The Canadian Sedentary Behaviour Guidelines for the Early Years (zero to four years of age) and screen time among children from Kingston, Ontario

Valerie Carson PhD[1], Mark S Tremblay PhD[2,3], John C Spence PhD[4], Brian W Timmons PhD[5], Ian Janssen PhD[1,6]

V Carson, MS Tremblay, JC Spence, BW Timmons, I Janssen. The Canadian Sedentary Behaviour Guidelines for the Early Years (zero to four years of age) and screen time among children from Kingston, Ontario. Paediatr Child Health 2013;18(1):25-28.

OBJECTIVES: To assess the proportion of children meeting the new Canadian Sedentary Behaviour Guidelines for the Early Years (zero to four years of age) and to describe parental attitudes toward and barriers to reducing screen time.

METHODS: Participants included 657 children zero to four years of age from the Kingston, Ontario, area. From May to September 2011, parents completed a questionnaire regarding their child's screen time and their attitudes toward and barriers to reducing their child's screen time.

RESULTS AND CONCLUSIONS: Approximately 32% of children younger than two years of age engaged in no screen time and approximately 46% of children two to four years of age engaged in <1 h per day; thereby, meeting the recommendations of the new guidelines. Most parents believed that their child did not engage in excessive screen time. Physicians and other health professionals should inform parents of these new guidelines and provide strategies to help their children meet targets.

Key Words: *Children; Computers; Infant; Parents; Preschool; Television; Video games*

Les Directives canadiennes en matière de comportement sédentaire pour la petite enfance (0 à 4 ans) et le temps d'écran des enfants de Kingston, en Ontario

OBJECTIFS : Évaluer la proportion d'enfants qui respectent les nouvelles Directives canadiennes en matière de comportement sédentaire pour la petite enfance (0 à 4 ans) et décrire les attitudes des parents envers la réduction du temps d'écran et les obstacles pour le réduire.

MÉTHODOLOGIE : Ont participé à l'étude 657 enfants de 0 à 4 ans de la région de Kingston, en Ontario. De mai à septembre 2011, les parents ont rempli un questionnaire au sujet du temps d'écran de leur enfant, de leurs attitudes envers cette pratique et des obstacles pour la réduire.

RÉSULTATS ET CONCLUSIONS : Environ 32 % des enfants de moins de 2 ans n'avaient droit à aucun temps d'écran et environ 46 % des enfants de 2 à 4 ans y avaient droit moins d'une heure par jour, respectant ainsi les recommandations des nouvelles lignes directrices. La plupart des parents pensaient que leur enfant ne passait pas trop de temps devant un écran. Les médecins et les autres professionnels de la santé devraient informer les parents de ces nouvelles lignes directrices et leur fournir des stratégies pour aider leur enfant à les respecter.

Historically, the terms 'physically inactive' and 'sedentary' were used interchangeably. However, moderate-to-vigorous intensity physical activity (MVPA) and sedentary behaviour, defined as any waking behaviour characterized by a low energy expenditure (ie, ≤1.5 resting metabolic equivalents) while in a sitting or reclining posture, are now recognized as two distinct behaviours (1). In fact, MVPA and sedentary behaviour are weakly correlated (2) and have independent health effects (3). The negative health effects of excessive sedentary behaviour begin early, particularly for screen-based sedentary behaviours such as watching television and playing video/computer games (4). Among young children, screen time is associated with obesity (5,6), aggressive behaviour (7), attention problems (8,9), impaired language development (9) and lower cognitive development (9). Furthermore, screen time habits formed at an early age may persist over time (10) and predict negative health outcomes in adulthood (11).

In March 2012, the Canadian Society for Exercise Physiology released the Canadian Sedentary Behaviour Guidelines for the Early Years (zero to four years of age) (12). These evidence-based guidelines were created in response to an urgent call from public health, health care and child care practitioners for guidance on reducing sedentary behaviour during the early years. The guidelines set measurable targets for surveillance and provide guidance to physicians and other health professionals. Along with the general recommendation of minimizing the time spent being sedentary during waking hours, the guidelines also include specific recommendations regarding screen time. For children younger than two years of age, screen time is not recommended and for children two to four years of age, screen time should be limited to <1 h per day (12). The Canadian Paediatric Society has recently released a position statement on healthy active living that encourages physicians and health care professionals to promote these guidelines (13).

To appreciate the extent to which excessive screen time is an issue within the early years, surveillance studies need to determine what proportion of children zero to four years of age meet the new guidelines. Furthermore, because parents are an important determinant of young children's screen time engagement (14), information is also needed on parental attitudes toward and barriers to reducing screen time. This knowledge could be used to help promote healthy screen time habits in the early years. Therefore, the objectives of the present study were to assess the proportion of children zero to four years of age meeting the new Canadian Sedentary Behaviour Guidelines for the Early Years and to describe parental attitudes toward and barriers to reducing screen time.

[1]*School of Kinesiology and Health Studies, Queen's University, Kingston;* [2]*Healthy Active Living and Obesity Research Group, CHEO Research Institute;* [3]*Department of Pediatrics, University of Ottawa, Ottawa, Ontario;* [4]*Sedentary Living Lab, Faculty of Physical Education and Recreation, University of Alberta, Edmonton, Alberta;* [5]*Child Health & Exercise Medicine Program, Department of Pediatrics, McMaster University, Hamilton;* [6]*Department of Community Health and Epidemiology, Queen's University, Kingston, Ontario*

Correpondence: Dr Ian Janssen, Kinesiology and Health Studies, Queen's University, 28 Division Street, Kingston, Ontario K7L 3N6. Telephone 613-533-6000 ext 78631, fax 613-555-2009, e-mail ian.janssen@queensu.ca

Accepted for publication May 14, 2012

TABLE 1
Participant characteristics

	Total (n=657)	Age, years	
		<2 (n=124)	2–4 (n=533)
Child sex*			
Male	52.3	46.3	53.7
Female	47.7	53.7	46.3
Child's age†, years	3.1±1.1	1.3±0.5	3.5±0.8
Child care*			
Centre based	71.9	41.9	78.8
Home based	8.5	12.9	7.5
None	19.6	45.2	13.7
Parental education*			
Elementary (grades 1–8)	1.5	2.5	1.3
High school (grades 9–12)	15.6	23.9	13.6
Community/technical college	34.4	24.8	36.6
University	27.6	28.1	27.5
Graduate university	20.9	20.7	21.0
Television†, min/day	64.3±48.7	31.4±43.1	71.9±46.7
Video/computer games†, min/day	7.0±18.6	0.6±2.9	8.4±20.4
Screen time†, min/day	71.3±56.9	32.0±44.1	80.3±55.6

*Data presented as % for categorical variables and as mean ± SD for continuous variables.*Categorical variable; †Continuous variable*

METHODS

Participants

The present study was based on the Healthy Living Habits in Pre-School Children study. Data were collected between May and September 2011 on children ≤5 years of age from the Kingston, Frontenac, Lennox and Addington Health Region of Ontario. Parents of preschool children were recruited from licensed child care centres (46 of 60 participated) and public health or community programs (14 of 16 participated). Eligible parents received a questionnaire package and approximately 37% of parents returned the brief (15 min) questionnaire, resulting in a total sample of 800 children. Children with missing birth date information (n=41) and children older than four years of age (n=102) were excluded from the study, leaving 657 participants. Ethics approval was obtained from the Queen's University General Research Ethics Board (Kingston, Ontario). Consent was obtained from participating child care centres, public health and community programs, and parents.

Screen time

Parents were asked two previously developed questions (15) regarding their child's television and video/computer games use: "On average, how much time per day does your child watch television, videos or DVDs?", and "On average, how much time per day does your child play video/computer games?". There were seven response options for weekday and weekend use, ranging from 'none' to '≥3 h/day'. Weighted means of weekday and weekend use were calculated and total screen time was determined by adding the time spent watching television and playing video/computer games. Parents were also asked questions regarding the age of their child when they first started watching television or playing video/computer games (seven response options ranging from '0 – 6 months' to '≥4 years old')

Parental attitudes and barriers

For parents whose child engaged in screen time, their attitudes toward and barriers to reducing their child's screen time were assessed using 15 questions developed from previous research (16-18). Four response options existed for each question ranging from 'strongly disagree' to 'strongly agree'. These responses were dichotomized into agree (strongly agree/agree) and disagree (strongly disagree/disagree).

Statistical analysis

Analyses were performed using SAS version 9.2 (SAS Institute Inc, USA). Descriptive statistics including means, SDs and frequencies were calculated. χ^2 tests were conducted to compare percentage of agreement for attitudes and barriers between parents whose children met and exceeded the guidelines. There were no significant differences (P>0.05) in screen time between sexes; therefore, analyses were only stratified according to age (younger than two years of age, two to four years of age) where applicable. Due to the small sample of children younger than two years of age (n=75) and the consistency of results across age groups, age-stratified analyses were not presented for attitudes and barriers.

RESULTS

Participant characteristics are shown in Table 1. The average age of the sample was 3.1 years, slightly greater than one-half (52.3%) were boys and 80.4% attended a child care centre (71.9 % centre-based and 8.5% home-based daycare). On average, children younger than two years of age watched 31.4 min/day of television and played video/computer games for 0.6 min/day, for a total of 32.0 min/day of screen time. The corresponding screen time values for children two to four years of age were 71.9 min/day of television, 8.4 min/day of video/computer game play and 80.3 min/day of total screen time.

For children younger than two years of age, 32.3% did not engage in screen time, 36.3% engaged in 1 min/day to 29 min/day, 16.1% engaged in 30 min/day to 59 min/day, 8.9% engaged in 60 min/day to 119 min/day, 4.0% engaged in 120 min/day to 179 min/day and 2.4% engaged in ≥180 min/day. For children two to four years of age, 2.1% did not engage in screen time, 18.4% engaged in 1 min/day to 29 min/day, 25.3% engaged in 30 min/day to 59 min/day, 34.7% engaged in 60 min/day to 119 min/day, 14.8% engaged in 120 min/day to 179 min/day and 4.7% engaged in ≥180 min/day. Therefore, 32.3% of children younger than two years of age, 45.8% of children two to four years of age and 43.2% of the total sample met the new sedentary behaviour guidelines (Figure 1).

For children two to four years of age , 16.7% watched television and 0.2% used video/computer games within the first six months of life, 44.6% watched television and 0.9% used video/computer games within the first year of life, and 79.7% watched television and 4.0% used video/computer games within the first two years of life.

The three most commonly agreed on attitudes toward screen time were that screen time was enjoyable for their child (95.8%), when their child engages in screen time it gives parents an opportunity to get things done (87.4%) and screen time is a good learning tool (79.4%) (Table 2). The three most commonly agreed on barriers to reducing screen time were that their child does not engage in excessive screen time (74.7%), screen time is enjoyable for their child (69.5%) and parents need time to perform household chores (63.5%). Compared with parents whose children met the guidelines, the percentage of agreement for parents whose children exceeded the guidelines was significantly higher (approximately 10% to 25%) for 13 of the 15 attitudes and barriers, and significantly lower (16.1%) for the barrier that their child does not engage in excessive screen time (Table 2).

DISCUSSION

Within this sample of 657 children from the Kingston area, only 43% met the new Canadian Sedentary Behaviour Guidelines for

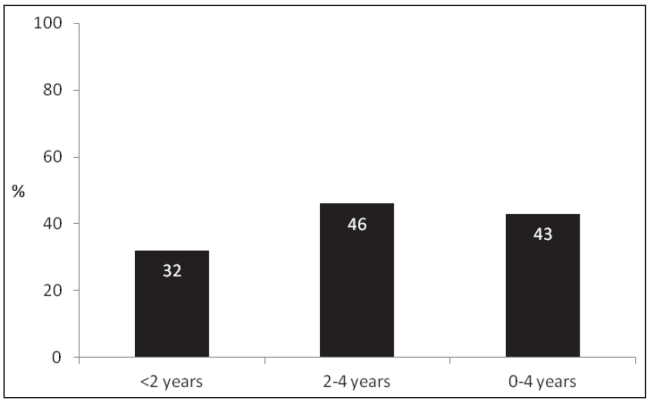

Figure 1) *Proportion of children meeting the new Canadian Sedentary Behaviour Guidelines for the Early Years (12) according to age group*

the Early Years (32% for children younger than two years of age, 46% for children two to four years of age). For parents whose children exceeded the guidelines, greater than two-thirds believed their child did not participate in excessive screen time and greater than three-quarters stated that screen time had educational benefits, was an enjoyable activity for their child or provided the parent with an opportunity to get things done.

The present study was the first to examine the proportion of children meeting the new sedentary behaviour guidelines. However, based on the Canadian Paediatric Society's previous recommendation of limiting television viewing to less than 1 h to 2 h a day (19), only 22% of a sample of approximately 1500 children four to five years of age from Edmonton (Alberta) engaged in ≤1 h of screen time per day or less (20). In addition to Canada, the proportion of children meeting similar screen time recommendations from the United States (21) and Australia (22) has recently been reported. Specifically, only 32% of a representative sample of American zero to two year olds engaged in no screen time (23) and only 22% of a sample of Australian three to five year olds engaged in ≤1 h of screen time per day (24). The different age groups in these studies make cross-national comparisons challenging. Future surveillance research is needed within representative samples of Canadian children to determine the extent to which excessive screen time is problematic at the national level.

Television watching represented the most dominant type of screen time, comprising 98% of total screen time in children younger than two years of age and 90% of total screen time in children two to four years of age. Nonetheless, the availability of video/computer games specifically designed for the early years is on the rise with the advancement and availability of new technology (25), such as tablet computers (eg, iPad [Apple Inc, USA] with hundreds of child-focused applications) and learning laptops (eg, 13 options available at www.Toysrus.ca in January, 2012). In fact, more than 50% of participants in the present study who played video/computer games used this type of technology at least 50% of the time (data not shown). Therefore, future studies involving this age group should continue to consider multiple screen-based activities.

While evidence of excessive screen time engagement and the associated health implications in the early years is accumulating, little is known about appropriate strategies for reducing or eliminating screen time in this age group (26). Emerging research suggests that parents' cognitions, such as attitudes and perceived barriers, are important determinants of children's screen time use (14). In terms of parental attitudes, similar descriptive findings were reported by approximately 1000 American parents of two to 24 month olds. More specifically, the three most important reasons

TABLE 2
Attitudes and barriers of all parents whose children engaged in screen time and according to whether their children met or exceeded the guidelines

	Agree or strongly agree*		
	Engaged in screen time (n=560)	Met guidelines (n=210)	Exceeded guidelines (n=350)
Attitudes			
Good learning tool	73.0	62.8	79.4†
Child enjoyment	95.8	94.1	96.8
Gives parent opportunity to get things done	84.0	78.6	87.4†
Allows parent to cope with busy day/multiple children	51.0	43.1	55.9†
Allows child to relax	53.5	45.6	58.3†
Family, bonding or quality time	47.2	37.6	53.1†
Grabs hold of child's attention	66.9	58.9	71.9†
It teaches children to get along with others	21.0	14.8	24.9†
Barriers			
Pressure from society to purchase media equipment	23.4	18.8	26.3†
Neighbourhood is unsafe	8.8	5.9	10.7†
Poor weather limits time outside	50.7	40.8	56.9†
Parent needs coping-tool for busy day/multiple children	32.5	21.7	39.4†
Parent needs time to do household chores	63.5	53.5	69.6†
Child really enjoys screen time	69.5	54.0	79.3†
Child does not engage in too much screen time	74.7	84.5	68.4†

*Data presented as %. *Ninety-seven parents did not respond to these attitudes and barriers questions, including 53 parents whose child did not engage in screen time activities; †χ^2 P≤0.05*

for television use were its perceived educational value, child enjoyment and the opportunity for parents to get things done (16). Although young children enjoy screen time activities and screen time allows parents to complete household chores more easily, these reasons should not outweigh the health implications associated with screen time engagement (4). Furthermore, while many parents believe that screen-based activities may provide some learning and educational benefits, the scientific evidence does not support this belief (9). In fact, accumulating evidence suggests that engagement in screen time during the early years is detrimental for language and cognitive development (9). For example, a recent systematic review examining the relationship between sedentary behaviour and health outcomes in children zero to four years of age found moderate quality evidence in infants (one month to one year of age) and low-quality evidence in toddlers (1.1 to three years of age) that increased television viewing was associated with a decrease in cognitive outcomes such as attention, vocalization count, reading recognition, reading comprehension, memory scores, classroom engagement and math scores (4).

To promote healthy screen time habits in the early years, physicians and other health professionals should consider increasing parental awareness of the health benefits of limiting or eliminating screen time (27). This objective may be achieved by discussing the new sedentary behaviour guidelines and their importance with parents. The recent position statement from the Canadian Paediatric Society on healthy active living encourages this dialogue (13). Along with increasing awareness, providing parents with strategies to keep their children occupied and safe

while they complete household tasks should also be considered (27). These strategies may include the promotion of nonscreen-based toys, puzzles and games. Furthermore, as screen time habits formed at an early age track over time (28) and because almost one-half of children two to four year of age in the present study started watching television within the first year of life, parents of infants or even expecting parents should be targeted.

As with all studies, the present study was not void of limitations. A key limitation was the use of parental-reported screen time, which is prone to measurement error. However, direct measurements of screen time are not feasible in large samples. Another limitation was the low response rate and the fact that a primary recruitment source was licensed child care centres, which only 15% of preschool children in the health region attend (29). Consequently, the proportion of children meeting the sedentary behaviour guidelines within the entire Canadian population may be lower than reported here due to the relatively high socioeconomic status of our sample. It is also important to note that the data for the present study were collected just before the guidelines were released. Therefore, the present study represents a baseline assessment of the proportion of children meeting the new guidelines.

CONCLUSION

Only 32% of children younger than two years of age and 46% of children two to four years of age met the Canadian Sedentary Behaviour Guidelines for the Early Years. Physicians and other health professionals should inform parents of the health benefits associated with the new sedentary behaviour guidelines and provide them with strategies to help their children meet these recommendations.

ACKNOWLEGEMENTS: The authors are grateful to all of the parents and children who participated in the present study. The authors thank their partners from Kingston, Frontenac, Lennox and Addington Public Health, Mary Jane Gordon, Connie Wowk and Alison Bradshaw for their assistance with the logistical planning of the study. They also thank Hoda Gharib for her help with data collection and entry. VC was supported by a CIHR – Frederick Banting and Charles Best Doctoral Award. IJ was supported by a Canada Research Chair and the present research was supported by funds received through that award.

REFERENCES

1. Sedentary Behaviour Research Network. Standardized use of the terms "sedentary" and "sedentary behaviours". Appl Physiol Nutr Metab 2012;37:540-2.
2. Marshall SJ, Biddle SJ, Gorely T, Cameron N, Murdey I. Relationships between media use, body fatness and physical activity in children and youth: A meta-analysis. Int J Obes Relat Metab Disord 2004;28:1238-46.
3. Mark AE, Janssen I. Relationship between screen time and metabolic syndrome in adolescents. J Public Health (Oxf) 2008;30:153-60.
4. LeBlanc A, Spence JC, Carson V, et al. Systematic review of sedentary behaviour and health indicators in the early years (aged 0-4 years). Appl Physiol Nutr Metab 2012;37:753-72.
5. Mendoza JA, Zimmerman FJ, Christakis DA. Television viewing, computer use, obesity, and adiposity in US preschool children. Int J Behav Nutr Phys Act 2007;4:44.
6. Reilly JJ, Armstrong J, Dorosty AR, et al. Early life risk factors for obesity in childhood: Cohort study. BMJ 2005;330:1357.
7. Manganello JA, Taylor CA. Television exposure as a risk factor for aggressive behavior among 3-year-old children. Arch Pediatr Adolesc Med 2009;163:1037-45.
8. Lillard AS, Peterson J. The immediate impact of different types of television on young children's executive function. Pediatrics 2011;128:644-9.
9. Christakis DA. The effects of infant media usage: What do we know and what should we learn? Acta Paediatr 2009;98:8-16.
10. Biddle SJ, Pearson N, Ross GM, Braithwaite R. Tracking of sedentary behaviours of young people: A systematic review. Prev Med 2010;51:345-51.
11. Hancox RJ, Milne BJ, Poulton R. Association between child and adolescent television viewing and adult health: A longitudinal birth cohort study. Lancet 2004;364:257-62.
12. Tremblay M, LeBlanc A, Carson V, et al. Canadian Sedentary Behaviour Guidelines for the Early Years (aged 0-4 years). Appl Physiol Nutr Metab 2012;37:370-91.
13. Lipnowski S, LeBlanc CMA; Canadian Paediatric Society, Healthy Active Living and Sports Medicine Committee. Healthy active living: Physical activity guidelines for children and adolescents. Paediatr Child Health 2012;17:209-10.
14. Smith BJ, Grunseit A, Hardy LL, King L, Wolfenden L, Milat A. Parental influences on child physical activity and screen viewing time: A population based study. BMC Public Health 2010;10:593.
15. Statistics Canada. 2008-2009 National Longitudinal Survey of Children and Youth. <www.statcan.gc.ca/cgi-bin/imdb/p2SV.pl?Function=getSurvey&SDDS=4450&lang=en&db=imdb&adm=8&dis=2> (Accessed September, 2011).
16. Zimmerman FJ, Christakis DA, Meltzoff AN. Television and DVD/video viewing in children younger than 2 years. Arch Pediatr Adolesc Med 2007;161:473-9.
17. He M, Irwin JD, Sangster Bouck LM, Tucker P, Pollett GL. Screen-viewing behaviors among preschoolers parents' perceptions. Am J Prev Med 2005;29:120-5.
18. Dorey E, Roberts V, Maddison R, Meagher-Lundberg P, Dixon R, Ni Mhurchu C. Children and television watching: A qualitative study of New Zealand parents' perceptions and views. Child Care Health Dev 2009;36:414-20.
19. Neiman P; Canadian Paediatric Society, Psychosocial Paediatrics Committee. Impact of media on children and youth. Paediatr Child Health 2003;8:301-6.
20. Carson V, Spence JC, Cutumisu N, Cargill L. Association between neighborhood socioeconomic status and screen time among pre-school children: A cross-sectional study. BMC Public Health 2010;10:367.
21. American Academy of Pediatrics, Council on Communications and Media. Media use by children younger than 2 years. Pediatrics 2011;128:1-6.
22. Australian Government. Department of Health and Ageing. Move and play every day. National physical activity recommendations for children 0-5 years. Commonwealth of Australia, Department of Health and Ageing, 2009.
23. Vandewater EA, Rideout VJ, Wartella EA, Huang X, Lee JH, Shim MS. Digital childhood: Electronic media and technology use among infants, toddlers, and preschoolers. Pediatrics 2007;119:e1006-15.
24. Hinkley T, Salmon J, Okely AD, Crawford D, Hesketh K. Preschoolers' physical activity, screen time and compliance with recommendations. Med Sci Sports Exerc 2012;44:458-65.
25. Rideout VJ, Vandewater EA, Wartella EA. Zero to Six: Electronic Media in the Lives of Infants, Toddlers, and Preschoolers. Menlo Park: Kaiser Family Foundation; 2003.
26. Hinkley T, Salmon J, Okely AD, Trost SG. Correlates of sedentary behaviours in preschool children: A review. Int J Behav Nutr Phys Act 2010;7:66.
27. Bolling C, Crosby L, Boles R, Stark L. How pediatricians can improve diet and activity for overweight preschoolers: A qualitative study of parental attitudes. Acad Pediatr 2009;9:172-8.
28. Janz KF, Burns TL, Levy SM. Tracking of activity and sedentary behaviors in childhood: The Iowa Bone Development Study. Am J Prev Med 2005;29:171-8.
29. Rosenbaum R, Austin L, Blanchette R, et al. Review of Early Learning & Child Care in Kingston, Frontenac, Lennox & Addington: United Way Success by 6; 2008.