ENCYCLOPEDIA
on Early Childhood
Development

Sedentary Behaviour Recommendations for Early Childhood

Rachel A. Jones, PhD, Anthony D. Okely, EdD

University of Wollongong, Australia

February 2020, Éd. rév.

Introduction

Early childhood (defined as 0-5 years) has been identified as a critical time in the development of sedentary behaviours as data shows that these behaviours track strongly into childhood and adolescence.[1,2] Some sedentary behaviours are important for healthy child development (e.g., play-based activities). These are not the focus of this updated review. This review is more concerned with sedentary behaviours, such as screen time – inclusive of television watching, use of electronic media and use of tablets and phones – as this is where most of the evidence exists. It is also important to note that sedentary behaviour is not the opposite of physical activity; that is, just because a child is physically active does not mean he/she does not spend excessive time in sedentary behaviours.

In recent years, a number of countries and organizations have released sedentary behaviour recommendations for the early years (0-5 years).[3-7] Such recommendations have been informed by current evidence pertaining to the relationship between health and developmental outcomes and sedentary behaviour in this age group and the “dose” of sedentary behaviour above which

©2020-2026 ABILIO | PHYSICAL ACTIVITY

these health consequences become more pronounced. For some countries these guidelines form part of 24-Hour Movement Guidelines, which are inclusive of physical activity, sedentary behaviour and sleep.[4,5,6]

Subject and Research Context

Sedentary behaviour is defined as behaviours that encompass sitting or lying as the dominant posture and result in very low levels of energy expenditure.[8] They are multi-faceted and include screen time (television, DVD, computer, tablet and mobile phone), motorised transportation, and sitting to read or complete homework.[8] The majority of sedentary behaviour research in young children has focused on television viewing. While this is an important sedentary behaviour, it is only one of a range that can be undertaken. It is becoming increasingly clear that it is the total time spent in sedentary behaviour, and the length and number of the bouts spent being sedentary, that are important risk factors for health in adults[8,9] and adolescents.[10,11] As such, it is important to examine the health evidence for this behaviour in early childhood and to make recommendations for parents, service planners and providers and policy makers within the early childhood sector.

Problems and Key Research Questions

The aim of this chapter is to summarize the evidence which has informed the development of current global and country-specific sedentary behaviour recommendations for children aged 0 to 5 years.

The key research questions addressed in this chapter are:

1. What is current evidence highlighting associations between health and developmental outcomes in early childhood and sedentary behaviours?
2. Based on the evidence, how much time should young children spend in specific sedentary behaviours?
3. Do these recommendations differ for different stages of early childhood (infants, toddlers, and preschoolers)?

Recent Research Results

©2020-2026 ABILIO | PHYSICAL ACTIVITY

Evidence reporting on associations between sedentary behaviour and health and developmental outcomes (inclusive of adiposity, motor development, psychosocial health, cognitive development, cardiometabolic health, fitness and bone and skeletal health) has increased several -fold over the last decade. Associations between sedentary behaviour and health and development outcomes have been succinctly summarized in a recent review by Poitras et al.[12] A total of 96 studies were included in the review.[12] Overall, there is enough evidence to suggest that screen time (measured largely as television viewing time) is either not beneficial or negatively associated with children's health and developmental outcomes, namely adiposity, motor development, cognitive development and psychosocial health. Most studies in the review reported on the relationship between sedentary behaviour and adiposity (n=60, 63%).[12] Of the 10 longitudinal studies that reported the relationship between television time and adiposity, six (60%) studies reported negative associations.[13-18] Cross sectional evidence found that total screen time was negatively associated with adiposity.[19-23] Television watching was negatively associated with motor skill development; children who were frequently exposed to television were more likely to have delayed motor skill development.[24] Of the studies that reported associations between television viewing and psychosocial outcomes more than half reported negative associations. Furthermore, several studies reported specific psychosocial behaviours which were heightened as result of the television viewing. These included aggression,[25] bullying,[26] aggression towards siblings,[27] peer-problems,[28] anxiety or depressive symptoms.[29,30] Negative associations between screen time and cognitive development have also been reported in a number of studies, including both longitudinal studies[18,28,29,31,32] and cross-sectional studies.[24,33,34,35] The current evidence pertaining to the association between sedentary behaviour and bone and skeletal health, fitness and cardiometabolic health is not developed enough therefore definitive conclusion cannot be made.

Based on the evidence provided, and consensus among experts, the following global and country-specific sedentary behaviour recommendations for early childhood have recently been published.

Table 1: Global and country-specific sedentary behaviour recommendations for children birth to five years

Country	Infants	Toddlers	Preschoolers

©2020-2026 ABILIO | PHYSICAL ACTIVITY

World Health Organization* (updated 2019) Infants: 0-1 year Toddlers: 1-2 years Preschoolers: 3-4 years[3]	Not be restrained for more than 1 hour at a time (e.g., prams/strollers, high-chairs, or strapped on a caregiver's back). Screen time is not recommended. When sedentary, engaging in reading and storytelling with a caregiver is encouraged.	Not be restrained for more than 1 hour at a time (e.g., prams/strollers, high-chairs, or strapped on a caregiver's back) or sit for extended periods of time. For 1-year-olds, sedentary screen time (such as watching TV or videos, playing computer games) is not recommended. For those aged 2 years, sedentary screen time should be no more than 1 hour; less is better. When sedentary, engaging in reading and storytelling with a caregiver is encouraged.	Not be restrained for more than 1 hour at a time (e.g., prams/strollers) or sit for extended periods of time. Sedentary screen time should be no more than 1 hour; less is better. When sedentary, engaging in reading and storytelling with a caregiver is encouraged.

Australia* (released 2017) (0-5 years) Infants: 0-1 year Toddlers: 1-3 years Preschoolers: 3-5 years[4]	Not being restrained for more than 1 hour at a time (e.g., in a stroller, car seat or high-chair). Screen time is not recommended. When sedentary, engaging in pursuits such as reading and storytelling with a caregiver is encouraged.	Not being restrained for more than 1 hour at a time (e.g., in a stroller, car seat or high-chair) or sitting for extended periods. For those younger than 2 years, sedentary screen time is not recommended. For those aged 2 years, sedentary screen time should be no more than 1 hour; less is better. When sedentary, engaging in pursuits such as reading and storytelling with a caregiver is encouraged.	Not being restrained for more than 1 hour at a time (e.g., in a stroller or car seat) or sitting for extended periods. Sedentary screen time should be no more than 1 hour; less is better. When sedentary, engaging in pursuits such as reading and storytelling with a caregiver is encouraged.
Canada* (released 2016) (0-4 years) Infants: 0-1 year Toddlers: 1-2 years Preschoolers: 3-4 years[5]	Not being restrained for more than 1 hour at a time (e.g., in a stroller or high-chair). Screen time is not recommended. When sedentary, engaging in pursuits such as reading and storytelling with a caregiver is encouraged.	Not being restrained for more than 1 hour at a time (e.g., in a stroller or high-chair) or sitting for extended periods. For those younger than 2 years, sedentary screen time is not recommended. For those aged 2 years, sedentary screen time should be no more than 1 hour—less is better. When sedentary, engaging in pursuits such as reading and storytelling with a caregiver is encouraged.	Not being restrained for more than 1 hour at a time (e.g., in a stroller or car seat) or sitting for extended periods. Sedentary screen time should be no more than 1 hour—less is better. When sedentary, engaging in pursuits such as reading and storytelling with a caregiver is encouraged.

New Zealand (released 2017) Recommendations for specific ages groups not provided[6]	Provide regular activity breaks to limit the amount of time a child spends sitting. Discourage screen-time for under-two-year-olds and limit screen time to less than one hour every day for children aged two years or older- less is best. Limit time in equipment that restricts free movement.		
South Africa* (released 2018) Infants: 0-1 year Toddlers: 1-3 years Preschoolers: 3-5 years[7]	Engaging in stimulating activities with a caregiver, such as playing with safe objects and toys, having baby conversations, singing and storytelling. Babies should NOT be strapped in and unable to move for more than 1 hour at a time (e.g., in a pram, high-chair, or on a caregiver's back or chest) while awake. Screen time is NOT recommended.	Engaging in activities that promote development, such as reading, singing, games with blocks, puzzles, and storytelling with a caregiver. Toddlers should NOT be strapped in and unable to move for more than 1 hour at a time (e.g., in a pram, high-chair or strapped on a caregiver's back or chest) and should not sit for extended periods. For toddlers younger than 2 years, scree time is NOT recommended. For toddlers aged 2 years, screen time should be no more than 1 hour, less is better.	Engaging in activities such as reading, singing, puzzles, arts and crafts and storytelling with a caregiver and other children. Preschooler should not be strapped in or unable to move for more than 1 hour at a time and should not sit for extended periods. Screen time should be no more than 1 hour per day, less is better.

*Included as part of 24-hour Movement behavior Guidelines

Research Gaps

Despite the increase in the number of studies investigating associations between sedentary behaviour and health and developmental outcomes, there are still several gaps in the current research that need further investigation. These include:

1. Is the relationship between sedentary behaviour and health mediated by other associated health behaviours such as an increase in energy intake as a result of increased snacking and exposure to food advertising?
2. Does sedentary behaviour displace physical activity or sleep?
3. Is the relationship between sedentary behaviour and fatness mediated by participation in moderate-to-vigorous intensity physical activity? Few studies to date control for physical activity and sleep, and these are independent behaviours not necessarily inversely correlated with one another, it is not known if the relationships that have been found between sedentary behaviour and some of the outcomes are a result of higher levels of sedentary behaviour or lower levels of physical activity or sleep or both.
4. It is not possible to determine if the amount of time spent sitting watching television or the content of the programs viewed is what explains the relationship between television viewing and some cognitive and self-regulation outcomes.

In addition:

1. More high-quality evidence from experimental and longitudinal studies which have a measure of sedentary behaviour during early childhood is needed.
2. More studies that use an objective measure of sedentary behaviour such as accelerometry or inclinometry are needed when examining overall time spent in sedentary behaviour or sitting.
3. Most of the evidence is for television viewing. More evidence is needed on the relationship of other sedentary behaviours, especially electronic media use, mobile phones and tablets, with health and developmental outcomes.

Conclusions

For children aged 2 to 5 years, spending more than two hours per day watching television or using other electronic media or hand-held devices may be detrimental to a wide range of health, developmental and educational outcomes. As time spent in sedentary behaviour (especially screen time) increases as young children transition into formal schooling[36] and throughout childhood and adolescence.[37,38] It is important to minimize time spent in these behaviours prior to school to maximize compliance with the recommendations for school-aged children of no more than two hours of screen time per day. For children under two, there is no evidence that

watching television or using electronic media/hand-held devices has educational or health benefits; moreover, there is some evidence that it may delay or reduce some cognitive outcomes such as language and word vocabulary. Children aged 0-5 should not be sedentary or restrained (i.e., in a stroller, car seat or high-chair) for more than one hour at a time, except while sleeping. This includes any situation where the child is predominantly inactive (i.e., not standing up or moving).

Implications for Parents, Services and Policy

To assist parents, service providers and policy makers in meeting the recommendations around television and other electronic media, it is advised to not have televisions or game consoles in children's bedrooms or child care centres, not eat meals in front of the television, and to turn the television off when it is not being watched. Parents and service providers should also set limits and rules for their own viewing as well as for children to role model correct behaviours to children.

References

1. Janz KF, Burns TL, Levy SM. Tracking of activity and sedentary behaviors in childhood: The Iowa Bone Development study. *American Journal of Preventive Medicine* 2005;29(3):171-178.
2. Zimmerman FJ, Christakis DA. Children's television viewing and cognitive outcomes: a longitudinal analysis of national data. *Archives of Pediatrics and Adolescent Medicine* 2005;159:619-625.
3. World Health Organization. WHO guidelines on physical activity, sedentary behavior and sleep for children under 5 years of age. Geneva: World Health Organization; 2019.
4. Australian Government, Department of Health. Australian 24-hour movement guidelines. https://www1.health.gov.au. Accessed November 2019.
5. Canadian Society for Exercise Physiology. Canadian 24-hour movement guidelines: an integration of physical activity, sedentary behavior and sleep. https://csepguidelines.ca. Accessed November 2019.
6. Ministry of Health New Zealand. Sit less, move more, sleep well: Active play guidelines for under-fives. https://www.health.govt.nz. Accessed November 2019.
7. Laureus. Moving, playing, sleeping: starting early with health habits. https://www.laureus.co.za. Accessed November 2019.
8. Biddle S, Cavill N, Ekelund U, Gorely T, Griffiths MD, Jago R, et al. *Sedentary behaviour and obesity: review of the current scientific evidence*. London, UK: Department of Health/Department for Children, Schools and Families. 2010.
9. Dunstan DW, Barr EL, Healy GN, Salmon J, Shaw JE, Balkau B, Magliano DJ, Cameron AJ, Zimmet PZ, Owen N. Television viewing time and mortality: the Australian Diabetes, Obesity and Lifestyle study (AusDiab). *Circulation* 2010;121(3):384-391.
10. Healy GN, Wijndaele K, Dunstan DW, Shaw JE, Salmon J, Zimmet PZ, Owen N. Objectively measured sedentary time, physical activity, and metabolic risk. *Diabetes Care* 2008;31(2):369-371.

©2020-2026 ABILIO | PHYSICAL ACTIVITY

11. Ekelund U, Brage S, Froberg K, Harro M, Anderssen SA, Sardinha LB, Riddoch C, Andersen LB. TV viewing and physical activity are independently associated with metabolic risk in children: The European Youth Heart Study. *PLoS Medicine* 2006;3(12):e488.

12. Poitras, V.J., Gray, C.E., Janssen, X. et al. Systematic review of the relationships between sedentary behaviour and health indicators in the early years (0–4 years). *BMC Public Health* 2017;17,868 doi:10.1186/s12889-017-4849

13. Olafsdottir S, Berg C, Eiben G, Lanfer A, Reisch L, Ahrens W, et al. Young children's screen activities, sweet drink consumption and anthropometry: results from a prospective European study. *European Journal of Clinical Nutrition* 2014;68(2):223-228. doi: 10.1038/ejcn.2013.234

14. Fuller-Tyszkiewicz M, Skouteris H, Hardy LL, Halse C. The associations between TV viewing, food intake, and BMI. A prospective analysis of data from the longitudinal study of Australian children. *Appetite* 2012;59(3):945-948.

15. Reilly JJ, Armstrong J, Dorosty AR, Emmett PM, Ness A, Rogers I, et al. Early life risk factors for obesity in childhood: cohort study. *British Medical Journal* 2005;330:1357.

16. Flores G, Lin H. Factors predicting overweight in US kindergartners. *American Journal of Clinical Nutrition* 2013;97:1178-1187.

17. Schmidt ME, Rich M, Rifas-Shiman SL, Oken E, Taveras EM. Television viewing in infancy and child cognition at 3 years of age in a US cohort. *Pediatrics* 2009;123:e370-e375.

18. Pagani LS, Fitzpatrick C, Barnett TA, Dubow E. Prospective associations between early childhood television exposure and academic, psychosocial, and physical well-being by middle childhood. *Archives of Pediatric and Adolescent Medicine* 2010;164:425-431.

19. Chiasson M, Scheinmann R, Hartel D, McLeod N, Sekhobo J, Edmunds LS, et al. Predictors of obesity in a cohort of children enrolled in WIC as infants and retained to 3 years of age. *Journal of Community Health* 2016;41:127-133.

20. Sijtsma A, Koller M, Sauer PJ, Corpeleijn E. Television, sleep, outdoor play and BMI in young children: the GECKO Drenthe cohort. *European Journal of Pediatrics* 2015;174:631-639.

21. van Stralen MM, te Velde SJ, van Nassau F, Brug J, Grammatikaki E, Maes L, et al. Weight status of European preschool children and associations with family demographics and energy balance-related behaviours: a pooled analysis of six European studies. *Obesity Reviews* 2012;13 Suppl 1:29-41.

22. Nelson JA, Carpenter K, Chiasson MA. Diet, activity, and overweight among preschool-age children enrolled in the special supplemental nutrition program for women, infants, and children (WIC). *Preventing Chronic Disease* 2006;3:A49.

23. Twarog JP, Politis MD, Woods EL, Boles MK, Daniel LM. Daily television viewing time and associated risk of obesity among U.S. preschool aged children: an analysis of NHANES 2009-2012. *Obesity Research and Clinical Practice* 2015;9:636-638.

24. Lin LY, Cherng RJ, Chen YJ, Yang HM. Effects of television exposure on developmental skills among young children. *Infant Behavior and Development* 2015;38:20-26.

25. Manganello JA, Taylor CA. Television exposure as a risk factor for aggressive behavior among 3-year-old children. *Archives of Pediatric and Adolescent Medicine* 2009;163:1037–45.

26. Zimmerman FJ, Glew GM, Christakis DA, Katon W. Early cognitive stimulation, emotional support, and television watching as predictors of subsequent bullying among grade-school children. *Archives of Pediatric and Adolescent Medicine* 2005;159:384–388.

27. Miller LE, Grabell A, Thomas A, Bermann E, Graham-Bermann SA. The associations between community violence, television violence, intimate partner violence, parent-child aggression, and aggression in sibling relationships of a sample of preschoolers. *Psychology of Violence* 2012;2:165-178.

28. Cheng S, Maeda T, Yoichi S, Yamagata Z, Tomiwa K, Japan Children's study group. Early television exposure and children's behavioral and social outcomes at age 30 months. *Journal of Epidemiology* 2010;20 Suppl 2:S482-S489.

29. Pagani LS, Fitzpatrick C, Barnett TA. Early childhood television viewing and kindergarten entry readiness. *Pediatric Research* 2013;74:350-355.

30. Mistry KB, Minkovitz CS, Strobino DM, DLG B. Children's television exposure and behavioral and social outcomes at 5.5 years: does timing of exposure matter? *Pediatrics* 2007;120:762-769.

31. Christakis DA, Zimmerman FJ, DiGiuseppe DL, McCarty CA. Early television exposure and subsequent attentional problems in children. *Pediatrics* 2004;113:708-713.

32. McKean C, Mensah FK, Eadie P, Bavin EL, Bretherton L, Cini E, et al. Levers for language growth: characteristics and predictors of language trajectories between 4 and 7 years. *PLoS One* 2015;10:e0134251.

33. Duch H, Fisher EM, Ensari I, Font M, Harrington A, Taromino C, Yip J, Rodriguez C. Association of screen time use and language development in Hispanic toddlers: a cross-sectional and longitudinal study. *Clinical Pediatrics* 2013;52(9):857-865.

34. Byeon H, Hong S. Relationship between television viewing and language delay in toddlers: evidence from a Korea national cross-sectional survey. *PLoS One* 2015;10:e0120663.

35. Nathanson AI, Fries PT. Television exposure, sleep time, and neuropsychological function among preschoolers. *Media Psychology* 2014;17:237-261.

36. Wake, M, Hardy P, Canterford L, Sawyer M, Carlin JB. Overweight, obesity and girth of Australian preschoolers: prevalence and socio-economic correlates. *International Journal of Obesity* 2007;31:1044-1051.

37. Certain LK, Kahn RS. Prevalence, correlates, and trajectory of television viewing among infants and toddlers. *Pediatrics* 2002;109:634-642.

38. Hardy LL, Dobbins TA, Denney-Wilson EA, Booth ML, Okely AD. Sedentary behaviours among Australian adolescents. *Australian and New Zealand Journal of Public Health* 2006;30:534-540.

©2020-2026 ABILIO | PHYSICAL ACTIVITY