995).
- ¹¹ Mean BMI, triceps skinfolds and sum of skinfolds in most active tertile; p-value is for trend compared to the low and moderately active groups of average daily activity from ages 4 to 11 years (Moore 2009).
- ¹² Includes one unique prospective cohort study with results presented in two papers (Specker 2003; Binkley 2004). Specker is main study and outcomes. Binkley reports BMC at 12 months post-intervention.
- ¹³ Randomization methods not reported; allocation concealment not reported; randomization stratified according to childcare center and gender. Not reported if children, parents, or childcare providers were blinded to physical activity intervention (gross vs. fine motor). No intention-to-treat analysis; excluded those who completed less than 38 weeks of the 1-year intervention.
- ¹⁴ Intervention: $n=80$, control: $n=81$ (Binkley 2004); Intervention: $n=62$, control: $n=57$ (Specker 2003).
- ^{15a} Tibia periosteal circumference (mm) post intervention was significantly larger than fine motor group. ^{15b} Tibia endosteal circumference (mm) post intervention was significantly larger than fine motor group (Specker 2003). Gross motor physical activity intervention had no effect on total body BMC, arm BMC, leg BMC, total body bone area, arm bone area or leg bone area (Specker 2003; Binkley 2004).
- ¹⁶ Includes two randomized control trial (Jones 2011; Reilly 2006).
- ¹⁷ Intervention $n=52$, control $n=45$ (Jones 2011); intervention $n=268$, control $n=277$ (Reilly 2006).
- ¹⁸ Adjusted mean difference between score on movement skill development test of experimental and control group from baseline to follow-up (Jones 2011).
- ¹⁹ Mean differences in fundamental movement skills score, interpret with caution as the intervention was not able to significantly increase physical activity levels (Reilly 2006).

- ²⁰ Includes 1 non-randomized controlled study (Venetsanou 2004). The children of the experimental group (n = 28) attended the intervention programme for 20 weeks, participating in two sessions a week, while the children of the control group (n = 38) did not participate regularly in any organized physical activity programme.
- ²¹ Mean difference on motor development score (*The Motoriktest für vier-bis sechsjährige Kinder (MOT 4–6)*) between intervention and control group at follow up.
- ²² Includes 1 randomized control trial (Lobo 2006)
- ²³ Children who participated in the dance program made significantly greater gains from pre-test to post-test on parent and teacher reports of social competence; internalizing and externalizing behaviour (Lobo 2006).
- ²⁴ Includes 1 prospective cohort (Buss 1980)
- ²⁵ Correlations between physical activity and teacher ratings on the California Child Q set (measure of personality characteristics) were significant.
- ²⁶ Includes 3 unique prospective studies (Metcalf 2008; Metcalf 2009; Saakslanti 2004; Wilson 1992). Metcalf (2008) and Metcalf (2009) report follow-ups of the same study. Wilson (1992) measured physical activity at yearly intervals for three years but presented cross-sectional analysis and was excluded from further analysis.
- ²⁷ Metcalf *n*=213; Saakslanti *n*=155; Wilson *n*=175
- ²⁸ Metcalf (2009): between 202-213 analyzed of 307 originally enrolled; Metcalf (2008) - 212 analyzed of 307 originally enrolled
- ²⁹ Association between moderate to vigorous physical activity and adiponectin for girls but not for boys, although in the opposite direction as expected by the authors
- ^{30a} Change in composite metabolic status score for boys above the median for moderate to vigorous physical activity; ^{30b} for girls above the median.
- ³¹ No numeric data provide, but constantly active girls reported to have decreased cholesterol (p=0.004) and increased HDL/total cholesterol ratio (p<0.001); constantly active boys reported to have decreased triglyceride concentration (p=0.011) (Saakslanti 2004).

DEVELOPMENT OF GUIDELINE RECOMMENDATIONS

The development of the physical activity guidelines occurred in four steps (described in detail below):

1. A consensus meeting was convened to draft guidelines based on the information gathered in systematic review.
2. Stakeholders were surveyed through online consultations for comments and concerns.
3. A second consensus meeting was convened to discuss changes to the draft guidelines and develop methods for dissemination to the general public.
4. A messaging meeting was convened to determine the key audience for the guidelines and what key messages should be.

These new Canadian Physical Activity Guidelines for the Early Years (aged 0-4 years) are presented alongside the new Sedentary Behaviour Guidelines for the Early Years (aged 0-4 years). Details on dissemination and messaging strategies for the physical activity guidelines can be found elsewhere (Latimer et al. 2010, Rhodes et al. 2010). The PAMG project has been guided by the AGREE II framework and was assessed by two methodologists familiar with the AGREE II process; the final assessment and assessment can be found in Appendix E.

At both consensus meetings (i.e. to create a draft of the guidelines and then to finalize the wording of the guidelines) participants were asked to declare if they had any conflict or competing interests that may influence the development of the physical activity guidelines (“**Yes**, as a guideline development committee member I would like to declare that I have competing interests (i.e. to give myself a business or professional advantage) that may have influenced the development of the Canadian Physical Activity Guidelines for the Early Years (aged 0-4 years)” OR “**No**, I have no competing or conflicting interests to declare.”) Declarations of conflict or competing interests can be found in Appendix A along with the list of consensus meeting participants.

1. CONSENSUS MEETING AND DRAFT GUIDELINES

In December 2011, a consensus meeting was convened to discuss and debate the information presented in the systematic review and to draft recommendations for the physical activity guidelines. Work from groups in the U.S. (NASPE, American Academy of Pediatrics), the U.K. (Start Active, Stay Active), Australia (Australian Department of Health and Ageing) were also scanned to ensure harmonization of efforts.

In addition to discussing the health benefits of physical activity, effort was made to discuss possible risks associated with increasing physical activity during the early years. However, when using similar search terms as those used for the health indicators, we could not find any studies that specifically examined the association between increased physical activity and increased health risk. The lack of evidence may be indicative of the fact that children aged 0-4 years do not usually participate in the kinds of activity that increase risk of injuries that require medical treatment (e.g., contact sports). It was therefore the decision of the panel to suggest that the potential benefits of increased physical activity far exceeded the potential risks.

Based on the evidence described in the systematic review above, the PAMG Steering Committee, review authors, key informants, and representatives from partner organizations (i.e. CSEP, ParticipACTION, Active Healthy Kids Canada, Best Start) drafted the following recommendations:

INFANTS (aged < 1 year) and CHILDREN (aged 1-4 years)

Draft Preamble

These guidelines are relevant to all apparently healthy infants (aged < 1 year) and children (aged 1-4 years), irrespective of gender, race, ethnicity or socio-economic status of the family. Infants and children are

encouraged to participate in a variety of physical activities that support their healthy growth and development, are age-appropriate, enjoyable and safe and occur in the context of family, childcare and community.

Infants should be physically active daily as part of supervised exposure to different indoor and outdoor environments. Activities could include tummy time, reaching and grasping, pushing and pulling, and crawling.

Children should be physically active daily as part of play, games, sports, transportation, recreation and physical education. For those who are physically inactive, doing amounts below the recommended levels can provide some benefits.

Following these physical activity guidelines may improve motor skills, body composition, and aspects of metabolic health and social development. These potential benefits far exceed the potential risks associated with physical activity.

These guidelines may be appropriate for infants and children with a disability or medical condition; however, their parents or caregiver should consult a health professional to understand the types and amounts of physical activity appropriate for them.

This recommendation places a high value on the benefits of physical activity that accumulate throughout the life course. It also takes into consideration the preferences of practitioners to have guidance in this area for young children and the importance of setting targets for surveillance. Expert opinion and other international guidelines were used to strengthen the evidence base upon which these guidelines were developed.

For guidance on decreasing sedentary behaviour, please refer to the *Canadian Sedentary Behaviour Guidelines*. www.csep.ca/guidelines

Draft Guidelines

For healthy growth and development:

- Infants (aged <1 year) should be physically active several times daily – particularly through interactive floor-based play.
- Children (aged 1-4 years) should be physically active daily for at least 180 minutes (3 hours), spread throughout the day. This should include:
 - A variety of activities in different environments at different intensities.
 - Activities that develop movement skills.
 - Progression toward at least 60 minutes of energetic play by 5 years of age.

More daily physical activity provides greater benefits.

2. STAKEHOLDER PROCESS (External review)

Based on the evidence presented in the systematic review and the draft recommendations presented above, feedback was sought from a wide range of stakeholders. These included national and international content experts, health professionals, governmental and non-governmental organizations, teachers, and caregivers. Feedback was provided through an online consultation process and included respondents from every province and territory. The majority of respondents (40%) self-identified as a health professional (nurse, health promoter, dietician, physiotherapist etc.) or as an early child educator (21%). Further details can be found in the online survey results.

Methods for external guideline review

An online survey was sent out to stakeholders with interest in physical activity, sedentary behaviours and health promotion. A list of organizations initially contacted by CSEP can be found in Appendix B. CSEP made

efforts to contact each organization and determine the best individual to receive the survey. The initial stakeholders were encouraged to share the survey link with their peers and colleagues. The survey consisted of 6 questions about the wording and level of agreement for the proposed Canadian Physical Activity Guidelines for the Early Years and the associated preamble (with an additional 6 questions directly related to the sedentary behaviour guidelines). Written comments were invited and respondents were told they would receive updated and refined guidelines when the survey process was completed. The results of the survey were reviewed by the CSEP PAMG Steering Committee.

Stakeholder consultation process

Through the consultation process, 932 individuals (858 in English, 74 in French) completed the survey and 212 respondents provided additional written comments. Overall, the majority of respondents either ‘completely agreed’ (68.8%) or ‘somewhat agreed’ (27.7%) with the proposed preamble and guidelines for the early years. A summary of the survey results can be found in English [here](#) and in French [here](#).

The biggest concern identified from the written comments was with respect to clarity and ability for implementation of the new guidelines. There was some confusion regarding the difference between the ‘180 minutes of daily physical activity’ required for the early years and ‘60 minutes of daily moderate- to vigorous-intensity physical activity’ required for children and youth (aged 5-17 years). We have tried to clarify this in the wording of the final guidelines by differentiating all physical activity and energetic play. This will also be clarified in the information sheets and accompanying documents.

3. FINALIZATION OF GUIDELINES

In January 2012, the PAMG Steering Committee re-convened to address the concerns and comments brought up through the stakeholder consultations and to adjust the guidelines accordingly. Table 4 outlines the draft guidelines, the concerns and comments by stakeholders and how they were addressed, and the final guidelines for each age group.

Table 4: Final guideline wording following the consultation process.

DRAFT GUIDELINE RECOMMENDATIONS	DISCUSSION AND COMMENTS FROM STAKEHOLDERS	FINAL GUIDELINE RECOMMENDATIONS
The Early Years (aged 0-4 years)		
Title: Canadian Physical Activity Guidelines for “preschoolers”, “under 5’s”, “the early years”	Preference for ‘the early years’ terminology by stakeholder consultation and to harmonize with other jurisdictions	Canadian Physical Activity Guidelines for the Early Years (aged 0-4 years)
<p>For healthy growth and development:</p> <ul style="list-style-type: none"> • Infants (aged <1 year) should be physically active several times daily – particularly through interactive floor-based play. • Children (aged 1-4 years) should be physically active daily for at least 180 minutes (3 hours), spread throughout the day. This should include: <ul style="list-style-type: none"> ○ A variety of activities in different environments at different intensities. 	<ul style="list-style-type: none"> • Concern: stakeholders did not like the ‘less than’ (<) symbol. Response: the symbol was changed to text in the public facing messaging; however due to formatting constraints, was left as a symbol in scientific publications. • Concern: why 180 minutes of physical activity when children and youth were only required to do 60 mins. Response: text of the guidelines has changed to 	<p>For healthy growth and development:</p> <ul style="list-style-type: none"> • Infants (aged less than 1 year) should be physically active several times daily – particularly through interactive floor-based play. • Toddlers (aged 1–2 years) and preschoolers (aged 3– 4 years) should accumulate at least 180 min of physical activity at any intensity spread throughout the day, including <ul style="list-style-type: none"> ○ A variety of activities in different environments.

DRAFT GUIDELINE RECOMMENDATIONS	DISCUSSION AND COMMENTS FROM STAKEHOLDERS	FINAL GUIDELINE RECOMMENDATIONS
<ul style="list-style-type: none"> ○ Activities that develop movement skills. ○ Progression toward at least 60 minutes of energetic play by 5 years of age. <p>More daily physical activity provides greater benefits.</p>	<p>emphasize that 180 mins is of activity at ANY intensity (whereas the 60 mins refers to moderate- to vigorous-intensity physical activity in children and youth). We will work to clarify this further in the accompanying documents.</p> <ul style="list-style-type: none"> ● Concern: some wording in the guidelines was unclear (e.g., ‘energetic play’, ‘floor-based play’). Response: terms used in the guidelines will be clarified in the info sheets, vignettes and glossary with definitions and examples. ● Concern: there needs to be more emphasis on parent/caregiver ‘modeling’. Response: the ‘how-to’s’ will be addressed in the information sheets and vignettes. 	<ul style="list-style-type: none"> ○ Activities that develop movement skills. ○ Progression toward at least 60 min of energetic play by 5 years of age. <p>More daily physical activity provides greater benefits.</p>

4. MESSAGING MEETING

In January 2012, shortly after the wording of the guidelines was finalized, a meeting was convened to determine the key messages and intended audience for the guidelines and associated public facing messages. This meeting included marketing and communications experts from ParticipACTION and CSEP, content experts focused on physical activity and health in the early years, and content experts with a focus on effective messaging. The goal of this meeting was to determine a short term and a longer term plan for dissemination and implementation of the guidelines. The framework for developing messaging strategies was similar to that which was developed for Canadian Physical Activity and Sedentary Behaviour Guidelines for other age groups and supported by peer-reviewed systematic reviews (Latimer et al. 2010, Rhodes et al. 2010). Information on materials for messaging and disseminating the guidelines will be made available on the CSEP website (www.csep.ca/guidelines).

DISSEMINATION AND IMPLEMENTATION

The work to inform the development of these guidelines is published in the peer-review literature (Timmons et al. 2007, 2012 (*submitted*); Tremblay et al. 2007*b*, 2010, 2011, 2012 (*in press*)). Further, the methodological process, systematic review, and final recommendations have been and will be shared at scientific meetings and conferences.

Dissemination and implementation of these guidelines within the general public will occur through work with our partnership organizations (e.g. CSEP, ParticipACTION, Active Healthy Kids Canada) alongside the Canadian physical activity and sedentary behaviour guidelines for other age groups. Public facing messages will be created through these partnership organizations and will be developed through a similarly rigorous process as

used for the development of the guidelines. This information will be updated regularly to reflect feedback from stakeholders.

The intended audience for these guidelines is parents, teachers, caregivers and health care providers responsible for children in the early years. CSEP is working to produce a variety of online and hard copy resources to be made available to all Canadians. These resources will also be distributed to partner organizations so that they are further disseminated. These resources will be created over time and updated as feedback is received from stakeholders. The primary resources will be an information sheet (i.e. what the guidelines are, health benefits of achieving guidelines and examples of ways to meet the guidelines); an online presentation; a Q&A document; and vignettes and activity log books. Additional resources will be made available in a timely manner.

Some potential barriers for increasing physical activity include motivation to change, lifestyle habits (e.g. parents are too busy to play with children, unsafe environments), and enjoyment (i.e. those who enjoy more sedentary pursuits); some potential facilitators include potential for long term impact, proper growth and development, improvement in lifestyle habits. For more information on messaging and behaviour modification see Latimer et al. (2010) and Rhodes et al. (2010).

SURVEILLANCE

There are a variety of mechanisms that will be used for surveillance of adherence to the new guidelines. The primary Canadian studies of national-scope that will be used and their affiliated organization are as follows:

- Canadian Health Measures Survey ([CHMS](#), Statistics Canada)
- National Longitudinal Survey of Children and Youth ([NLSCY](#), Statistics Canada)
- National Population Health Survey ([NPHS](#), Statistics Canada)
- Physical Activity Monitor (Canadian Fitness and Lifestyle Research Institute)

For example, the CHMS will directly measure (i.e. through accelerometry) the average amount of time young children will engage in physical activity per week. This information will be used to determine the proportion of 3-4 year old Canadians meeting the new guidelines. The CHMS is conducted in two year intervals and makes the information available to researchers in a timely manner. For recent, specific examples of CHMS surveillance in school aged children and youth see Colley et al. (2011). For further surveillance reports see the Active Healthy Kids Canada Report Card Report Card on Physical Activity for Children and Youth (Active Healthy Kids Canada 2005, 2006, 2007, 2008, 2009, 2010). See each survey for specific examples of monitoring tools used and relevant operational definitions. The potential resources implications of implementing these guideline recommendations were beyond the scope of the PAMG project.

FUTURE RESEARCH

Areas for future research have been identified within the process paper, the systematic review as well as through the stakeholder consultations. Despite a recent call to action by many funding bodies, the research examining physical activity in the early years is still in its infancy and there is need for large studies using direct and consistent measurements (i.e. larger and more diverse sample sizes, direct measures of physical activity, intent-to-treat analyses, reporting of adverse events). These larger studies should then be able to speak to the impact of dose (i.e. frequency, intensity, time and type) of physical activity needed for good health. Finally, future research should focus on standardizing methods for data collection and analysis and work towards implementing direct (i.e. accelerometers) and indirect (i.e. questionnaires for context) measures of physical activity.

The information captured in the systematic review allowed the PAMG Steering Committee to develop evidence-informed guidelines on the amount of time that children in the early years should engage in physical

activity. Future work needs to focus on successfully messaging these guidelines so this information can be effectively disseminated to the public.

UPDATING THE GUIDELINES

The PAMG Steering Committee realizes that updating the new guidelines is important and necessary to ensure that they remain true to the science that has informed them. Due to the immense amount of work required to update the systematic review, it is not feasible to update the guidelines every year. For this reason, the PAMG will work to update them in a cyclical fashion and harmonize with updating Canadian sedentary behaviour guidelines and guidelines from other jurisdictions. This means that an official update to the early years guidelines is not planned until 2016. This plan allows guidelines for each age group to be updated in a timely and efficient fashion. However, if important evidence emerges in the interim between updates, authors will work to include it in a timely fashion and the timeline for updates may change. Further, the PAMG will work with other jurisdictions for interim updates as necessary.

Year	Age group to be updated
2011	Children (aged 5-11 years) and youth (aged 12-17 years) (physical activity guidelines updated and sedentary behaviour guidelines created)
2012	Early years (aged 0-4 years) (physical activity and sedentary behaviour guidelines created)
2013	Adults (aged 18-64 years) (sedentary behaviour guidelines to be created)
2014	Older adults (aged ≥65 years) (sedentary behaviour guidelines to be created)
2015	Children and Youth (updated)
2016	Early years (updated)
2017	Adults (updated)
2018	Older adults (updated)
2019	Children and Youth (updated)
2020	Early years (updated)
2021	Adults (updated)
...	...

FINAL GUIDELINES

Preamble

These guidelines are relevant to all apparently healthy infants (aged less than 1 year), toddlers (aged 1–2 years), and preschoolers (aged 3–4 years), irrespective of gender, race, ethnicity, or socio-economic status of the family. Parents and caregivers should encourage infants, toddlers, and preschoolers to participate in a variety of physical activities that support their healthy growth and development, are age-appropriate, enjoyable and safe, and occur in the context of family, child care, school, and community.

Infants should be physically active daily as a part of supervised indoor and outdoor experiences. Activities could include tummy time, reaching and grasping, pushing and pulling, and crawling. Children in the early years should be physically active daily as part of play, games, sports, transportation, recreation, and physical education. For those who are physically inactive, increasing daily activity towards the recommended levels can provide some health benefits.

Following these physical activity guidelines may improve motor skills, body composition, and aspects of metabolic health and social development. These potential benefits far exceed the potential risks associated with physical activity. These guidelines may be appropriate for infants, toddlers, and preschoolers with a disability or medical condition; however, their parents or caregiver should consult a health professional to understand the types and amounts of physical activity appropriate for them.

This recommendation places a high value on the advantages and benefits of physical activity that accrue throughout life. It also takes into consideration the preferences of practitioners to have guidance in this area for young children and the importance of setting targets for surveillance. Expert opinion and other international guidelines were used to complement the evidence upon which these guidelines were developed.

For guidance on decreasing sedentary behaviour, please refer to the Canadian Sedentary Behaviour Guidelines (www.csep.ca/guidelines).

Guidelines

For healthy growth and development:

- Infants (aged less than 1 year) should be physically active several times daily – particularly through interactive floor-based play.
- Toddlers (aged 1–2 years) and preschoolers (aged 3– 4 years) should accumulate at least 180 min of physical activity at any intensity spread throughout the day, including
 - A variety of activities in different environments.
 - Activities that develop movement skills.
 - Progression toward at least 60 min of energetic play by 5 years of age.

More daily physical activity provides greater benefits.

GLOSSARY

For a list of important definitions and explanations, see here [here](#).

LIST OF ABBREVIATIONS

The following is a list of common abbreviations used throughout this document.

Abbreviation	Definition
AHKC	Active Healthy Kids Canada
CAN PLAY	Physical Activity Levels Among Youth
CCHS	Canadian Community Health Survey
CFLRI	Canadian Fitness and Lifestyle Research Institute
CHMS	Canadian Health Measures Survey
CSEP	Canadian Society for Exercise Physiology
HALO	Healthy Active Living and Obesity research group
NLSCY	National Longitudinal Survey of Children and Youth
PAM	Physical Activity Monitor
PAMG	Physical Activity Measurement and Guidelines project
PHAC	Public Health Agency of Canada
WHO	World Health Organization

REFERENCES

- Active Healthy Kids Canada. Dropping the ball - Report Card on Physical Activity for Children and Youth. Active Healthy Kids Canada, 2005. Toronto, Active Healthy Kids Canada.
- Active Healthy Kids Canada. Report Card on Physical Activity for Children and Youth. Active Healthy Kids Canada, 2006. Toronto, Active Healthy Kids Canada.
- Active Healthy Kids Canada. Older but not wiser, Canada's future at risk - Report Card on Physical Activity for Children and Youth. Active Healthy Kids Canada, 2007. Toronto, Active Healthy Kids Canada.
- Active Healthy Kids Canada. It's time to unplug our kids - Report Card on Physical Activity for Children and Youth. Active Healthy Kids Canada, 2008. Toronto, Active Healthy Kids Canada.
- Active Healthy Kids Canada. Active kids are fit to learn - Report Card on Physical Activity for Children and Youth. Active Healthy Kids Canada, 2009. Toronto, Active Healthy Kids Canada.
- Active Healthy Kids Canada. Healthy habits start earlier than you think - Report Card on Physical Activity for Children and Youth. Active Healthy Kids Canada, 2010. Toronto, Active Healthy Kids Canada.
- Australian Government. Department of Health and Ageing 2011. Move and play every day. National physical activity recommendations for children 0-5 years. Commonwealth of Australia. Department of Health and Ageing.
- Balshem, H., Helfand, M., Schunemann, H.J., Oxman, A.D., Kunz, R., Brozek, J., Vist, G.E., Falck-Ytter, Y., Meerpohl, J., Norris, S., and Guyatt, G.H. 2011. GRADE guidelines: 3. Rating the quality of evidence. *J Clin. Epidemiol.* **64**: 401-406.
- Binkley, T. and Specker, B. 2004. Increased periosteal circumference remains present 12 months after an exercise intervention in preschool children. *Bone* **35**: 1383-1388.
- Brouwers, M.C., Kho, M.E., Browman, G.P., Burgers, J.S., Cluzeau, F., Feder, G., Fervers, B., Graham, I.D., Grimshaw, J., Hanna, S.E., Littlejohns, P., Makarski, J., Zitzelsberger, L. 2010a. AGREE II: Advancing guideline development, reporting and evaluation in health care. *CMAJ.* **51**(5):421-4
- Brouwers, M.C., Kho, M.E., Browman, G.P., Burgers, J.S., Cluzeau, F., Feder, G., Fervers, B., Graham, I.D., Grimshaw, J., Hanna, S.E., Littlejohns, P., Makarski, J., Zitzelsberger, L. 2010b. Development of the AGREE II, part 1: performance, usefulness and areas for improvement. *CMAJ.* **182**(10):1045-1052.
- Brouwers, M.C., Kho, M.E., Browman, G.P., Burgers, J.S., Cluzeau, F., Feder, G., Fervers, B., Graham, I.D., Grimshaw, J., Hanna, S.E., Littlejohns, P., Makarski, J., Zitzelsberger, L. 2010c. Development of the AGREE II, part 2: assessment of validity of items and tools to support application. *CMAJ.* **182**(10):E472-E478.
- Buss, D.M., Block, J.H., and Block, J. 1980. Preschool activity level: personality correlates and developmental implications. *Child Dev.* **51**: 401-408.
- Canadian Society for Exercise Physiology. 2011. CSEP physical activity guidelines stakeholder survey results and final report. Canadian Society for Exercise Physiology. Canadian Society for Exercise Physiology and the Public Health Agency of Canada.

Canadian Society for Exercise Physiology. 2009 Consensus conference: advancing the future of physical activity measurement and guidelines. Canadian Society for Exercise Physiology, Kananaskis, AB.

Colley RC, Garriguet D, Janssen I, Craig C, Clarke J, Tremblay MS. 2011. Physical activity of Canadian children and youth: Accelerometer results from the 2007-2009 Canadian Health Measures Survey. Health Reports (Statistics Canada, Catalogue no. 82-003-XPE) **22**(1).

Guyatt,G., Oxman,A.D., Akl,E.A., Kunz,R., Vist,G., Brozek,J., Norris,S., Falck-Ytter,Y., Glasziou,P., DeBeer,H., Jaeschke,R., Rind,D., Meerpohl,J., Dahm,P., and Schunemann,H.J. 2011a. GRADE guidelines: 1. Introduction- GRADE evidence profiles and summary of findings tables. J Clin. Epidemiol. **64**: 383-394.

Guyatt,G.H., Oxman,A.D., Kunz,R., Atkins,D., Brozek,J., Vist,G., Alderson,P., Glasziou,P., Falck-Ytter,Y., and Schunemann,H.J. 2011b. GRADE guidelines: 2. Framing the question and deciding on important outcomes. J Clin. Epidemiol. **64**: 395-400.

Guyatt, G., Oxman, A.D., Akl, E.A., Kunz, R., Vist, G., Brozek, J., Norris, S., Falck-Ytter, Y., Glasziou, P., DeBeer, H., Jaeschke, R., Rind, D., Meerpohl, J., Dahm, P., and Schunemann, H.J. 2011a. GRADE guidelines: 1. Introduction- GRADE evidence profiles and summary of findings tables. J Clin. Epidemiol. **64**: 383-394.

Guyatt, G.H., Oxman, A.D., Kunz, R., Atkins, D., Brozek, J., Vist, G., Alderson, P., Glasziou, P., Falck-Ytter, Y., and Schunemann, H.J. 2011b. GRADE guidelines: 2. Framing the question and deciding on important outcomes. J Clin. Epidemiol. **64**: 395-400.

Guyatt, G.H., Oxman, A.D., Kunz, R., Brozek, J., Alonso-Coello, P., Rind, D., Devereaux, P.J., Montori, V.M., Freyschuss, B., Vist, G., Jaeschke, R., Williams, J.W., Jr., Murad, M.H., Sinclair, D., Falck-Ytter, Y., Meerpohl, J., Whittington, C., Thorlund, K., Andrews, J., and Schunemann, H.J. 2011c. GRADE guidelines 6. Rating the quality of evidence--imprecision. J Clin. Epidemiol. **64**: 1283-1293.

Guyatt, G.H., Oxman, A.D., Kunz, R., Woodcock, J., Brozek, J., Helfand, M., Alonso-Coello, P., Falck-Ytter, Y., Jaeschke, R., Vist,G., Akl, E.A., Post, P.N., Norris, S., Meerpohl, J., Shukla, V.K., Nasser, M., and Schunemann, H.J. 2011d. GRADE guidelines: 8. Rating the quality of evidence--indirectness. J Clin. Epidemiol. **64**: 1303-1310.

Guyatt, G.H., Oxman, A.D., Kunz, R., Woodcock, J., Brozek, J., Helfand, M., Alonso-Coello, P., Glasziou, P., Jaeschke, R., Akl, E.A., Norris, S., Vist, G., Dahm, P., Shukla, V.K., Higgins, J., Falck-Ytter, Y., and Schunemann, H.J. 2011e. GRADE guidelines: 7. Rating the quality of evidence--inconsistency. J Clin. Epidemiol. **64**: 1294-1302.

Guyatt, G.H., Oxman, A.D., Montori, V., Vist, G., Kunz, R., Brozek, J., Alonso-Coello, P., Djulbegovic, B., Atkins, D., Falck-Ytter, Y., Williams, J.W., Jr., Meerpohl, J., Norris, S.L., Akl, E.A., and Schunemann, H.J. 2011f. GRADE guidelines: 5. Rating the quality of evidence--publication bias. J Clin. Epidemiol. **64**: 1277-1282.

Guyatt, G.H., Oxman, A.D., Sultan, S., Glasziou, P., Akl, E.A., Alonso-Coello, P., Atkins, D., Kunz, R., Brozek, J., Montori, V., Jaeschke, R., Rind, D., Dahm, P., Meerpohl, J., Vist, G., Berliner, E., Norris, S., Falck-Ytter,Y., Murad, M.H., and Schunemann, H.J. 2011g. GRADE guidelines: 9. Rating up the quality of evidence. J Clin. Epidemiol. **64**: 1311-1316.

Guyatt, G.H., Oxman, A.D., Vist, G., Kunz, R., Brozek, J., Alonso-Coello, P., Montori, V., Akl,E. A., Djulbegovic, B., Falck-Ytter, Y., Norris, S.L., Williams, J.W., Jr., Atkins, D., Meerpohl, J., and Schunemann, H.J. 2011h. GRADE guidelines: 4. Rating the quality of evidence--study limitations (risk of bias). J Clin. Epidemiol. **64**: 407-415.

Health Canada and the Canadian Society for Exercise Physiology. 1999. Canada's physical activity guide for older adults. Cat. No. H39-429/1999-1E. Health Canada, Ottawa, Ont.

- Health Canada and the Canadian Society for Exercise Physiology. 2002a. Canada's physical activity guide for children. Cat. No. H39-611/2002-2E. Minister of Public Works and Government Services Canada, Ottawa, Ont. Health Canada and the Canadian Society for Exercise Physiology.
- Health Canada and the Canadian Society for Exercise Physiology. 2002b. Canada's physical activity guide for youth. Cat. No. H39-611/2002-1E. Minister of Public Works and Government Services Canada, Ottawa, Ont.
- Janssen, I., LeBlanc, A.G. 2010. Systematic review of the health benefits of physical activity and fitness in school-aged children and youth. *Int. J. Behav. Nutr. Phys. Act.* **7**(40).
- Jones, R.A., Riethmuller, A., Hesketh, K., Trezise, J., Batterham, M., and Okely, A.D. 2011. Promoting fundamental movement skill development and physical activity in early childhood settings: a cluster randomized controlled trial. *Pediatr. Exerc. Sci.* **23**: 600-615.
- Katzmarzyk, P.T, Church, T.S., Craig, C.L., Bouchard, C. Sitting time and mortality from all causes, cardiovascular disease, and cancer. *Med Sci Sports Exerc.* 2009;**41**:998-1005.
- Klesges, R.C., Klesges, L.M., Eck, L.H., and Shelton, M.L. 1995. A longitudinal analysis of accelerated weight gain in preschool children. *Pediatrics* **95**: 126-130.
- Ku, L.C., Shapiro, L.R., Crawford, P.B., and Huenemann, R.L. 1981. Body composition and physical activity in 8-year-old children. *Am. J Clin. Nutr* **34**: 2770-2775.
- Latimer, A, Brawley, L, Bassett, R. 2010. A systematic review of three approaches for constructing physical activity messages: what messages work and what improvements are needed? *Int. J. Behav. Nutr. Phys. Act.* **7**(36).
- Li, R., O'Connor, L., Buckley, D., and Specker, B. 1995. Relation of activity levels to body fat in infants 6 to 12 months of age. *J Pediatr* **126**: 353-357.
- Lobo, Y.B. and Winsler, A. 2006. The effects of a creative dance and movement program on the social competence of Head Start preschoolers. *Social Development* **15**: 501-519.
- Metcalf, B.S., Jeffery, A.N., Hosking, J., Voss, L.D., Sattar, N., and Wilkin, T.J. 2009. Objectively Measured Physical Activity and Its Association With Adiponectin and Other Novel Metabolic Markers: A longitudinal study in children (EarlyBird). *Diabetes Care* **32**: 468-473.
- Metcalf, B.S., Voss, L.D., Hosking, J., Jeffery, A.N., and Wilkin, T.J. 2008. Physical activity at the government-recommended level and obesity-related health outcomes: a longitudinal study (Early Bird 37). *Arch. Dis. Child* **93**: 772-777.
- Mo-suwan, L., Pongprapai, S., Junjana, C., and Puetpaiboon, A. 1998. Effects of a controlled trial of a school-based exercise program on the obesity indexes of preschool children. *Am J Clin Nutr* **68**: 1006-1011.
- Moore, L.L., Gao, D., Bradlee, M.L., Cupples, L.A., Sundarajan-Ramamurti, A., Proctor, M.H., Hood, M.Y., Singer, M.R., and Ellison, R.C. 2003. Does early physical activity predict body fat change throughout childhood? *Prev. Med.* **37**: 10-17.

Moore, L.L., Nguyen, U.D.T., Rothman, K.J., Cupples, L.A., and Ellison, R.C. 1995. Preschool physical activity level and change in body fatness in young children: The Framingham children's study. *American Journal of Epidemiology* **142**: 982-988.

National Association for Sport and Physical Education. 2009. *Active Start: A Statement of Physical Activity Guidelines for Children From Birth to Age 5 – Second Edition*. AAHPERD Publications, Oxon Hill, MD.

Okely, A.D., Salmon, J., Trost, S.G., Hinkley, T. Discussion paper for the development of physical activity recommendations for children under 5 years. Australian Department of Health and Ageing. In press.

Pate, R.R., Pfeiffer, K.A., Trost, S.G., Ziegler, P., and Dowda, M. 2004. Physical activity among children attending preschools. *Pediatrics* **114**: 1258-1263.

Physical Activity Guidelines Advisory Committee. 2008. *Physical Activity Guidelines Advisory Committee Report*. Department of Health and Human Services, Washington, DC, U.S.

Porter, L.S. 1972. The impact of physical-physiological activity on infants' growth and development. *Nurs. Res* **21**: 210-219.

Reilly, J.J., Jackson, D.M., Montgomery, C., Kelly, L.A., Slater, C., Grant, S., and Paton, J.Y. 2004. Total energy expenditure and physical activity in young Scottish children: mixed longitudinal study. *Lancet* **363**: 211-212.

Reilly, J. J., Kelly, L., Montgomery, C., Williamson, A., Fisher, A., McColl, J.H., Lo, C.R., Paton, J.Y., and Grant, S. 2006. Physical activity to prevent obesity in young children: cluster randomised controlled trial. *BMJ* **333**: 1041.

Rhodes, R., Pfaeffli, L. 2010. Mediators of physical activity behaviour change among adult non-clinical populations: a review update. *Int. J. Behav. Nutr. Phys. Act.* **7**(37).

Saakslähti, A., Numminen, P., Varstala, V., Helenius, H., Tammi, A., Viikari, J., and Valimäki, I. 2004. Physical activity as a preventive measure for coronary heart disease risk factors in early childhood. *Scand. J Med. Sci Sports* **14**: 143-149.

Specker, B. and Binkley, T. 2003. Randomized trial of physical activity and calcium supplementation on bone mineral content in 3- to 5-year-old children. *J Bone Miner. Res* **18**: 885-892.

Specker, B.L., Mulligan, L., and Ho, M. 1999. Longitudinal study of calcium intake, physical activity, and bone mineral content in infants 6-18 months of age. *J Bone Miner. Res* **14**: 569-576.

Start Active, Stay Active: A report on physical activity for health from the four home countries' Chief Medical Officers. 2011. United Kingdom. www.dh.gov.uk/en/Publications/PublicationsPolicyAndGuidance/DH_128209 accessed 9th Jan. 2012.

Strong, W.B., Malina, R.M., Blimkie, C.J., Daniels, S.R., Dishman, R.K., Gutin, B., Hergenroeder, A.C., Must, A., Nixon, P.A., Pivarnik, J.M., Rowland, T., Trost, S., and Trudeau, F. 2005. Evidence based physical activity for school-age youth. *J Pediatr.* **146**: 732-737.

Sugimori, H., Yoshida, K., Izuno, T., Miyakawa, M., Suka, M., Sekine, M., Yamagami, T., and Kagamimori, S. 2004. Analysis of factors that influence body mass index from ages 3 to 6 years: A study based on the Toyama cohort study. *Pediatr Int.* **46**: 302-310.

Timmons, B.W., Naylor, P.J., Pfeiffer, K. 2007. Physical activity for preschool children – how much and how. *Appl. Physiol. Nutr. Metab.* **32**:S122-S134.

Timmons, B.W., LeBlanc, A.G., Carson, V., Connor Gorber, S., Dillman, C., Janssen, I., et al. 2012. Systematic review of the relationship between physical activity and health indicators in the early years (ages 0-4 years). *Appl. Physiol. Nutr. Metab.* **Submitted**.

Tremblay, M.S., Shephard, R.J., Brawley, L. 2007a. Research that informs Canada's physical activity guides: and introduction. *Appl. Physiol. Nutr. Metab.* **32**:S1-S8.

Tremblay, M.S., Esliger, D.W., Tremblay, A., Colley, C. 2007b. Incidental movement, lifestyle-embedded activity and sleep; new frontiers in physical activity assessment. **32**:S208-S217.

Tremblay, M.S., Shephard, R.J., Brawley, L., Cameron, C., Craig, C.L., Duggan, M., Esliger, D.W., Hearst, W., Hicks, A., Janssen, I., Katzmarzyk, P.T., Latimer, A.E., Martin Ginis, K.A., McGuire, A., Paterson, D.H., Sharratt, M., Spence, J.C., Timmons, B., Warburton, D., Young, K., Zehr, L. 2007c. Physical activity guidelines and guides for Canadians: facts and future. *Can. J. Public Health.* **98**(suppl.2):S218-S224; *Appl. Physiol. Nutr. Metab.* **32**(suppl.2E):S218-S224.

Tremblay, M.S., Colley, R.C., Saunders, T.J., Healy, G.H., Owen, N. 2010a. Physiological and health implications of a sedentary lifestyle. *Appl. Physiol. Nutr. Metab.* **35**:725-740.

Tremblay, M.S., Kho, M.E., Tricco, A.C., Duggan, M. 2010b. *Process description and evaluation of Canadian Physical Activity Guidelines development.* *Int. J. Behav. Nutr. Phys. Act.* **7**(42).

Tremblay, M.S., Shields, M., Lavoilette, M., Craig, C.L., Janssen, I., Connor Gorber, S. 2010c. Fitness of Canadian children and youth: results from the 2007-2009 Canadian Health Measures Survey. *Health Reports (Statistics Canada, Catalogue no. 82-003-XPE)* 21(1): 7-20.

Tremblay, M.S., and Haskell, W.L. 2012a. From science to physical activity guidelines. In C. Bouchard, S.N. Blair, W.L. Haskell (Eds.) *Physical Activity and Health* (2nd Ed.). Human Kinetics Publishers, Champaign, IL. p. 359-378.

Tremblay, M.S., LeBlanc, A., Carson, V., Choquette, L., Connor-Gorber, S., Dillman, C., Duggan, M., Gordon, M.J., Hicks, A., Janssen, I., Kho, M.E., Latimer, A.E., LeBlance, C., Murumets, K., Okely, A., Reilly, J.J., Stearns, J.A., Spence, J.C. and Timmons, B.W. 2012a. Canadian physical activity guidelines for the early years (aged 0-4 years). *Appl. Physiol Nutr. Metab.* **in press**.

Tremblay, M.S., LeBlanc, A., Carson, V., Choquette, L., Connor-Gorber, S., Dillman, C., Duggan, M., Gordon, M.J., Hicks, A., Janssen, I., Kho, M.E., Latimer, A.E., LeBlance, C., Murumets, K., Okely, A., Reilly, J.J., Timmons, B.W., Stearns, J.A., and Spence, J.C.. 2012b. Canadian sedentary behaviour guidelines for the early years (aged 0-4 years). *Appl. Physiol Nutr. Metab.* **in press**.

Venetsanou, F. and Kambas, A. 2004. How can a traditional Greek dances programme affect the motor proficiency of pre-school children? *Research in Dance Education* **5**: 127-138.

Wells, J.C. and Ritz, P. 2001. Physical activity at 9-12 months and fatness at 2 years of age. *Am J Hum. Biol.* **13**: 384-389.

Wilson, D.K., Klesges, L.M., Klesges, R.C., Eck, L.H., Hackett-Renner, C.A., Alpert, B.S., and Dalton, E.T. 1992. A prospective study of familial aggregation of blood pressure in young children. *J Clin. Epidemiol.* **45**: 959-969.

World Health Organization. Global recommendations on physical activity for health. 2010. World Health Organization. Geneva, Switzerland.

Young, T.K., Katzmarzyk, P.T. 2007. Physical activity of Aboriginal people in Canada. *Appl. Physiol. Nutr. Metab.* **32**:S148-S160.

Appendix A: Meeting participants and members of the early years guideline steering committee

Panel Member	Affiliation	Role	Conflict of interest
Mark Tremblay, PhD	Director, Healthy Active Living and Obesity Research Group, Children's Hospital of Eastern Ontario (Canada)	Chair, content expert	None
Allana LeBlanc	Healthy Active Living and Obesity Research Group, Children's Hospital of Eastern Ontario (Canada)	Systematic review project manager	None
Ian Janssen, PhD	School of Kinesiology and Health Studies and Department of Community Health and Epidemiology, Queen's University (Canada)	Co-Investigator, content expert	None
Brian Timmons, PhD	Child Health & Exercise Medicine Program, McMaster University (Canada)	Co-Investigator, content expert	None
John Spence, PhD	Faculty of Physical Education and Recreation, University of Alberta (Canada)	Co-Investigator, content expert	None
Val Carson, PhD(c)	School of Kinesiology and Health, Queen's University (Canada)	Systematic review author	None
Jodie Stearns	Faculty of Physical Education and Recreation, University of Alberta (Canada)	Systematic review author	None
Carrie Dillman, PT	Child Health & Exercise Medicine Program, McMaster University (Canada)	Systematic review author	None
Sarah Conor Gorber, PhD	Public Health Agency of Canada (Canada)	Methodological expert	None
Michelle Kho, MT PhD	Department of Physical Medicine & Rehabilitation, Johns Hopkins University (U.S.A.)	Methodological expert	None
Amy Latimer, PhD	School of Kinesiology and Health, Queen's University (Canada)	Dissemination and messaging expert	None
Tone Okely, PhD	Director of the Interdisciplinary Educational Research Institute, University of Wollongong (Australia)	Collaborator, external reviewer	None
John Reilly, PhD	Royal Hospital for Sick Children (Scotland)	Collaborator, external reviewer	None
Claire LeBlanc, MD	Canadian Pediatric Society (Canada)	Medical representative	None
Mary Jane Gordon	Kingston, Frontenac and Lennox & Addington Public Health (Canada)	Public health nurse and stakeholder representative	None
Louise Choquette	Best Start Resource Centre, a key program of Health Nexus (Canada)	Community and stakeholder representative	None
Mary Duggan	Canadian Society for Exercise Physiology (Canada)	Knowledge user	None
Audrey Hicks, PhD	Canadian Society for Exercise Physiology (Canada)	Knowledge user	None
Kelly Murumets	President and CEO, ParticipACTION (Canada)	Knowledge user	None

APPENDIX B: List of organizations contacted for stakeholder consultation

Active Healthy Kids Canada
Active Living Alliance for Canadians with a Disability
Active Living Coalition for Older Adults
Alberta Centre for Active Living
Alberta Health Services
Alberta Recreation and Parks Association
Alzheimer Society of Canada
Arctic Health Research Network - Yukon
Asthma Society of Canada
Autism Society of Canada
BC Coalition of People with Disabilities
Be Fit For Life Centre, University of Calgary
Best Start
Boys and Girls Clubs - Alberta
Boys and Girls Clubs - Ontario
Boys and Girls Clubs of Canada
Canada Safety Council
Canadian Academy of Sport Medicine
Canadian Association for Community Living
Canadian Association for School Health
Canadian Association for the Advancement of Women in Sport and Physical Activity
Canadian Association of Cardiac Rehabilitation
Canadian Association of Family Resource Programs
Canadian Association of Gerontology
Canadian Association of Occupational Therapists
Canadian Association of Principals
Canadian Association of Retired Persons (CARP)
Canadian Association of Social Workers
Canadian Athletic Therapists Association
Canadian Cancer Society
Canadian Centre for Activity and Aging
Canadian Centre for Stress and Well-Being
Canadian Child Care Federation
Canadian Chiropractic Association
Canadian Diabetes Association
Canadian Ethnocultural Council
Canadian Fitness and Lifestyle Research Institute
Canadian Forces Personnel Support Agency
Canadian Healthcare Association
Canadian Home and School Federation
Canadian Home Care Association
Canadian Institute of Child Health
Canadian Institute of Planners
Canadian Intramural Recreation Association
Canadian Labour Congress
Canadian Medical Association
Canadian MedicAlert Foundation
Canadian Mental Health Association

Canadian Network for Leadership in Education and Early Learning & Care
Canadian Nurses Association
Canadian Organization for Rare Disorders
Canadian Orthopaedic Foundation
Canadian Paediatric Society
Canadian Parks and Recreation Association
Canadian Physiotherapy Association
Canadian Public Health Association
Canadian Red Cross
Canadian Senior Games Association
Canadian Sport Massage Therapist Association
Canadian Teachers Federation
Centre for Education and Research on Aging and Health
Children's Hospital of Eastern Ontario
Coalition for Active Living
College of Physicians and Surgeons of Ontario
Conseil communauté en santé du Manitoba
Conseil scolaire acadien provincial
Culture, Heritage, Tourism and Sport, Government of Manitoba
Dept of Tourism, Culture and Recreation - Government of Newfoundland and Labrador
Dept of Tourism, Parks and Recreation - Government of Alberta
Dept. of Community Services, Sport and Recreation Branch - Government of Yukon
Dept. of Culture, Language, Elders and Youth - Government of Nunavut
Dept. of Culture, Language, Elders and Youth - Government of Nunavut
Dept. of Education - Government of Newfoundland and Labrador
Dept. of Health and Community Services - Government of Newfoundland and Labrador
Dept. of Health and Wellness - Government of Prince Edward Island
Dept. of Health Promotion & Protection - Government of Nova Scotia
Dept. of Human Resources, Labour and Employment - Government of Newfoundland and Labrador
Dept. of Municipal and Community Affairs, Sport, Recreation, Youth and Volunteerism - Government of Northwest Territories
Dept. of Municipal and Community Affairs, Sport, Recreation, Youth and Volunteerism - Government of Northwest Territories
Dept. of Wellness, Culture and Sport, Government of New Brunswick
Dieticians of Canada
Doctors Nova Scotia
Early Childhood Development Intercultural Partnership
Eastern Health
Ever Active Schools (Alberta)
Faculty of Physical Education and Recreation - University of Alberta
First Nations Child and Family Caring Society
Focus on Fathers Program - Catholic Community Services of York Region
Fondation Lucie et André Chagnon
Girl Guides of Canada
Healthy Indoors Partnership
Healthy Start for Mom and Me
High Five Program, Parks and Recreation Ontario
Hospital for Sick Children

Industrial Accident Prevention Association
Institut Pacific
Institute of Musculoskeletal Health and Arthritis, Canadian Institutes of Health Research
Invest in Kids
IWK Health Centre
Joint Consortium for School Health
Lawson Health Research Institute
Lets Go Green Canada
March of Dimes
Mi'kmaw Kina'matnewey, Nova Scotia
Ministry of Children and Youth Services - Government of Ontario
Ministry of Education - Government of Ontario
Ministry of Health Promotion - Government of Ontario
Ministry of Tourism, Parks, Culture and Sport - Government of Saskatchewan
Moncton Headstart
National Aboriginal Diabetes Association
National Aboriginal Health Association
National Association of Federal Retirees
National Association of Friendship Centres
National Indian & Inuit Community Health Representatives Organization
National Pensioners and Senior Citizens Federation
New Brunswick Gymnastics Association
New Brunswick Lung Association
Older Adults Centres' Association of Ontario
One Voice, The Canadian Seniors Network
Ontario Public Health Association
Osteoporosis Canada
Pan-Canadian Public Health Network
Parkgate Community Services
Parks and Recreation Ontario
ParticipACTION
Physical Activity Coordinator, Richmond County, Nova Scotia
Physical and Health Education Canada
Physical Literacy Wapiti Project - Saskatchewan
Psychologists Association of Alberta
Recreation and Parks Association of the Yukon
Recreation Connections Manitoba
Recreation Newfoundland and Labrador
Recreation Newfoundland and Labrador
Recreation Nova Scotia
Registered Nurses Association of Ontario
Reh-Fit Centre
Right to Play Canada
Road Scholar (Elderhostel Inc)
Royal College of Physicians and Surgeons of Canada
Safe Kids Canada
Saskatchewan Parks and Recreation Association
Saskatchewan Seniors Mechanism
Scouts Canada

SmartRisk
Society of Obstetricians and Gynaecologists of Canada
Special Olympics Canada
Stanton Territorial Health Authority
The Arthritis Society
The Canadian Association of Naturopathic Doctors
The Canadian Centre for Occupational Health & Safety
The Canadian National Institute for the Blind
The College of Family Physicians of Canada
The Federation of Canadian Municipalities
The Heart and Stroke Foundation of Canada
The Lung Association
The Royal Canadian Legion
The Salvation Army
UNICEF Canada
United Way of Canada
Victorian Order of Nurses for Canada
Yellowknife Family Centre
YMCA Canada
YMCA Fitness / YMCA Calgary
YMCA Ontario
YWCA Canada

APPENDIX C: Search Strategy for health indicators and physical activity

Preschool PA_May4_Medline: MEDLINE

1. Motor activity/ or motor activit*.tw.
2. Locomotor activity/
3. Physical exertion/
4. exercise/ or aerobic exercise.tw.
5. Play/
6. exp obesity/
7. (obesit* or obese).tw.
8. exp overweight/
9. (overweight or over-weight).tw.
10. exp body fat distribution/
11. exp body composition/
12. waist circumference/
13. skinfold thickness/ or (skin fold* or skinfold*).tw.
14. (body composition* or BMI or body mass index).tw.
15. exp "body weights and measures"/
16. (bio-impedance analysis or BIA).tw.
17. absorptiometry, photon/
18. (absorptiometry or densitometry or photodensitometry or DXA or DEXA).tw.
19. exp bone/
20. bone tissue.tw.
21. Bone density/
22. Bone development/
23. Osteogenesis/
24. insulin resistance/
25. (metabolic cardiovascular syndrome or metabolic syndrome or syndrome x).tw.
26. ((cardiovascular or heart or vascular) adj2 risk*).tw.
27. exp hypertension/
28. exp blood pressure determination/ or exp blood pressure monitoring, ambulatory/ or exp blood/
29. exp blood pressure/
30. exp blood glucose/ or exp diabetes mellitus, type 2/
31. exp glucose intolerance/ or glucose tolerance test/
32. Motor activity/
33. Psychomotor performance/
34. Child development/
35. gross motor skill*.tw.
36. cognitive development.tw.
37. "growth and development"/
38. Attention/
39. Self efficacy/
40. Self concept/
41. Child behavior disorder/
42. (pro-social behav* or prosocial behav* or pro social behav*).tw.
43. exp social behavior/
44. Aggression/
45. Temperament/
46. Social adjustment/

47. or/1-5
48. or/6-18
49. or/18-23
50. or/24-31
51. or/32-35
52. or/36-38
53. or/39-46
54. or/48-53
55. 47 and 54
56. limit 55 to ("infant (1 to 23 months)" or "preschool child (2 to 5 years)")
57. (infant* or preschool* or child* or pediatric* or paediatric*).tw.
58. 55 and 57
59. 56 or 58
60. limit 59 to randomized controlled trial
61. clinical trials as topic.sh.
62. randomly.ab.
63. trial.ti.
64. randomized controlled trial.pt.
65. controlled clinical trial.pt.
66. randomized.ab.
67. or/61-66
68. cohort studies/ or comparative studies/ or follow-up studies/ or prospective studies/ or risk factors/ or cohort.mp. or compared.mp. or groups.mp. or multivariate.mp.
69. 67 or 68
70. 59 and 69
71. 60 or 70

Preschool PA_May4_Embase

EMBASE

1. Motor activity/ or motor activit*.tw.
2. Locomotor activity/
3. Physical exertion/
4. exercise/ or aerobic exercise.tw.
5. Play/
6. exp obesity/
7. (obesit* or obese).tw.
8. exp overweight/
9. (overweight or over-weight).tw.
10. exp body fat distribution/
11. exp body composition/
12. waist circumference/
13. skinfold thickness/ or (skin fold* or skinfold*).tw.
14. (body composition* or BMI or body mass index).tw.
15. exp "body weights and measures"/
16. (bio-impedance analysis or BIA).tw.
17. absorptiometry, photon/
18. (absorptiometry or densitometry or photodensitometry or DXA or DEXA).tw.
19. exp bone/
20. bone tissue.tw.
21. Bone density/
22. Bone development/
23. Osteogenesis/
24. insulin resistance/
25. (metabolic cardiovascular syndrome or metabolic syndrome or syndrome x).tw.
26. ((cardiovascular or heart or vascular) adj2 risk*).tw.
27. exp hypertension/
28. exp blood pressure determination/ or exp blood pressure monitoring, ambulatory/ or exp blood/
29. exp blood pressure/
30. exp blood glucose/ or exp diabetes mellitus, type 2/
31. exp glucose intolerance/ or glucose tolerance test/
32. Motor activity/
33. Psychomotor performance/
34. Child development/
35. gross motor skill*.tw.
36. cognitive development.tw.
37. "growth and development"/
38. Attention/
39. Self efficacy/
40. Self concept/
41. Child behavior disorder/
42. (pro-social behav* or prosocial behav* or pro social behav*).tw.
43. exp social behavior/
44. Aggression/
45. Temperament/
46. Social adjustment/
47. or/1-5

48. or/6-18
49. or/18-23
50. or/24-31
51. or/32-35
52. or/36-38
53. or/39-46
54. or/48-53
55. 47 and 54
56. (infant* or preschool* or child* or pediatric* or paediatric*).tw.
57. randomly.ab.
58. trial.ti.
59. randomized.ab.
60. cohort studies/ or comparative studies/ or follow-up studies/ or prospective studies/ or risk factors/ or cohort.mp. or compared.mp. or groups.mp. or multivariate.mp.
61. limit 55 to (infant or preschool child <1 to 6 years>)
62. 55 and 56
63. 61 or 62
64. limit 63 to (clinical trial or randomized controlled trial or controlled clinical trial)
65. or/57-59
66. 60 or 64 or 65
67. 63 and 66

Preschool PA_May4_PsycINFO

PsycINFO

1. exp obesity/
2. (obesit* or obese).tw.
3. exp overweight/
4. (overweight or over-weight).tw.
5. Body Fat/
6. Body Weight/
7. waist circumference.tw.
8. skin fold*.mp. or skinfold*.tw. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures]
9. (body composition* or BMI or body mass index).tw.
10. (bio-impedance analysis or BIA).tw.
11. (absorptiometry or densitometry or photodensitometry or DXA or DEXA).tw.
12. bones/
13. bone tissue.tw.
14. bone disorders/
15. insulin resistance/
16. (metabolic cardiovascular syndrome or metabolic syndrome or syndrome x).tw.
17. ((cardiovascular or heart or vascular) adj3 risk\$).tw.
18. exp hypertension/
19. exp blood pressure determination/ or exp blood pressure monitoring, ambulatory/ or exp blood/
20. exp blood pressure/
21. Diabetes Mellitus/ or Glucose/
22. exp motor development/
23. exp motor performance/
24. Motor Skills/ or Gross Motor Skill Learning/
25. exp attention/
26. Self Efficacy/
27. Self Concept/
28. childhood play development/
29. behavior problems/
30. prosocial behavior/
31. Social Behavior/
32. Aggressive Behavior/ or Child Attitudes/
33. Personality/
34. Social Adjustment/
35. Physical Activity/
36. Activity Level/
37. energy expenditure/
38. exp exercise/
39. exp recreation/
40. Language Development/
41. or/1-11
42. or/11-14
43. or/15-21
44. exp cognitive development/
45. Development/ or Early Childhood Development/ or Childhood Development/
46. 22 or 23 or 24

47. 22 or 23 or 24
48. 25 or 40 or 44 or 45
49. 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34
50. or/35-39
51. 41 or 42 or 43 or 46 or 48 or 49
52. (infant* or preschool* or child* or pediatric* or paediatric*).tw.
53. 50 and 51
54. 52 and 53
55. limit 53 to (140 infancy or 160 preschool age)
56. 54 or 55
57. cohort studies/ or comparative studies/ or follow-up studies/ or prospective studies/ or risk factors/ or cohort.mp. or compared.mp. or groups.mp. or multivariate.mp.
58. 56 and 57
59. limit 56 to ("0430 followup study" or "0450 longitudinal study" or "2000 treatment outcome/randomized clinical trial")
60. 58 or 59

SPORT DISCUS (EBSCO)

Monday, May 09, 2011 3:22:51 PM

#	Query	Results
S12	S8 and S9 and S11	874
S11	S1 and S10	Display
S10	(S2 or S3 or S4 or S5 or S6 or S7)	Display
S9	case control study or cohort analysis or compared or multivariate or randomized controlled trial or longitudinal or follow up	Display
S8	children or preschool or infant or pediatric or peadiatric	Display
S7	self efficacy or self esteem or self concept or pro social behaviour or aggression or temperament or social adjustment	Display
S6	cognitive development or attention or language development	Display
S5	motor activity or gross motor skill or motor development or object control or child development or (growth and development)	Display
S4	insulin resistance or metabolic syndrome or hypertension or blood pressure or blood glucose or glucose intolerance	Display
S3	bone or bone density or bone development or osteogenesis	Display
S2	obesity or obese or overweight or body fat or waist circumference or skinfold or (DXA or DEXA)	Display
S1	motor activity or physical activity or exercise or play	Display

ID	Search	Hits	Edit	Delete
#1	<u>(physical activity)</u>	10133	edit	delete
#2	<u>(activity level)</u>	18146	edit	delete
#3	<u>(energy expenditure)</u>	1612	edit	delete
#4	<u>(play)</u>	9392	edit	delete
#5	<u>(motor activity)</u>	4176	edit	delete
#6	<u>(#1 OR #2 OR #3 OR #4 OR #5)</u>	35364	edit	delete
#7	<u>(obesit* OR obese OR overweight OR over-weight OR body composition OR body fat OR waist circumference OR bio-impedance analysis OR BIA OR absorptiometry OR DXA OR DEXA OR body mass index OR BMI OR skin folds OR skin-folds OR skin-fold OR skin-folds)</u>	22737	edit	delete
#8	<u>((cardiovascular disease* OR heart disease* OR vascular disease*) ADJ risk*)</u>	517	edit	delete
#9	<u>(self-esteem OR self concept OR motor development OR child development)</u>	12059	edit	delete
#10	<u>(cognition development OR behavioural conduct OR behavioral conduct OR pro-social behaviour OR pro-social behavior OR prosocial behaviour OR prosocial behavior)</u>	4246	edit	delete
#11	<u>(#7 OR #8 OR #9 OR #10)</u>	36688	edit	delete
#12	<u>(#6 AND #11)</u>	7146	edit	delete
#13	<u>(child* OR infant* OR preschool* OR pediatric OR paediatric)</u>	86523	edit	delete
#14	<u>(#12 AND #13)</u>	2901	edit	delete
#15	<u>(#14)</u>	1141	edit	delete

Appendix D: Search Strategy for Physical Activity and Risk of Injury

Database: Ovid MEDLINE(R) In-Process & Other Non-Indexed Citations and Ovid MEDLINE(R) <1946 to Present>

Search Strategy:

-
- 1 "Wounds and Injuries"/ (56375)
 - 2 Motor activity/ or motor activit*.tw. (71441)
 - 3 Locomotor activity/ (64483)
 - 4 Physical exertion/ (50776)
 - 5 exercise/ or aerobic exercise.tw. (57397)
 - 6 Play/ (6111)
 - 7 2 or 3 or 4 or 5 or 6 (180814)
 - 8 1 and 7 (402)
 - 9 limit 8 to ("infant (1 to 23 months)" or "preschool child (2 to 5 years)") (115)

APPENDIX E: AGREE II assessment

AGREE II Reporting Grid – 2012 Canadian Physical Activity Guidelines for the Early Years (aged 0 -4 years)

AGREE II Item	MK Reporting Location for Physical Activities Guidelines	MK Internal AGREE II Score	MK Rationale
Domain 1. Scope and Purpose			
1. The overall objective(s) of the guideline is (are) specifically described.	<ul style="list-style-type: none"> Clinical practice guideline development report Introduction, Background Clinical practice guideline paper – Introduction and background 	7	Describes health intent, expected outcomes, and guideline targets.
2. The health question(s) covered by the guideline is (are) specifically described.	<ul style="list-style-type: none"> Clinical practice guideline development report – Summary, Guidelines questions Clinical practice guideline paper - Methods 	7	Describes target population, intervention, outcomes, and health care setting.
3. The population (patients, public, etc.) to whom the guideline is meant to apply is specifically described.	<ul style="list-style-type: none"> Clinical practice guideline development report – Summary, Guideline preamble, Final guidelines, preamble Clinical practice guideline paper – Results, preamble 	7	Describes, target population, gender, ages, clinical conditions
Domain 2. Stakeholder Involvement			
4. The guideline development group includes individuals from all the relevant professional groups.	<ul style="list-style-type: none"> Clinical practice guideline development report – Appendix A 	7	International multidisciplinary group, including scientists, guideline developers, government, and methodologists; describes each person’s name, expertise, affiliation, location, and role
5. The views and preferences of the target population (patients, public, etc.) have been sought.	<ul style="list-style-type: none"> Clinical practice guideline development report – Table 4 – final guidelines following consultation process Clinical practice guideline paper – Methods, consultation process 	7	Description of stakeholder consultation process (on-line surveys), information gathered, and how feedback informed final guideline recommendations
6. The target users of the guideline are clearly defined.	<ul style="list-style-type: none"> Clinical practice guideline development report – Summary, Guideline preamble, Final guidelines, preamble Clinical practice guideline paper – Results, preamble 	7	Describes the intended guideline audience, and describes how the guideline may be used by the target audience.
Domain 3. Rigour of Development			
7. Systematic methods were used to search for evidence.	<ul style="list-style-type: none"> Clinical practice guideline development report, Systematic review , Methods, Literature search strategy Systematic review 	7	Systematic review reports evidence sources, time periods, search terms, and search strategies.

AGREE II Item	MK Reporting Location for Physical Activities Guidelines	MK Internal AGREE II Score	MK Rationale
8. The criteria for selecting the evidence are clearly described.	<ul style="list-style-type: none"> Clinical practice guideline development report, Systematic review, Methods, Inclusion criteria Systematic review 	7	Systematic review reports inclusion (population, study design, comparisons, language, and context) and exclusion criteria.
9. The strengths and limitations of the body of evidence are clearly described.	<ul style="list-style-type: none"> Clinical practice guideline development report – Systematic review, Results, Tables 1-3 Clinical practice guideline paper – Discussion, Future research Systematic review 	7	Systematic review reports study design, methodology limitations, relevance of outcomes, consistency and direction of results across studies, magnitude of benefit vs. harm (pending available data), and applicability
10. The methods for formulating the recommendations are clearly described.	<ul style="list-style-type: none"> Clinical practice guideline development report – Summary, Development of Guideline Recommendations; Stakeholder process Clinical practice guideline paper - Methods 	7	Described development of guideline consensus recommendation process, results from stakeholder feedback, and final development of recommendations
11. The health benefits, side effects and risks have been considered in formulating the recommendations.	<ul style="list-style-type: none"> Clinical practice guideline development report – Summary, Guideline preamble, Final guidelines, preamble Clinical practice guideline paper – Results, preamble 	7	Reported supporting data and report of benefits. Attempted to identify studies of harms/ side effects.
12. There is an explicit link between the recommendations and the supporting evidence.	<ul style="list-style-type: none"> Clinical practice guideline development report – Methods – summary of evidence 	7	Specific citations to systematic reviews and summary tables of evidence
13. The guideline has been externally reviewed by experts prior to its publication.	<ul style="list-style-type: none"> Clinical practice guideline development report –Development of Guideline Recommendations, Stakeholder feedback Clinical practice guideline paper – Methods 	7	Description of external review purpose (feedback on draft recommendations), methods, invitees, information gathered, and how the information informed the guidelines.
14. A procedure for updating the guideline is provided.	<ul style="list-style-type: none"> Clinical practice guideline development report – Summary, Development of Guideline Recommendations Clinical practice guideline paper – Discussion, Updating the guidelines 	7	Described the guideline date, an explicit timeline for guideline updates, and mechanism for updates
Domain 4. Clarity of Presentation			
15. The recommendations are specific and	<ul style="list-style-type: none"> Clinical practice guideline development report – Summary, Table 4 Clinical practice guideline paper – 	7	Explicitly states the recommended action, purpose of the recommended action, recommended population, and

AGREE II Item	MK Reporting Location for Physical Activities Guidelines	MK Internal AGREE II Score	MK Rationale
unambiguous.	Results		qualifying statements
16. The different options for management of the condition or health issue are clearly presented.	<ul style="list-style-type: none"> • Clinical practice guideline development report – Dissemination and implementation • Clinical practice guideline paper – Dissemination and implementation 	N/A	The physical activity guidelines focus on the use of physical activity for health outcomes.
17. Key recommendations are easily identifiable.	<ul style="list-style-type: none"> • Clinical practice guideline development report – Summary, Final Guidelines • Clinical practice guideline paper - Results 	7	Specific recommendations are grouped together in the Summary, Final Guidelines, and Results sections.
Domain 5. Applicability			
18. The guideline describes facilitators and barriers to its application.	<ul style="list-style-type: none"> • Clinical practice guideline development report – Dissemination and Implementation • Clinical practice guideline paper – Dissemination and Implementation 	2 (interim score)	Description of potential barriers and facilitators to framing guideline recommendations, and messaging to improve guideline adherence in progress.
19. The guideline provides advice and/or tools on how the recommendations can be put into practice.	<ul style="list-style-type: none"> • Clinical practice guideline development report – Summary; Dissemination and Implementation • Clinical practice guideline paper – Dissemination and Implementation 	6	Description of dissemination efforts (conference presentations, linkage with ParticipACTION, Federal-Provincial-Territorial partners, media campaigns), summary document, and plans for future tools.
20. The potential resource implications of applying the recommendations have been considered.	<ul style="list-style-type: none"> • Clinical practice guideline development report – Surveillance 	3	We do not discuss the potential resource implications of applying the recommendations.
21. The guideline presents monitoring and/or auditing criteria.	<ul style="list-style-type: none"> • Clinical practice guideline development report – Surveillance • Clinical practice guideline paper - Surveillance 	6	Identifies data sources and links that monitor guideline concordance. Provides an example of how one of the data sources will monitor guideline concordance.
Domain 6. Editorial Independence			
22. The views of the funding body have not influenced the content of the guideline.	<ul style="list-style-type: none"> • Clinical practice guideline development report – Summary, Disclaimer • Clinical practice guideline paper - Acknowledgements 	7	Funding sources identified, and statement that the funding sources did not influence guideline content.
23. Competing interests of guideline	<ul style="list-style-type: none"> • Clinical practice guideline development report – Appendix A 	7	Description of types and methods of data collection for competing

AGREE II Item	MK Reporting Location for Physical Activities Guidelines	MK Internal AGREE II Score	MK Rationale
development group members have been recorded and addressed.	<ul style="list-style-type: none"> • Systematic review 		interests.

Legend:

Clinical practice guideline development report = Canadian Physical Activity Guidelines Clinical Practice Guideline Development Report, *Canadian Society for Exercise Physiology*

Clinical practice guideline paper = Tremblay MS, LeBlanc AG, Carson V, Choquette L, Connor Gorber S, Dillman C, Duggan M, Gordon MJ, Hicks A, Janssen I, Kho ME, Latimer AE, LeBlanc C, Murumets K, Okely T, Reilly J, Spence J, Stearns J, Timmons B. Canadian Physical Activity Guidelines for the Early Years (aged 0-4 years). *Applied Physiology, Nutrition, and Metabolism*. In press.

Systematic review = Timmons BW, LeBlanc AG, Carson V, Connor Gorber S, Dillman C, Janssen I, Kho ME, Stearns J, Spence J, Tremblay MS. Systematic review of physical activity and health in the early years (aged 0-4 years). Submitted to: *Applied Physiology, Nutrition, and Metabolism*.