

## Canadian Sedentary Behaviour Guidelines for Children and Youth

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**Abstract:** The Canadian Society for Exercise Physiology (CSEP), in partnership with the Healthy Active Living and Obesity Research Group (HALO) at the Children's Hospital of Eastern Ontario Research Institute, and in collaboration with ParticipACTION, and others, has developed the Canadian Sedentary Behaviour Guidelines for Children (aged 5–11 years) and Youth (aged 12–17 years). The guidelines include a preamble to provide context, followed by the specific recommendations for sedentary behaviour. The entire development process was guided by the Appraisal of Guidelines for Research Evaluation (AGREE) II instrument, which is the international standard for clinical practice guideline development. Thus, the guidelines have gone through a rigorous and transparent developmental process and the recommendations are based on evidence from a systematic review and interpretation of the research evidence. The final guidelines benefitted from an extensive online consultation process with 230 domestic and international stakeholders and key informants. The final guideline recommendations state that for health benefits, children (aged 5–11 years) and youth (aged 12–17 years) should minimize the time that they spend being sedentary each day. This may be achieved by (i) limiting recreational screen time to no more than 2 h per day — lower levels are associated with additional health benefits; and (ii) limiting sedentary (motorized) transport, extended sitting time, and time spent indoors throughout the day. These are the first evidence-based Canadian Sedentary Behaviour Guidelines for Children and Youth and provide important and timely recommendations for the advancement of public health based on a systematic synthesis, interpretation, and application of the current scientific evidence.

**Key words:** physical inactivity, screen time, recommendations, measurement, surveillance, indoor time.

**Résumé :** La Société canadienne de physiologie de l'exercice (SCPE) en collaboration avec le groupe de recherche Healthy Active Living and Obesity Research Group (HALO) de l'Institut de recherche du Centre hospitalier pour enfants de l'est de l'Ontario, de ParticipACTION et d'autres organismes a élaboré les Directives canadiennes en matière de comportement sédentaire à l'intention des enfants âgés de 5 à 11 ans et des jeunes âgés de 12 à 17 ans. Les directives comprennent un préambule situant le contexte et des recommandations spécifiques en matière de comportement sédentaire. L'élaboration complète des directives a respecté la Grille II d'évaluation de la qualité des recommandations pour la pratique clinique (AGREE), un outil reconnu internationalement pour l'élaboration des lignes directrices en pratique clinique. L'élaboration des directives est donc le résultat d'un processus rigoureux et transparent, et les recommandations présentées dans cet article sont basées sur l'interprétation des données probantes relevées dans une analyse documentaire systématique. Les directives finales sont le fruit d'une vaste consultation en ligne auprès de 230 intervenants concernés et de sources de premier plan sur la scène nationale et internationale. Les directives finales énoncent ce qui suit : Afin de profiter des bienfaits pour leur santé, les enfants âgés de 5 à 11 ans et les jeunes âgés de 12 à 17 ans doivent diminuer chaque jour le temps consacré à des activités sédentaires. Ceci peut être accompli (i) en limitant le temps de loisir passé devant l'écran à moins de 2 h par jour; moins de temps passé devant l'écran est associé à des bienfaits supplémentaires pour la

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santé; (ii) en diminuant les déplacements en véhicule motorisé et en réduisant le temps passé assis à l'intérieur pendant la journée. Ces directives sont les premières Directives canadiennes en matière de comportement sédentaire à l'intention des enfants et des jeunes; elles résultent de la synthèse, de l'interprétation et de l'application des données probantes les plus récentes à ce jour et comportent des recommandations importantes qui arrivent à un moment opportun dans la promotion de la santé publique.

*Mots-clés* : inactivité physique, temps d'écran, recommandations, mesures, surveillance, temps à l'intérieur.

## Introduction

Over the past several decades, the physical activity and fitness of Canadians have decreased whereas overweight-obesity and associated comorbidities have increased (Colley et al. 2011a, 2011b; Shields et al. 2010; Tremblay et al. 2010b). This is true across all age, gender, and ethnic subgroups (Janssen and LeBlanc 2010; Warburton et al. 2010; Paterson and Warburton 2010). These disturbing trends, combined with the recognized public health importance of physical activity, led the Canadian Society for Exercise Physiology (CSEP) to develop and publish new Canadian Physical Activity Guidelines to promote healthy active living in the Canadian population (Tremblay et al. 2007b, 2007c, 2010a, 2011). As evidence has emerged that sedentary behaviours are omnipresent (Colley et al. 2011a, 2011b) and represent a health risk *independent of* moderate-to vigorous-intensity physical activity (Tremblay et al. 2010c), CSEP, in partnership with the Healthy Active Living and Obesity Research Group (HALO) at the Children's Hospital of Eastern Ontario Research Institute, created the Canadian Sedentary Behaviour Guidelines for Children (aged 5–11 years) and Youth (aged 12–17 years) in parallel with the development of the new Canadian Physical Activity Guidelines (Tremblay et al. 2011).

This paper summarizes the development process and final outcome for the first Canadian Sedentary Behaviour Guidelines for Children (aged 5–11 years) and Youth (aged 12–17 years). These guidelines were officially released in February 2011 by CSEP and HALO, with communication and dissemination support from ParticipACTION. The sedentary behaviour guidelines were informed by a rigorous and transparent process, and are based on a systematic review of the scientific evidence (Tremblay et al., manuscript in preparation<sup>2</sup>). A detailed report outlining the guideline methodological development process can be accessed through the CSEP Web site (<http://www.csep.ca/english/view.asp?x=881>). The purpose of this paper is to provide a summary of this process and to present the guidelines themselves.

## Background

The process to create new Canadian Physical Activity Guidelines started with a day-long think tank in Halifax in 2006. The think tank convened experts in the fields of exercise physiology, the psychosocial aspects of physical activity, social marketing, epidemiology, and physical activity guideline development. The think tank proposed the creation of the official Physical Activity Measurement and Guidelines project (PAMG) and the appointment of an official

steering committee to guide the project. In 2009, the Steering Committee highlighted sedentary behaviour as an important issue *independent* from physical activity (Canadian Society for Exercise Physiology and the Public Health Agency of Canada 2009), especially in the pediatric population (Janssen 2007). Sedentary behaviour was also highlighted as a gap area in the *Global Recommendations on Physical Activity for Health* by the World Health Organization (WHO 2010). However, public health agencies globally have continued to focus on physical activity and have paid less attention to the mounting evidence that suggests that sedentary behaviours have an independent and powerful impact upon health. Currently, in Canada, no evidence-based sedentary behaviour guidelines exist for any age group; recommendations and tips that do exist are largely based on expert opinion and not a rigorous scientific review process (Canadian Paediatric Society 2003; Health Canada and the Canadian Society for Exercise Physiology 2002a, 2002b).

Thus, we developed sedentary behaviour guidelines based on evidence from a systematic review examining the relationship between sedentary behaviour and health in school-aged children and youth (Tremblay et al., manuscript in preparation<sup>2</sup>). The Appraisal of Guidelines for Research Evaluation (AGREE) II instrument was used as a framework to guide the guideline development process. AGREE II is the internationally accepted standard for guideline development that ensures scientific rigor and transparency throughout the process (Brouwers et al. 2010a, 2010b, 2010c). AGREE II was also used as a framework for the development and reporting of the new Canadian Physical Activity Guidelines (<http://www.csep.ca/english/view.asp?x=804>).

In November 2010, a consensus meeting convened the PAMG Steering Committee, the systematic review authors, content experts, health care professionals, and partner organizations to draft the recommendations for the new sedentary behaviour guidelines. The recommendations for the guidelines were informed by the evidence from the systematic review. Attendees also received additional materials, including recent reports from Australia (Okely et al. 2008), and the United Kingdom (Biddle and the Sedentary Behaviour and Obesity Expert Working Group, in press). The resulting product was a preamble to explain the guidelines, followed by the specific recommendations. The draft guideline recommendations were sent to stakeholders, including national and international content experts, government and nongovernmental organizations, health care professionals, teachers, and caregivers for critical review and comment.

<sup>2</sup>Tremblay, M.S., LeBlanc, A.G., Kho, M.E., Saunders, T.J., Larouche, R., Colley, R.C., et al. Systematic review of sedentary behaviour and health indicators in school-aged children and youth. Submitted.

**Fig. 1.** Summary of the timeline and key events for creating the Canadian Sedentary Behaviour Guidelines for Children and Youth.

Canadian Sedentary Behaviour Guidelines for Children (aged 5–11 years) and Youth (aged 12–17 years)

TIMELINE

**JANUARY 2009**

**Physical Activity Guidelines International Consensus Conference, Kananaskis, Alberta**

- Recommendation to develop a guideline for this “gap” area

**DECEMBER 2009**

Systematic Review research team established by Healthy Active Living and Obesity (HALO) Research Institute, CHEO

**SEPTEMBER 7–9, 2010**

**Physical Activity Guidelines Consensus Meeting, Toronto, Ontario**

Preliminary results presented; debate on merits of linking with Physical Activity Guidelines or publishing separately

**NOVEMBER 3, 2010**

**International Sedentary Behaviour Guidelines Consensus Meeting, Toronto, Ontario**

Sedentary systematic review results presented and discussed; Sedentary Behaviour Guidelines drafted by scientific experts

**NOVEMBER–DECEMBER 2010**

Online Stakeholder Survey on relevancy of draft Sedentary Behaviour Guidelines for Children (5–11) and Youth (12–17)

**FEBRUARY 2011**

**Sedentary Behaviour Guidelines for Children (5–11) and Youth (12–17) released**

The final technical sedentary behaviour guidelines for children and youth are presented in this paper.

## Materials and methods

### Guideline development

Figure 1 summarizes the process and timelines for the development of the Canadian Sedentary Behaviour Guidelines for Children and Youth. The development process was similar to that of the Canadian Physical Activity Guidelines (<http://www.csep.ca/english/view.asp?x=804>; Tremblay et al. 2011), and was guided by the AGREE II instrument (Brouwers et al. 2010a, 2010b, 2010c). Details on the guideline development process, including the assessment results from the AGREE II instrument, can be found at the CSEP Web site at <http://www.csep.ca/english/view.asp?x=881>.

The target populations and guideline questions were as follows:

### Children (aged 5–11 years) and youth (aged 12–17 years)

- What is the available evidence to explain the relationship between sedentary behaviour and health in school-aged children and youth (aged 5–17 years)?
- Is there evidence to suggest minimal and optimal thresholds for exposure amounts of daily sedentary behaviour children and youth?
- Does the relationship between sedentary behaviour and health differ depending on the specific health outcome?

The following definitions have been adapted from Tremblay et al. (2010c) and were used to guide the systematic review and guidelines development:

- *Sedentary*: A distinct class of behaviours (i.e., sitting, watching television, playing video games) that is characterized by little physical movement and low energy expenditure ( $\leq 1.5$  METs).
- *Sedentarism*: Engagement in sedentary behaviours characterized by minimal movement, low energy expenditure, and rest.
- *Physically active*: Meeting established guidelines for physical activity (see the accompanying report on physical activity for details on guidelines (Tremblay et al. 2011)).
- *Physical inactivity*: The absence of physical activity, usually reflected as the proportion of time not engaged in physical activity of a predetermined intensity.
- *Active video gaming*: Video games that are designed to promote movement and interaction from the participant(s). Some examples include the Nintendo Wii, Microsoft Kinect, Sony’s Playstation Move, and arcade-type video games that require movement.
- *Recreational screen time*: Television watching, video game playing, using the computer, or use of other screens during discretionary time (ie. nonschool- or work-based use) that are practiced while sedentary.

### Stakeholder involvement

Throughout the guideline development process there was substantial stakeholder involvement, including scientists, guideline developers, and potential guideline users. The PAMG Steering Committee liaised regularly with representatives involved in sedentary behaviour guideline development in the United Kingdom and Australia (Biddle and Sedentary Behaviour and Obesity Expert Working Group, in press; Okely et al. 2008). The scientific stakeholders were engaged through the peer-review process of all the background papers (Esliger and Tremblay 2007; Tremblay et al. 2007a, 2010c) and the systematic review (Tremblay et al., manuscript in preparation<sup>2</sup>). Based on the evidence presented in the systematic review and the draft guideline recommendations prepared at the November 2010 consensus meeting, feedback was also sought via an online survey through a wide range of stakeholders interested in physical activity, sedentary behaviours, health promotion, and public health. These included national and international content experts, health professionals, government and nongovernmental organizations, teachers, and caregivers.

The stakeholder consultation was orchestrated by CSEP

and completed through an online survey that consisted of 6 questions about the recommendations and agreement for the proposed sedentary behaviour guidelines and their associated preamble. Stakeholders were also encouraged to share this survey with their peers and colleagues. Because respondents were recruited using a “snowball” process, it was not possible to calculate a response rate for the online survey. Written comments were invited and respondents were told they would receive updated and refined guidelines when the survey process was completed. A total of 230 individuals completed the survey and 165 respondents provided additional written comments. Overall, the majority of respondents (90.8%) “completely agreed” or “agreed” with the proposed preamble and guideline for children and youth. In December 2010, the PAMG Steering Committee reconvened to address the concerns and comments raised through the stakeholder consultation process and revised the guidelines accordingly. A summary of the survey results can be found at the CSEP Web site at <http://www.csep.ca/english/view.asp?x=882>.

## Results

The Canadian Sedentary Behaviour Guidelines for Children (aged 5–11 years) and Youth (aged 12–17 years) are presented below.

### Preamble

These guidelines are relevant to all apparently healthy children (aged 5–11 years) and youth (aged 12–17 years), irrespective of gender, race, ethnicity, or socioeconomic status of the family. Children and youth are encouraged to limit sedentary behaviours and to participate in physical activities that support their natural development and that are enjoyable and safe.

Children and youth should limit recreational screen time (watching television, computer use, playing video games, etc.), motorized transportation, indoor time, and extended sitting in the context of family, school, and community (e.g., volunteer, employment) activities.

Following these guidelines can improve body composition, cardiorespiratory and musculoskeletal fitness, academic achievement, self-esteem, and social behaviours. The benefits of reduced sedentary time exceed potential risks.

These guidelines may be appropriate for children and youth with a disability or medical condition; however, they should consult a health professional to understand the types and amounts of activities appropriate for them.

For those with recreational screen-time levels in excess of 2 h per day, it is appropriate to start to progressively reduce screen time as a stepping stone to meeting the guidelines.

For guidance on increasing physical activity, please refer to the Canadian Physical Activity Guidelines for Children and Youth (Tremblay et al. 2011).

### Guidelines

For health benefits, children (aged 5–11 years) and youth (aged 12–17 years) should minimize the time they spend being sedentary each day. This may be achieved by

- Limiting recreational screen time to no more than 2 h per

day — lower levels are associated with additional health benefits.

- Limiting sedentary (motorized) transport, extended sitting time, and time spent indoors throughout the day.

## Discussion

This paper presents the first Canadian Sedentary Behaviour Guidelines for Children (aged 5–11 years) and Youth (aged 12–17 years). These guidelines were developed through a robust, rigorous, and transparent process; were based on the best possible scientific evidence; and involved extensive input from stakeholders.

### Dissemination and implementation

The work to inform the development of these guidelines was published in peer-reviewed literature (Tremblay et al. 2007a, 2007c, 2010a, 2010c, manuscript in preparation<sup>2</sup>). Further, the methodological process, systematic review, and final recommendations will be shared at scientific meetings and conferences.

Dissemination and implementation of these guidelines with the general public will occur with leadership from CSEP and collaboration with stakeholder organizations (e.g., ParticipACTION, HALO, Active Healthy Kids Canada). Public-facing messages are being created through these partnership organizations following a similarly rigorous process as was used for the development of the guidelines (Latimer et al. 2010; Rhodes and Pfaeffli 2010).

### Surveillance

A variety of mechanisms will be used for surveillance of adherence to the new guidelines. The primary surveys that will be used and their affiliated organization are as follows:

- 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>)
- Canadian Community Health Survey (CCHS; Statistics Canada: <http://www.statcan.gc.ca/cgi-bin/imdb/p2SV.pl?Function=getSurvey&SDDS=3226&lang=en&db=imdb&adm=8&dis=2>)
- National Longitudinal Survey of Children and Youth (NLSCY; Statistics Canada: <http://www.statcan.gc.ca/cgi-bin/imdb/p2SV.pl?Function=getSurvey&SDDS=4450&lang=en&db=imdb&adm=8&dis=2>)
- Physical Activity Levels Among Youth (CAN PLAY; Canadian Fitness and Lifestyle Research Institute: <http://www.cflri.ca/eng/programs/canplay/>)
- Physical Activity Monitor (PAM; Canadian Fitness and Lifestyle Research Institute: <http://www.cflri.ca/eng/statistics/surveys/pam2005.php>)
- Health Behavior in School-aged Children Survey (HBSC; PHAC and Queen’s University <http://www.hc-sc.gc.ca/fn-an/surveill/nutrition/child-enfant/index-eng.php>)

For recent, specific examples of surveillance activities see results from the Canadian Health Measures Survey (Colley et al. 2011a, 2011b), Active Healthy Kids Canada Report Cards (Active Healthy Kids Canada 2005, 2006, 2007, 2008, 2009, 2010), and the Canadian Fitness and Lifestyle Research Institute’s CANPLAY results (Craig et al. 2010).

## Future research

Areas for future research have been identified in the systematic review, through the stakeholder consultations, and in recent reviews (Owen et al. 2009, in press; Tremblay et al. 2010c). Studies examining sedentary behaviour in children and youth to date have generally used observational and cross-sectional study designs. There is a need for a higher quality of randomized control trials in the pediatric population (i.e., larger and more diverse sample sizes, direct measures of sedentary behaviour, intent-to-treat analyses, and reporting of adverse events). These larger studies should then be able to address the impact of various sociodemographic variables. Future research should focus on standardizing methods for data collection and analysis, and work towards implementing direct (i.e., accelerometers) as well as indirect (i.e., questionnaires) measures of sedentary behaviour. Standardized methods for assessing and defining sedentary behaviours will also allow researchers to look more specifically at different contexts–settings and their relationship with various health outcomes.

As the accessibility and popularity of multiple forms of technology increases among the pediatric population, future work needs to explore the health consequences of the changing use of various forms and formats of electronic media engagement. Specifically, with advances in technology and an increasing popularity for handheld, portable devices, “sedentary multitasking” is increasingly common (e.g., children and youth are able watch television, talk on the phone, and use the computer at the same time) (Rideout et al. 2010). This is a relatively new phenomenon and the health effects associated with extremely high levels of screen-time use are largely unknown. There is also a need for future work to gain a better understanding of “active video gaming” (e.g., Nintendo Wii, Microsoft Kinect, Sony’s Playstation Move).

Finally, the systematic review used to inform these guidelines was limited to school-aged children and youth. Similar work will have to be completed to inform sedentary guidelines for young children aged 0–4 years, adults, and older adults, and information will need to be disseminated to the public in the form of public health guidelines. Robust evaluation of the effectiveness of public health messaging efforts must also be completed.

## Conclusions

This paper provides a brief overview of the process that has been followed to develop the first evidence-informed Canadian Sedentary Behaviour Guidelines for Children (aged 5–11 years) and Youth (aged 12–17 years). These guidelines have been developed through collaborations with many organizations to present the best evidence on the relationship between sedentary behaviours and various health outcomes. The PAMG Steering Committee has ensured that the process to develop the guidelines has been rigorous, transparent, and thoroughly documented.

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