Canadian Sedentary Behaviour Guidelines for the Early Years (aged 0–4 years)

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Abstract: The Canadian Society for Exercise Physiology (CSEP), with assistance from multiple partners, stakeholders, and researchers, developed the first Canadian Sedentary Behaviour Guidelines for the Early Years (aged 0–4 years). These national guidelines are in response to a call from health and health care professionals, child care providers, and fitness practitioners for guidance on sedentary behaviour in the early years. The guideline development process followed the Appraisal of Guidelines for Research Evaluation (AGREE) II framework. The recommendations are informed by evidence from a systematic review that examined the relationships between sedentary behaviour (predominantly screen time) and health indicators (healthy body weight, bone and skeletal health, motor skill development, psychosocial health, cognitive development, and cardio-metabolic disease risk factors) for three age groups (infants aged <1 year; toddlers aged 1–2 years; preschoolers aged 3–4 years). Evidence from the review was assessed using the Grading of Recommendations Assessment, Development and Evaluation (GRADE) system. The new guidelines include a preamble to provide context, followed by the specific recommendations. The final guidelines benefitted from extensive on-line consultations with input from >900 domestic and international stakeholders, end-users, and key informants. The final guidelines state: for healthy growth and development, caregivers should minimize the time infants (aged <1 year), toddlers (aged 1–2 years), and preschoolers (aged 3–4 years) spend being sedentary during waking hours. This includes prolonged sitting or being restrained (e.g., stroller, high chair) for more than 1 h at a time. For those under 2 years, screen time (e.g., TV, computer, electronic games) is not recommended. For children 2–4 years, screen time should be limited to under 1 h per day; less is better.

Key words: sedentary behaviour, recommendations, infants, toddlers, preschoolers.

Résumé : La Société canadienne de physiologie de l'exercice (SCPE) en collaboration avec plusieurs partenaires, intervenants concernés et chercheurs a élaboré les premières directives canadiennes en matière de comportement sédentaire à l'intention des enfants âgés de 0 à 4 ans. Ces directives nationales répondent à une demande des praticiens en santé, des personnes qui prennent soin des enfants et en condition physique désireux d'avoir des directives au sujet du comportement sédentaire durant la petite enfance. L'élaboration des directives a respecté la *Grille II d'évaluation de la qualité des recom-*

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mandations pour la pratique clinique (AGREE). Les recommandations présentées dans cet article sont basées sur les données probantes d'une analyse documentaire systématique portant sur les relations entre le comportement sédentaire (surtout le temps passé devant un écran) et des indicateurs de santé (poids santé, santé des os et du squelette, développement des habiletés motrices, santé psychosociale, développement cognitif et facteurs de risque de maladie cardiométabolique) chez les nourrissons (âgés de <1 an), les tout-petits (âgés de 1–2 ans) et les enfants d'âge préscolaire (âgés de 3–4 ans). La qualité des données issues de l'analyse documentaire a été évaluée au moyen de la méthodologie GRADE (Grading of Recommendations Assessment, Development and Evaluation). Les nouvelles directives sont composées d'un préambule situant le contexte et de directives spécifiques. Les directives finales ont bénéficié des fruits d'une vaste consultation en ligne auprès de plus de 900 intervenants concernés, d'utilisateurs finaux et de sources de premier plan, sur la scène nationale et internationale. La directive finale énonce ce qui suit : « Pour favoriser une croissance et un développement sains, les personnes qui prennent soin des enfants devraient minimiser le temps que les nourrissons (âgés de <1 an), les tout-petits (âgés de 1–2 ans) et les enfants d'âge préscolaire (âgés de 3–4 ans) consacrent à des activités sédentaires pendant les heures d'éveil. Les enfants ne devraient pas être immobilisés ou assis (p. ex., dans une poussette ou une chaise) pendant plus d'une heure à la fois. Chez les enfants de moins de 2 ans, l'exposition à des écrans (télévision, ordinateur, jeux vidéo) n'est pas recommandée. Chez les enfants de 2 à 4 ans, le temps passé devant un écran devrait être limité à moins d'une heure par jour; passer moins de temps devant un écran est encore mieux.

Mots-clés : comportement sédentaire, recommandations, nourrissons, tout-petits, enfants d'âge préscolaire.

Introduction and background

Low levels of childhood physical activity (Colley et al. 2011) and physical fitness (Tremblay et al. 2010*b*), along with excessive levels of sedentary time (Colley et al. 2011) and obesity (Shields 2006; Tremblay and Willms 2000; Tremblay et al. 2002), are significant public health issues that may threaten the future health and well-being of young people (Reilly and Kelly 2011). Sedentary behaviour, separate and distinct from a lack of moderate- to vigorous-intensity physical activity, has been identified as an important contributor to the premature development of non-communicable disease (Tremblay et al. 2010*c*; United Nations General Assembly 2011). Sedentary behaviour refers to any waking behaviour characterized by an energy expenditure ≤1.5 METs while in a sitting or reclining posture (e.g., sitting, watching television (TV), motorized transportation) (Sedentary Behaviour Research Network 2012; Tremblay et al. 2010*c*). Research in Canadian school-aged children indicates that young people spend an average of 8.6 h, or two-thirds of their waking time engaging in sedentary behaviour (Colley et al. 2011) with about half of this time spent engaging in screen-based activities (e.g., TV, computers) (Mark et al. 2006). These sedentary behaviours, especially those that are screen-based, have been linked to obesity and decreased fitness, self-esteem, pro-social behaviour, and academic achievement in school-aged children (Tremblay et al. 2011*c*).

Until recently, little attention has been given to sedentary behaviour in the early years (defined in this paper as aged 0–4 years; i.e., birth to 4.99 years). However, accumulating evidence indicates that sedentary behaviours dominate the waking hours during the early years, with approximately 80% of this time being spent sedentary (Reilly et al. 2004; Vale et al. 2010). Furthermore, approximately 90% of children are exposed to screen-based activities before 2 years of age (Zimmerman et al. 2007). These findings have increased interest in the potential health consequences of excessive sedentary behaviour during the early years. Since this time period is formative for proper growth and development, it is possible that compared with school-aged children, younger children may experience additional negative health outcomes when exposed to excessive sedentary behaviour, such as impaired attention span and cognitive development (Christakis 2009; Lillard and Peterson 2011). Furthermore, sedentary behaviour habits formed during the early years may track over time (Janz et al. 2005), resulting in negative health outcomes during adulthood (Hancox et al. 2004). Consequently, promoting appropriate sedentary behaviour habits at a young age may have positive effects on immediate and long-term health.

Apart from a position statement by the Canadian Paediatric Society on the impact of media use on children and youth (Ford-Jones and Nieman 2003), no specific guidelines on sedentary behaviour existed for Canadian children until recently. In February 2011, the Canadian Society for Exercise Physiology (CSEP) released the first set of sedentary behaviour guidelines for school-aged children (aged 5–11 years) and youth (aged 12–17 years) to set measurable targets for surveillance, provide guidance to public health and health care professionals, and motivate Canadians to reduce sedentary behaviours (Tremblay et al. 2011*b*). These guidelines acknowledge the important, negative effects of sedentary behaviour on health, independent of physical activity. The demand for similar guidelines for the early years became apparent during the consultation processes for the guidelines for school-aged children and youth completed by both the CSEP (CSEP 2011) and the Public Health Agency of Canada. The recent release of physical activity guidelines for the early years from Australia (Australian Government 2010) and the United Kingdom (Start Active Stay Active 2011), each of which contained recommendations related to sedentary behaviours, also fuelled the effort to fill this gap in Canada and meet a clear need for guidance from health and health care professionals and the childcare sector.

This paper briefly outlines the process and outcomes for the development of the first Canadian Sedentary Behaviour Guidelines for the Early Years (aged 0–4 years), which were released in March 2012 by the CSEP. The new guidelines were informed by a rigorous and transparent process, and recommendations are based on a systematic review of the sci-

entific evidence, expert consensus, and input from stakeholders. A detailed report outlining the full guideline methodological development process and related materials can be accessed through the CSEP Web site at http://www.csep.ca/english/view.asp?x=804. The purpose of this paper is to provide a summary of this process and to present the guidelines themselves.

Methods

The entire guideline development process followed the framework explained in detail by Tremblay and Haskell (2012). Briefly, 15 stages are included in the guideline development process as follows: establishing a leadership team; instituting process assessment procedures; forming a Guideline Development and Research Committee; international and inter-jurisdictional guideline harmonization; systematic literature review; interpretation of findings; identification of research gaps; consensus and stakeholder engagement; knowledge translation strategy (including language translation, messaging, communication strategy, dissemination strategy); evaluation; and update and revision planning.

Figure 1 provides a summary of the events leading to the development of the first Canadian Sedentary Behaviour Guidelines for the Early Years (aged 0–4 years). Details on the events and processes between 2006 and 2010 are provided elsewhere (Tremblay et al. 2007*a*, 2007*b*, 2010*a*, 2011*b*; CSEP 2009). After the release of the new sedentary behaviour guidelines for school-aged children and youth (Tremblay et al. 2011*b*), the CSEP targeted the early years as the next priority for guideline development. The CSEP and the Healthy Active Living and Obesity Research Group (HALO) at the Children's Hospital of Eastern Ontario Research Institute, with assistance from ParticipACTION, provided leadership and support to the project.

The AGREE II instrument was used as a framework to guide the project (Brouwers et al. 2010*a*, 2010*b*, 2010*c*). AGREE II is the internationally accepted standard for guideline development that provides the framework and assesses scientific rigour and transparency throughout the process. Two research methodology consultants (S.C.G., M.E.K.) were engaged to advise the leadership team on best practices for developing the guidelines and conducting the systematic review.

A Guideline Development and Research Committee (composed of the authors of this paper) was formed and provided the human resources and expertise to complete the guidelines development tasks. This committee provided input and guidance on the systematic literature review, interpretation of research findings, international and inter-jurisdictional guideline harmonization (with sedentary behaviour-related statements contained in physical activity guidelines from other jurisdictions), and identification of research gaps.

The purpose of the systematic review was to evaluate the available evidence examining the relationship between sedentary behaviour and health indicators in the early years to assist in the development of public health guidelines. Our research question was "what are the frequencies, interruptions (i.e., brief breaks in sedentary behaviours), times (duration) and types of sedentary behaviour, as measured by direct and indirect methods, associated with improved health indicators in the early years (aged 0–4 years)?" The systematic review aimed to identify and synthesize the best available evidence to determine the amount of sedentary behaviour associated with unhealthy growth and development (i.e., healthy body weight, bone and skeletal health, motor skill development, psychosocial health, cognitive development, and cardio-metabolic disease risk factors) in infants (<1 year), toddlers (1–2 years), and preschoolers (3–4 years). Studies that reported measures of sedentary behaviour and a relevant health indicator during the early years as well as follow-up measures later in life were also included. The evidence from the systematic review was assessed using the Grading of Recommendations Assessment, Development, and Evaluation (GRADE) system (Balshem et al. 2011; Guyatt et al. 2008) and it was registered on the international prospective register of systematic reviews PROSPERO network (registration number: CRD42011001280). Relevant studies were identified through online databases (Ovid MEDLINE, Ovid EMBASE, Ovid psycINFO, EBSCO SPORTDiscus, and Cochrane Central Database), personal libraries, and government documents. Only high quality studies (i.e., experimental studies, case-control studies, and prospective cohort studies) were included in the review. Relevant health indicators were prioritized by age group a priori (Table 1). More details on the systematic review can be found elsewhere (LeBlanc et al., in press).

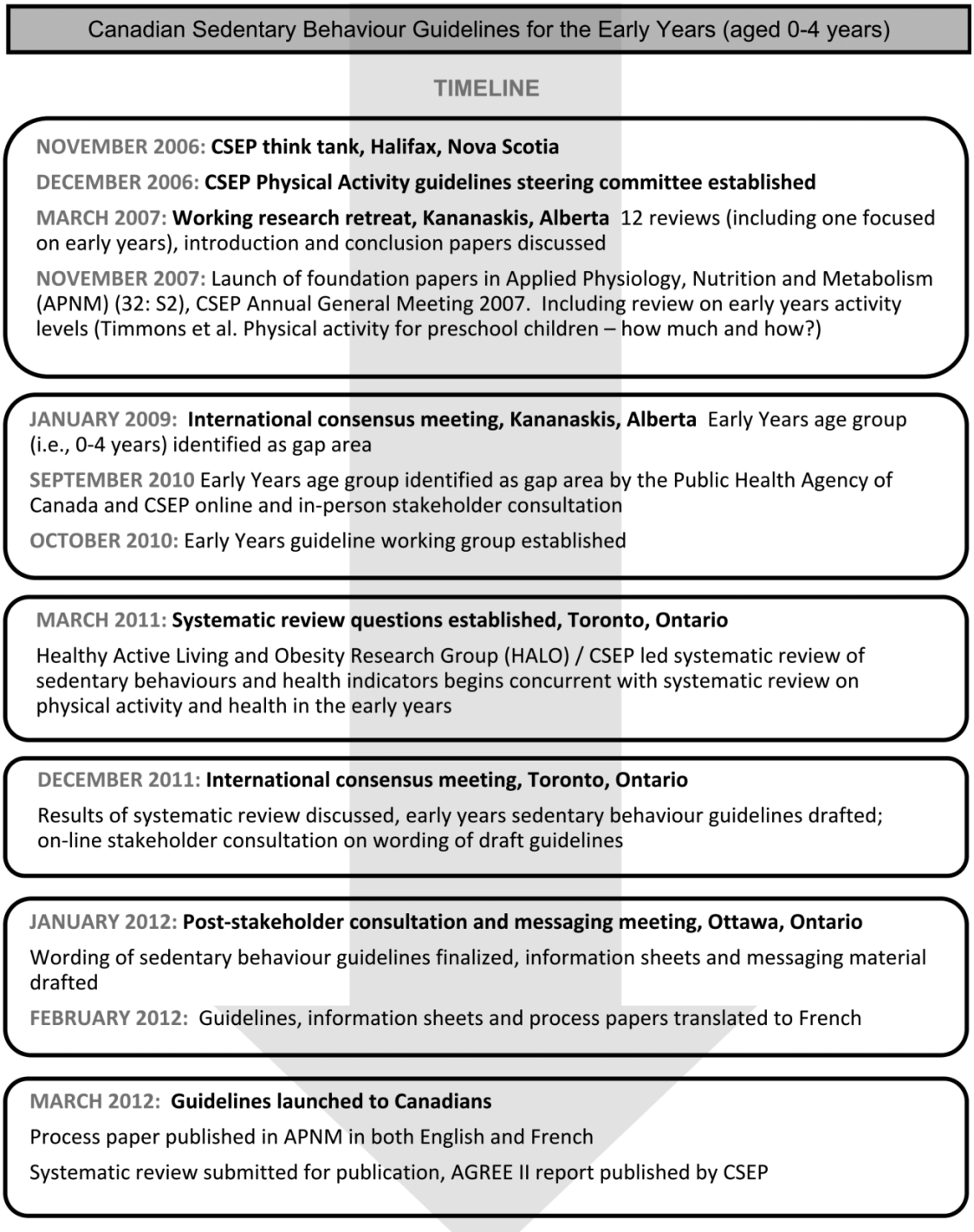
Consensus meeting

In December 2011, the Guideline Development and Research Committee convened for a 1.5 day consensus meeting where available evidence was discussed and draft guidelines were written. The guideline recommendations were informed by evidence from the systematic review described above. Participants received background materials, including documents that helped inform similar guidelines in the United Kingdom and Australia, as well as previous Canadian physical activity and sedentary behaviour 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 potential guideline 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 Guideline Development and Research Committee also included representatives involved in the development of sedentary behaviour guidelines for the early years in Australia (A.D.O.) and the United Kingdom (J.J.R.), health professionals, and end users of the guidelines. Based on the evidence summarized in the systematic review and the draft guidelines prepared at the December 2011 consensus meeting, the CSEP sought feedback from a wide range of stakeholders interested in sedentary behaviour and health promotion for the early years including national and international content experts, public health and health care professionals, government and non-

Fig. 1. Summary of the timeline and key events in the development of the Canadian Sedentary Behaviour Guidelines for the Early Years (aged 0–4 years).



governmental organizations, teachers, caregivers, and parents. Stakeholders were encouraged to share the CSEP survey with their peers and colleagues to further expand the consultation base.

The consultation was completed through an on-line survey conducted for 10 days in December 2011. The CSEP on-line survey consisted of 12 questions about the wording and agreement for the proposed sedentary behaviour guidelines and their associated preamble. Written comments were invited and respondents were informed that they would receive updated and refined guidelines when the survey process was completed. In late December 2011, the Guideline Development and Research 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 paper.

Table 1. A priori consensus rankings assigned by the Guideline Development and Research Committee for each health indicator by age group.

Health indicator	Infant (<1 year)	Toddler (1–2 years)	Preschooler (3–4 years)
Adiposity (e.g., overweight, obesity, BMI)	Critical	Critical	Critical
Bone (e.g., bone and skeletal health)	Unimportant	Unimportant	Critical
Motor development (e.g., gross motor skills, locomotor/object control)	Critical	Critical	Critical
Psychosocial health (e.g., self-efficacy, self esteem, pro-social behaviour, temperament, aggression, social functioning)	Unimportant	Critical	Critical
Cognitive development (e.g., language development, attention)	Important	Important	Critical
Cardio-metabolic health (e.g., blood pressure, insulin resistance, blood lipids)	Unimportant	Unimportant	Important
Risks (injury)	N/A	N/A	N/A

Note: Health indicators were ranked based on whether they were critical for decision-making, important but not critical, or of low importance for decision-making. The focus when searching and summarizing the evidence was on indicators that were important or critical. Rankings were based on the GRADE framework (Guyatt et al. 2011).

Results

Systematic review

Complete details of the systematic review are being published separately (LeBlanc et al., in press). In brief, the search identified 6240 papers (5265 after de-duplication) and 21 unique studies, representing the 23 papers that met our inclusion criteria and were included in the review (some covering more than one health indicator or age group). TV viewing was the only sedentary behaviour studied in the papers that met the inclusion criteria. Of the included studies, the number of papers reporting on each outcome of interest were adiposity ($n = 11$), cognitive development ($n = 8$), psychosocial health ($n = 6$), motor development ($n = 0$), skeletal and bone health ($n = 0$), and cardio-metabolic disease risk factors ($n = 0$). In infants, there was moderate quality evidence to suggest TV viewing elicited no benefits and may be harmful to the cognitive development of infants and low quality evidence to suggest increased TV viewing was associated with unfavourable measures of adiposity. In toddlers, there was moderate quality evidence to suggest TV viewing has a negative impact on measures of adiposity and psychosocial health and low quality evidence to suggest it was negatively associated with cognitive development. In preschoolers, there was low quality evidence of a negative relationship between TV viewing and cognitive development, low to high quality evidence on TV's negative impact on adiposity and moderate quality evidence between increased TV viewing and decreased scores on measures of psychosocial health. In conclusion, this systematic review found low to high quality evidence to suggest that lower levels of screen time are associated with better measures of adiposity, cognitive development, and psychosocial health. No harms of engaging in decreased sedentary behaviour were identified and it was the judgement of the guideline panel that the benefits of decreased sedentary behaviours exceed the risks associated with higher levels of sedentary behaviours.

The research available through the systematic review did not provide consistent evidence on the dose–response (specific frequencies, interruptions, times, and types (other than screen time)) of sedentary behaviours associated with improved health indicators in the early years. In the absence of such evidence, expert consensus, international harmonization, and stakeholder input was used to inform these guidelines.

Consultation feedback

Nine-hundred and twenty-five stakeholders responded through the on-line consultation process and 212 provided additional comments and suggestions. The results of this on-line consultation were reviewed by the Guideline Development and Research Committee. Overall, 92% of respondents "completely agreed" or "agreed" with the proposed preamble and guideline recommendations. Because we recruited respondents using a "snowball" process, we were unable to calculate a response rate for our on-line survey. A complete summary of the results can be found at http://www.csep.ca/english/view.asp?x=879. Following peer-review, we made minor editorial revisions to the preamble and guidelines that did not materially change the consensus recommendations. All guideline committee members agreed with the final version of the guideline herein.

Final guidelines

The Canadian Sedentary Behaviour Guidelines for the Early Years (aged 0–4 years) are presented below.

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. For healthy growth and development, parents and caregivers are encouraged to limit sedentary behaviours of infants, toddlers, and preschoolers in the context of family, childcare, school, and community.

The benefits of reduced sedentary time exceed potential risks. In particular, sedentary screen time is associated with detrimental effects on aspects of cognitive and psychosocial development and may be associated with adverse effects on body composition.

These guidelines may be appropriate for infants, toddlers, and preschoolers with a disability or medical condition; however, their parents or caregivers should consult a health professional to understand the types and amounts of activities appropriate for them.

This recommendation places a high value on the harms associated with exposure to screen time, the value of having a guideline that is acceptable to parents and practitioners, and the importance of avoiding screen time in the earliest years of development.

For guidance on increasing physical activity at all ages, please refer to the *Canadian Physical Activity Guidelines* (www.csep.ca/guidelines).

Guidelines

For healthy growth and development, caregivers should minimize the time infants (aged <1 year), toddlers (aged 1–2 years) and preschoolers (aged 3–4 years) spend being sedentary during waking hours. This includes prolonged sitting or being restrained (e.g., stroller, high chair) for more than 1 h at a time.

For those under 2 years, screen time (e.g., TV, computer, electronic games) is not recommended.

For children 2–4 years, screen time should be limited to under 1 h per day; less is better.

Discussion

This paper presents the first Canadian Sedentary Behaviour Guidelines for the Early Years (aged 0–4 years). These guidelines were developed through a robust and rigorous process, are based on the best possible scientific evidence, and involved extensive input from a wide variety of experts and stakeholders. The guidelines are anchored to the scientific evidence and where evidence was lacking, were informed by existing guidelines from other jurisdictions (American Academy of Pediatrics 2006; Australian Government 2010; Canadian Pediatric Society, Healthy Active Living Committee 2002; Hagan et al. 2008; National Association for Sport and Physical Education 2009; Start Active Stay Active 2011), consensus of the Guideline Development and Research Committee, and input received through the stakeholder consultation survey. A summary of sedentary behaviour guidelines for the early years from other jurisdictions is provided in Table 2. A more detailed report of the process used to develop the Canadian Sedentary Behaviour Guidelines for the Early Years can be found at http://www.csep.ca/english/view.asp?x=804.

The new guidelines are evidence-based, realistic, and achievable; are widely endorsed by expert groups; and are broadly consistent with other jurisdictions. These new guidelines for the early years are consistent with the message of the existing Canadian Sedentary Behaviour Guidelines for Children (aged 5–11 years) and Youth (aged 12–17 years) that in general "less is better"; thus, the new guidelines presented should be viewed as maximum levels of exposure.

The major difference between the school-aged children guidelines (Tremblay et al. 2011*b*) and those for the early years relates to screen time exposure. The early years' guidelines recommend no screen time for those under 2 years, and for children 2–4 years, screen time should be limited to less than 1 h per day. The school-aged children guideline recommends limiting recreational screen time to no more than 2 h per day. This progression recognizes the potential social value of screen time and the decrease in incidental play as a child ages while remaining supportive of the physical activity guidelines for the early years (Tremblay et al. 2012) and suggesting that the majority of discretionary time be non-sedentary.

Dissemination and implementation

The process for the development of sedentary behaviour guidelines for the early years is presented in this paper. The complete clinical practice guideline report and AGREE II assessment is also publicly available (http://www.csep.ca/english/view.asp?x=804). Further, the methodological process, systematic reviews, and final recommendations have been and will be shared at scientific meetings and conferences and are posted on the CSEP Web site (www.csep.ca).

These new guidelines are endorsed, promoted, and disseminated by the CSEP, ParticipACTION, Federal–Provincial–Territorial partners, stakeholder groups, and committed individuals. This dissemination process is guided by a set of content and dissemination recommendations put forth by a committee of experts including the guideline authors, health communication and marketing experts, and health behaviour change researchers. The steps to develop these recommendations paralleled the rigorous process used for the development of the sedentary behaviour guidelines themselves. The process to inform and develop the messaging recommendations for the new guidelines can be found elsewhere (Latimer et al. 2010; Rhodes and Pfaeffli 2010; www.csep.ca). As developing public-facing messaging and dissemination materials take a great deal of time and resources, the CSEP will continue to work with stakeholders over the coming months (and years) to fill any gaps that currently exist. These will include information sheets (see Appendix A) for health professionals and caregivers, posters, vignettes and motivational stories, information webinars, and ebooks. All material prepared by the CSEP will be available on the CSEP Web site and when possible, promoted through partner groups and stakeholders.

Updating the guidelines

Updating these guidelines in the future will be important and necessary to ensure they remain true to the most current evidence. Because of the amount of work required to update each systematic review, it is difficult to update the guidelines for all age groups simultaneously. Therefore, it is recommended that the guidelines for each age group get updated in a cyclical manner such that each set of guidelines (i.e., both sedentary behaviour guidelines and physical activity guidelines) is updated every 5 years. However, if important evidence emerges in the interim between updates, leaders will work to make modifications in a more expeditious fashion. Efforts to coordinate updates with other countries or jurisdictions are recommended to reduce duplication of efforts and harmonize sedentary behaviour guidelines.

Surveillance

The surveillance of sedentary behaviours in the early years is very sparse in Canada, particularly for nationally representative samples. Although it is now finished, while active, the

Table 2. Summary of sedentary behaviour guidelines/recommendations for the early years from other jurisdictions.

Jurisdiction (reference)	Sedentary Behaviour Guidelines
United States (American Academy of Pediatrics 2006)	**Infants and Toddlers (birth to 3 years)** • Children younger than 2 years should not watch any television **Preschool-aged children (4 to 6 years)** • Parents should reduce sedentary transportation by car and stroller • Limit screen time to <2 h per day
Australia (Australian Government 2010)	**Children (aged <2 years)** • Should not spend any time watching television or using other electronic media (DVDs, computer, and other electronic games) **Children (aged 2 to 5 years)** • Sitting and watching television and the use of other electronic media (DVDs, computer, and other electronic games) should be limited to less than 1 h per day **All children (birth to 5 years)** • Should not be sedentary, restrained, or kept inactive for more than 1 h at a time, with the exception of sleeping
Canada (Canadian Pediatric Society, Healthy Active Living Committee 2002)	**Physicians and health care professionals are encouraged to promote healthy active living for all family members by:** • Counselling families to reduce sedentary activities by limiting exposure to television and (or) video games. An achievable first step is to reduce these activities by 30 min/day, and subsequently decreasing sedentary activities by 5 min/month, allowing up to 90 min/day for these activities
United States (National Association for Sport and Physical Education 2009)	**Toddlers (12 to 36 months) and preschoolers (3 to 5 years)** • Should not be sedentary for more than 60 min at a time, except when sleeping
United Kingdom (Start Active Stay Active 2011)	**Early years (under 5 years)** • Should minimize the amount of time spent being sedentary (being restrained or sitting) for extended periods (except time sleeping)

Note: Guidelines related to physical activity are not listed here and can be found in the Canadian physical activity guidelines for the early years paper (Tremblay et al. 2012).

National Longitudinal Survey of Children and Youth (NLSCY; Statistics Canada: http://www.statcan.gc.ca/imdb-bmdi/instrument/4450_Q2_V7-eng.pdf) collected information on the screen time behaviours of children from ages 0–17 years. The Canadian Health Measures Survey (CHMS; Statistics Canada: http://www.statcan.gc.ca/cgi-bin/imdb/p2SV.pl?Function=getSurvey&SDDS=5071&lang=en&db=imdb&adm=8&dis=2) cycle 2 (2009–2011) used accelerometers to measure sedentary behaviour in a nationally representative sample of 3–4 year-olds. The CHMS data will allow for the direct assessment of total daily sedentary behaviour and although this will not identify those meeting specific screen time guidelines, it will be invaluable in informing updates to the guidelines. Those meeting screen time guidelines will be assessed through the parental-report questionnaire also included in the CHMS. Future waves of the Physical Activity Monitor (PAM; Canadian Fitness and Lifestyle Research Institute: http://www.cflri.ca/pub_page/105) could accommodate the collection of parental-reported sedentary behaviours in the early years. The validity of parental-reported information on the sedentary behaviours of children in the early years is not clearly understood.

For recent, specific examples of sedentary behaviour surveillance activities in the early years, see the Active Healthy Kids Canada Report Cards (Active Healthy Kids Canada 2008, 2009, 2010, 2011). There are clear limitations and gaps in sedentary behaviour surveillance in Canada (Katzmarzyk and Tremblay 2007); additional efforts at monitoring the sedentary behaviours of children 0–4 years of age are needed, and it is hoped that the release of these guidelines will provoke such changes.

Future research

The literature in this field is at an early stage of development with more research required before a complete understanding of the relationships among frequency, duration, interruptions, and types of sedentary behaviours and health outcomes in the early years is available. These guidelines were developed based on the best available evidence, and while this evidence was not as comprehensive as desired, the clear demand among Canadians for guidance on reducing sedentary behaviours for the early years was a strong incentive to develop the guidelines now. The authors hope the existence of guidelines for children in this age group will encourage further research; even research to challenge these guidelines. We propose that research on infants, toddlers, and preschoolers is needed

- To understand the frequency, duration, interruptions, and types of sedentary behaviour associated with better health indicators and improvements in health indicators.
- On structured, longitudinal, population-based samples looking at direct and standardized measures of sedentary behaviours, including different types (e.g., TV, computer use, reading), and age-specific health outcomes while accounting for covariates such as age, gender, socioeconomic status, and ethnicity.
- On the effects of emerging technologies (e.g., tablet computers, smart phones, interactive video games) on sedentary behaviour and sedentary "multi-tasking".

- To assess the safety, efficacy, and relevance of these guidelines for children with special needs (i.e., living with chronic disease or disability).
- To understand the interaction and relative effects of different durations, amounts and types of sedentary behaviours, and physical activities of various intensities, durations, and frequencies.
- To understand the most effective ways to communicate the new guidelines to intermediaries (e.g., teachers, coaches, public health practitioners) and the general public.
- To monitor adverse effects related to the recommended levels of sedentary behaviours reported herein.
- To determine the best (i.e., most valid and reliable) sedentary behaviour measurement methods to use for the early years.
- To establish appropriate and responsive health indicators (or surrogate indictors) for the early years.

To our knowledge, Canada is the first country to release sedentary behaviour guidelines that have been developed separately and with a process independent from physical activity guidelines for any age group. Other jurisdictions have included recommendations related to sedentary behaviours for the early years within their physical activity guidelines (Table 2), as did the earlier Canadian Physical Activity Guidelines for Children (Health Canada and the Canadian Society for Exercise Physiology 2002). However, with the emerging evidence that the biology (and therefore health consequences) of sedentary behaviour is separate and distinct from physical activity and exercise (Tremblay et al. 2010*c*), the decision was made to produce separate sedentary behaviour guidelines, based on separate systematic reviews. This follows the same decision that was made when informing the CSEP physical activity and sedentary behaviour guidelines for school-aged children (Tremblay et al. 2011*a*, 2011*b*). The "sister" paper on the first Canadian Physical Activity Guidelines for the Early Years (aged 0–4 years) is also included in this journal issue (Tremblay et al. 2012).

Summary

This paper provides a brief overview of the process and outcomes for the development of the first Canadian Sedentary Behaviour Guidelines for the Early Years (aged 0–4 years). These guidelines have been developed through partnerships with many organizations to present the best evidence on the relationship between sedentary behaviours and various health indicators. The Guideline Development and Research Committee ensured that the process to develop the guidelines was rigorous, transparent, inclusive, and thoroughly documented.

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Appendix A

Appendix A appears on the following page.

Fig. A1. Information sheet for the Canadian Sedentary Behaviour Guidelines for the Early Years.

Canadian Sedentary Behaviour Guidelines

FOR THE EARLY YEARS - 0 – 4 YEARS

Guidelines:

For healthy growth and development, caregivers should minimize the time infants (aged less than 1 year), toddlers (aged 1–2 years) and preschoolers (aged 3–4 years) spend being sedentary during waking hours. This includes prolonged sitting or being restrained (e.g., stroller, high chair) for more than one hour at a time.

For those under 2 years, screen time (e.g., TV, computer, electronic games) is not recommended.

For children 2–4 years, screen time should be limited to under one hour per day; less is better.

The Lowdown on the Slowdown: what counts as being sedentary

Sedentary behaviours are those that involve very little physical movement while children are awake, such as sitting or reclining:

- in a stroller, high chair or car seat
- watching television
- playing with non-active electronic devices such as video games, tablets, computers or phones

Spending less time being sedentary can help young kids:

- Maintain a healthy body weight
- Develop social skills
- Behave better
- Improve learning and attention
- Improve language skills

So cut down on sitting down. To reduce young children's sedentary time, you can:

- ☑ Limit use of playpens and infant seats when baby is awake.
- ☑ Explore and play with your child.
- ☑ Stop during long car trips for playtime.
- ☑ Set limits and have rules about screen time.
- ☑ Keep TVs and computers out of bedrooms.
- ☑ Take children outside every day.

There's no time like right now to get up and get moving!

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