

Family Influence

**The Role of the Family
in the Physical Activity,
Sedentary and Sleep
Behaviours of Children
and Youth**



2020
ParticipACTION
Report Card on
Physical Activity for
Children and Youth

The 2020 ParticipACTION Report Card on Physical Activity for Children and Youth is the most comprehensive assessment of child and youth physical activity in Canada. The Report Card synthesizes data from multiple sources, including the best available peer-reviewed research, to assign evidence-informed grades across 14 indicators. The Report Card has been replicated in over 50 cities, provinces and countries, where it has served as a blueprint for collecting and sharing knowledge about the physical activity of young people around the world. 😊





About ParticipACTION

ParticipACTION is a national non-profit organization that helps Canadians sit less and move more.

Originally established in 1971, ParticipACTION works with its partners, which include sport, physical activity and recreation organizations as well as governments and corporate sponsors, to make physical activity a vital part of everyday life.



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The findings and recommendations contained within this report were developed in accordance with the best available evidence at the time of creation (pre COVID-19 pandemic). All Canadians should follow the guidance of their respective public health authorities for the appropriate measures to take while pursuing healthy movement behaviours.

ParticipACTION's strategic partner, the Healthy Active Living and Obesity Research Group (HALO) at the Children's Hospital of Eastern Ontario (CHEO) Research Institute (HALO-CHEO), played a critical role in the research and development of the 2020 Report Card:



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The 2020 Report Card and a summary of its findings (the Highlight Report) are available online at **ParticipACTION.com**.

Help Us Do Our Job Better

The Report Card is based on the best available data (primarily accumulated since the previous Report Card [2018], and from earlier years where appropriate). If you have data that could inform future grades for one or more indicators, please contact ParticipACTION (info@participation.com).

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Indicators & Grades

Grades are common to every report card. The 2020 Report Card Research Committee (RCRC) assigned letter grades to 14 different indicators grouped into four categories (Figure 1): Daily Behaviours (Overall Physical Activity, Active Play, Active Transportation, Organized Sport, Physical Education, Sedentary Behaviours, Sleep, 24-Hour Movement Behaviours), Individual Characteristics (Physical Literacy, Physical Fitness), Spaces & Places (Household, School, Community & Environment), and Strategies & Investments (Government). This year the RCRC decided to make changes to the names of categories and indicators compared to the 2018 Report Card, to align with Canada's pan-Canadian physical activity policy framework and to better reflect the corresponding benchmarks and data: (1) "Settings & Sources of Influence" was changed to "Spaces & Places"; (2) "Family & Peers" was changed to "Household"; (3) "Active Play & Leisure Activities" was changed to "Active Play"; and (4) "Organized Sport Participation" to "Organized Sport." Letter grades were based on an examination of current data for each indicator against a benchmark(s). Together, the indicators provide a complete and robust assessment of how we are doing as a country regarding the promotion and facilitation of physical activity among Canadian children and youth.

Early Years Data No Longer Informs Letter Grades in the 2020 Report Card

When assigning grades, the RCRC must consider key findings that apply to children and youth of varying ages with different corresponding Canadian 24-Hour Movement Guidelines.^{2,3,4} Since the 2013 Report Card, indicator grades have been informed by data on preschoolers (3- to 4-year-olds) in addition to data on children and youth (5- to 17-year-olds). This year, data on preschoolers are no longer factored into the letter grades. One of the main considerations informing this decision is that preschoolers have different benchmarks (e.g., at least 180 minutes of daily physical activity, of which at least 60 minutes is energetic play) vs. the benchmarks for children and youth (e.g., at least 60 minutes of daily moderate- to vigorous-intensity physical activity [MVPA], and this difference is not easily resolved simply by weighting the data by age group as has been done in previous report cards (see page 5 in the 2018 Report Card).⁵ Nevertheless, best-available data on the early years (0-4 years) are outlined in *A Notable Highlight: The Early Years* (see page 121-124).

Figure 1. Summary of the 2020 Report Card indicators.



Why is Physical Activity Important?

New research findings continue to highlight the pervasive link between physical activity and health among children and youth (5- to 17-year-olds). Such findings both confirm and expand upon the many well-known health benefits associated with a physically active lifestyle. For instance, recent studies demonstrate that greater physical activity levels in children and youth are associated with more beneficial scores on cardiovascular health (e.g., maximal oxygen

uptake, arterial stiffness),^{6,7,8} bone health (e.g., bone strength and density),^{9,10,11} indices of adiposity (e.g., body mass index, fat mass, waist circumference),^{12,13,14,15} cognitive development and brain health (e.g., executive functioning, white matter microstructure),^{16,17,18,19,20,21,22,23} academic achievement (e.g., mathematics, overall grade point average)^{24,25,26,27} and health-related quality of life (e.g., physical, social and emotional functioning).^{28,29}



Given the increasing emphasis on mental health in today's society, it is not surprising that emerging research has focused on the important role of physical activity in relation to children and youth's mental health and psychosocial well-being. This research has shown that higher physical activity levels are associated with favourable dimensions of mental health including greater self-efficacy,³⁰ pro-social behaviour,³¹ self-esteem and life satisfaction,³² and a flourishing mental state.³³ Higher physical activity levels are also associated with fewer mental health visits,³⁴ decreased behaviour of inattention and hyperactivity,³⁵ reduced smartphone addiction³⁶ and lower odds for symptoms of depression.³⁷ A study using nationally representative data from adolescents in the United States showed that those who were physically active had significantly lower odds of having bipolar II disorder, mood disorder and general psychological distress.³⁸ It should also be noted that while most studies explore the health benefits associated with higher physical activity levels (such as those highlighted above), some studies explicitly focus on the negative consequences associated with lower physical activity levels or not meeting physical activity recommendations. For example, children and youth who engage in insufficient physical activity have increased odds of obesity^{39,40} and symptoms of depression and anxiety,⁴¹ and those with insufficient physical activity and high sedentary behaviour have increased odds of suicide ideation and planning.⁴²



Finally, in some research, physical activity has been combined with other healthy lifestyle behaviours (e.g., good sleep and diet, lower screen time) to obtain a healthy lifestyle score. This body of research has shown that a healthy lifestyle is associated with greater health-related quality of life,⁴³ fewer health complaints (e.g., headaches, irritability)⁴⁴ and lower risk of overweight or obesity.⁴⁵

Physical Activity

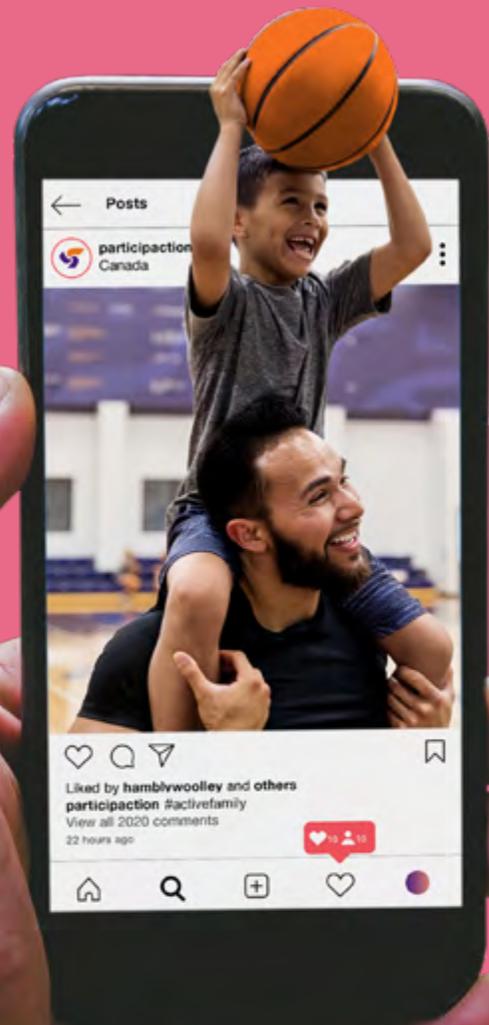


The Family Influence

We've known for decades about the benefits physical activity can have on kids, such as improving heart health, building strong bones and muscles, boosting self-esteem and maintaining healthy body weights. But with Canadian children's low activity levels and increasing sedentary behaviours, we should consider all angles of influence. This includes taking a closer look at how the family unit can support healthy movement behaviours (i.e., promoting sufficient physical activity, limiting sedentary behaviours and ensuring adequate sleep) in children and youth.

There's no denying **families play a crucial role in shaping and influencing all areas of kids' lives** – including their physical activity, sedentary behaviour and sleep behaviours. Other sources of influence – such as childcare, school, healthcare, community and governments – are important in supporting families in this pursuit.

At the end of the day, we all want happy and healthy kids. However, with everyday lives seeming to be busier than ever, fitting in activity, getting enough sleep and keeping kids away from tempting screens can be tough! But the evidence shows that it's worth it to work toward achieving the 24-Hour Movement Guidelines for Children and Youth.



What needs to be done to get Canadian kids moving?

This year, Canadian children received a “**D+**” grade for Overall Physical Activity, “**D+**” for Sedentary Behaviour, “**B**” for Sleep, and “**F**” for overall 24-Hour Movement Behaviours. Considering these grades it’s time to consider various ways to shift these trends in a more favourable direction. **What can we do as families to positively support healthy movement behaviours of our kids?**

Family support has been shown to be positively associated with children’s physical activity levels.⁵² Furthermore, family-based interventions have been effective at improving physical activity levels in children and youth. **How we move as a family has a direct impact on our kids.** We need to use this knowledge to positively influence kids’ lives.



- ▶ Facilitate physical activity by encouraging, watching, role modelling, co-participating and attending physical activity events.^{222,226,229,236}
- ▶ Be active as a family and make it a priority – this encourages physical activity, social support, connectedness and attachment, which are all important for good mental health.³²⁵

Encouraging kids to sit less and move more doesn’t have to be a complicated or strenuous task. By prioritizing physical activity and incorporating it into daily routines, we can create a mindset where being active won’t have to be a choice for Canadian children and youth, it will become second nature.



Get # Moving

Be an active role model in kids' lives

The ever-changing, fast-paced world we live in looks a lot different than it did even 20 years ago. The same can be said for the Canadian family unit. Families are more diverse and are structured in all kinds of different ways. Although a lot has changed, one thing remains the same: **the family unit is one of the closest and most important sources of influence for the movement behaviours of children and youth.**

Our kids are influenced every day by a number of different messages and sources, including friends, teachers, coaches, social media, TV, and ad campaigns. A lot of that is out of our control. But it is important to remember that the habits and opportunities fostered within the family environment can also have a big impact on children's lives. This includes modelling healthy movement behaviours.

Recent findings show that **parents' physical activity is directly associated with that of their children's.**

- ▶ Each additional 20 minutes of moderate to vigorous physical activity by a parent is associated with an additional 5 minutes in their child's daily physical activity (2016-17 CHMS, Statistics Canada).³²⁴

The connection is clear: the more families move, the more children and youth move. We've heard all about children mirroring their parents' behaviours, and how important role modelling can be in helping young people develop key life skills. Regardless of what the family dynamic looks like, the **family members in kids' lives are direct role models for how young Canadians develop – especially when it comes to healthy movement behaviours.**





Put the screens away – get active instead

Family screen time is on the rise. In 2019, 52% of parents said they spend too much time on their mobile devices, up from 29% in 2016. Also, the proportion of children and youth who thought their parent(s) was/were addicted to their mobile devices and wished their parent(s) would get off their device increased from 28% in 2016 to 39% in 2019.³²⁶ At the same time, children's and youths' screen time is also on a sharp incline.

- ▶ By age 11, over half (53%) of children have their own smartphone, and this increases to 69% by age 12.¹³⁸
- ▶ One-third of youth keep their mobile devices in bed with them³²⁶ – and those with screens in their bedroom get less sleep.³²⁷

The correlation between an increase in children's use of mobile devices, and their parents' increasing use, is no coincidence. Almost all parents have mobile devices and they are using them more than ever before. And, not surprisingly, so are their children. **This can have a direct impact on how much time children spend being sedentary and can negatively impact their sleep.**

Modelling behaviour can go both ways. Kids do see how much we rely on our smartphones, tablets and computers – but our positive behaviour has an impact on them, too. Prioritizing physical activity can have direct positive impacts on developing children's movement behaviours. When we make physical activity a part of our daily routine as a family, it is naturally engrained in the routines of our children and youth as well.





Reclaim family time as active time

We know kids are sitting more and moving less, and there is something we can do about it. Canadian families have the power to help their children and youth in getting active to live their best lives possible. Canadian families can be active role models and provide the kind of positive encouragement our kids need. **Start by identifying as an active family.**

Incorporating physical activity into daily routines doesn't have to be complicated, and it's a great way to build strong social bonds, get hearts pumping and have fun together. **It's time to take back family time and reclaim it as active time.**





Another great thing about physical activity is that it doesn't have to cost anything. Physical activity really is for everyone. It's for families of all backgrounds and dynamics.

To help families prioritize getting active, check out the following recommendations from *The Role of the Family in the Physical Activity, Sedentary and Sleep Behaviours of Children and Youth – A Consensus Statement*:

- ▶ Be an active role model:
 - ★ Incorporate physical activity into daily routines, limit sedentary behaviours and look for opportunities to be active as a family when possible. Engaging in healthy movement behaviours together also helps keep families connected while building strong social bonds.

#Active

#Family

- ▶ Use active transportation to get to destinations as a family:
 - ★ Whether you walk, wheel, rollerblade, skateboard or jog, there's a form of active transportation for everyone. Try leaving the car at home once or twice a week – not only will you save money on gas and reduce harmful emissions, but you will also be spending more quality time as a family getting active.
- ▶ Create a family media plan that includes:
 - ★ Setting limits around screen viewing
 - ★ Prioritizing screen-free family time and consider the use of “device baskets” (bins for storing personal mobile devices)
 - ★ Removing screens from children's bedrooms
 - ★ Having screen-free family meals
- ▶ Encourage more outdoor time:
 - ★ Spending some time outdoors each week as a family is an easy and effective way to limit screen time and naturally boost moods, and it can also decrease sedentary behaviour and improve sleep quality.

The bottom line: **family is a key source of influence on kids' healthy movement.** It's time to make physical activity a family priority and lead by example – not only for the next generation, but for our own as well. If being active is second nature for us as adults, it will, in turn, become second nature for our children, too. It all starts with the family.

Consensus Statement

On the Role of the Family in the Physical Activity, Sedentary and Sleep Behaviours of Children and Youth



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Families can support children and youth in achieving healthy physical activity, sedentary and sleep behaviours by encouraging, facilitating, modelling, setting expectations and engaging in healthy movement behaviours with them. Other sources of influence are important (e.g., child care, school, health care, community, governments) and can support families in these pursuits.





Background

Healthy physical activity, sedentary and sleep behaviours in childhood and adolescence are essential for healthy growth and development,¹⁻⁹ and this fact led to the development of the Canadian 24-Hour Movement Guidelines.^{10,11} Unfortunately, few Canadian children and youth are meeting these guidelines.¹²⁻¹⁴ There has been a dramatic decline in Canadian children's fitness over the past 35 years,¹⁵⁻¹⁸ which has negatively affected their health.¹⁹⁻²³ The United Nations Convention on the Rights of the Child protects a child's right to rest and play in recreational and leisure activities appropriate to their age.²⁴ These rights are reinforced in the Canadian Children's Charter.²⁵

Unfortunately, Canadians have not been successful in honouring these commitments. The 2020 ParticipACTION Report Card on Physical Activity for Children and Youth gives Canada a grade of "D+" for Overall Physical Activity, "D+" for Sedentary Behaviour, "B" for Sleep, and "F" for 24-Hour Movement Behaviours.²⁶ A recent UNICEF Canada report supports these findings, highlighting that only 21% of children aged 5-11 years engage in at least 1.5 hours per day of active play and unstructured physical activities.²⁷ Additional findings from Statistics Canada indicate that youth aged 12-17 years accumulate 4 hours per day of screen time outside of school.²⁸

Movement behaviours are affected by the family, home, school, community, government and environment.²⁹⁻³³ The family (e.g., parents, guardians, siblings) is typically the closest and most important influence, and its impact has received considerable research attention.³⁴⁻³⁶ This Consensus Statement was developed by synthesizing and interpreting the research evidence, integrating expert input, and incorporating stakeholder and end-user feedback to provide guidance for families, and those who influence them.

Families vary in structure, function, roles and interactions among members. Families are constantly changing, creating both challenges and opportunities to promote healthy movement behaviours.



Process

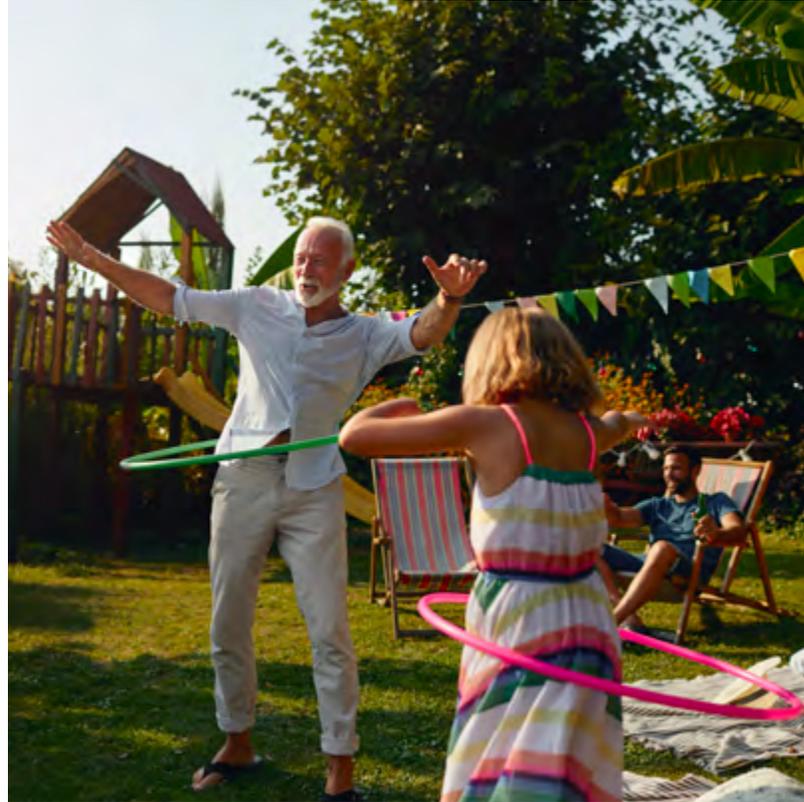
The process to develop this Consensus Statement included completing six comprehensive literature reviews, establishing a national multidisciplinary Expert Panel, gathering custom data analyses from Statistics Canada's Canadian Health Measures Survey (CHMS), integrating related research identified by Expert Panel members, conducting a stakeholder consultation process, achieving Expert Panel consensus and releasing the Consensus Statement in conjunction with the 2020 ParticipACTION Report Card.³⁷

Summary of Supporting Evidence

This Consensus Statement applies to all families and is relevant for children and youth aged 0-17 years, including all genders/sexes, ethnicities and family socio-economic statuses. Families vary in structure, function, roles and interactions among members, and are constantly changing,^{38,39} creating both challenges and opportunities for the promotion of healthy movement behaviours.

Overall Movement Behaviours

- ▶ Less than 1 in 5 children and youth in Canada meet national guidelines for physical activity, sedentary and sleep behaviours.^{5,12,14,40}
- ▶ Positive parenting practices and attitudes, perceived control, perceived low risk of harm in activities, and intentions to provide support are critical; parents who make specific plans (how, when, where) are more likely to follow through and support their child's healthy movement behaviours.^{36,41-48}
- ▶ As children age, their families provide less support for movement behaviours; however, parental support remains extremely important in supporting these behaviours in youth.^{49,50}



Physical Activity

- ▶ Parents' physical activity is associated with that of their children, with each additional 20 minutes of parental moderate-to-vigorous physical activity associated with an extra 5 minutes for their child;⁵¹ this finding is supported by other research.^{35,52} Parental fitness characteristics are also related to those of their children.⁵³
- ▶ Family social support is positively associated with children's physical activity levels.⁵⁴
- ▶ There are generally no differences in the physical activity behaviours of children and youth according to the number of siblings in the household, or single- versus two-parent households.⁵³
- ▶ Family-based interventions are generally effective at improving physical activity, while evidence about the efficacy of screen-time interventions to increase physical activity is less conclusive.⁵⁵⁻⁵⁹ Providing families with educational materials about reducing screen time, without providing additional intervention components, may not be effective in changing child and youth physical activity behaviours. Current evidence supports using interventions that focus on self-regulatory approaches (e.g., planning, setting goals) and involve the whole family.⁵⁷
- ▶ Two-thirds of parents said that monitoring their children's media use was more important than respecting their privacy;⁶¹ however, only 14% of youth with a phone or tablet said their parents tracked their device time.⁶²
- ▶ Parents overwhelmingly have positive attitudes about the role of technology in their children's education and development of important skills.⁶¹
- ▶ Children spend less time engaged in screen-based behaviours if they live in households with screen time restrictions.⁶³⁻⁶⁵
- ▶ Higher parenting stress and lower household income are associated with a higher amount of daily screen time in infants and toddlers aged 7-18 months.⁶⁶
- ▶ By age 11, the majority (53%) of children have their own smartphone, and this increases to 69% by age 12.⁶²
- ▶ Children aged 9-12 years from higher-income homes accumulate an hour and 50 minutes less screen time per day than those from lower-income households.⁶²

Sedentary Behaviours

- ▶ The number of parents who reported that they spend too much time on their own mobile devices increased from 29% in 2016 to 52% in 2019.⁶⁰
- ▶ The proportion of children and youth who thought their parent(s) were addicted to their mobile devices and wished their parent(s) would get off their device increased from 28% in 2016 to 39% in 2019.⁶⁰
- ▶ 78% of parents believed they were good media and technology role models for their children,⁶¹ even though the parents reported having high levels of screen viewing.

Sleep

- ▶ Good sleep hygiene is associated with positive sleep outcomes, such as longer sleep duration and better quality of sleep. Good sleep hygiene includes regular bedtimes, consistent bedtime routines (e.g., bathing, brushing teeth, reading) and screen-free bedrooms.⁷⁰⁻⁷³
- ▶ One-third of youth keep their mobile devices in bed with them.⁶⁰
- ▶ Having screens in bedrooms is consistently linked with less sleep.⁶⁷⁻⁶⁹

Conceptual Model

The Expert Panel developed the conceptual model below. It builds on earlier models that examined family systems in the context of child health behaviour change, and also incorporates new

evidence.⁷⁴⁻⁷⁶ The model illustrates the complexity of the family's role in influencing integrated movement behaviours, and provides a guide for future research and interventions.





Recommendations

Families may find it challenging to support children and youth in achieving the 24-Hour Movement Guidelines. A list of recommendations for how families, and those who influence them, can improve the physical activity, sedentary and sleep behaviours of children and youth is provided below. These recommendations are based on the evidence reviewed for the Consensus Statement, and the expertise of the Expert Panel members.

Including
parents, elders,
grandparents,
siblings, legal
guardians

Family

Overall Movement Behaviours

- ▶ Know, understand and strive to adhere to the 24-Hour Movement Guidelines.^{10,11}
- ▶ Establish an environment that supports healthy movement, and create routines and expectations for meeting the 24-Hour Movement Guidelines.^{10,11}
- ▶ Recognize that engaging in recommended healthy movement behaviours reinforces family cohesiveness.
- ▶ Be a good role model by being physically active, limiting your own sedentary behaviour and screen time, and practising healthy sleep habits.
- ▶ Help children self-regulate their behaviours by setting expectations and making sure to involve them in deciding how they can meet the 24-Hour Movement Guidelines.^{10,11}
- ▶ Encourage more outdoor time to increase physical activity, decrease sedentary behaviour and improve sleep.⁷⁷

Physical Activity

- ▶ Facilitate physical activity by encouraging, watching, role modelling and attending physical activity events, and by co-participation.^{52,54,78-91}
- ▶ Be active as a family – this encourages physical activity, social support, connectedness and attachment, which are all important for good mental health.⁹²
- ▶ Promote and support opportunities for physical activity, active outdoor play and sport at home and school, and in the community.²⁶
- ▶ Incorporate more opportunities for active transportation – walk, bike, wheel, skateboard, scooter or take transit to school, stores, parks and activities.⁹³
- ▶ Allow your children to play and roam unsupervised, while ensuring that their range is safe.⁹⁴
- ▶ Join with other families in enabling physical activity opportunities.



Sedentary Behaviours

- ▶ Create a family media plan that includes:
 - * Setting limits around screen viewing consistent with established guidelines^{10,11,63,64,69,95-108}
 - * Prioritizing screen-free family time^{97,109,110}
 - * Prioritizing device-free time at home and using “device baskets” (bins for personal mobile devices) as an aid
 - * Removing screens from children’s bedrooms^{68,69,97,109-118}
 - * Having screen-free family meals^{97,104,109,110,116,119-121}
- ▶ Avoid using screen time as a reward.
- ▶ Be present and engaged when screens are used, and co-view when possible.^{10,11,95-97,99,109,110}
- ▶ Break up children’s prolonged sitting with movement whenever possible – at home and during travel.^{10,11,95-97,99}

Sleep

- ▶ Create and adhere to a consistent bedtime routine (e.g., bathing, brushing teeth, reading).^{10,11,95-97,99,122-124}
- ▶ Schedule and encourage a regular bedtime that allows for sufficient sleep.^{10,11,95,100,125,126}
- ▶ Support screen-free bedrooms for all family members.^{97,104,110,122,127-134}
- ▶ Discourage screen viewing in the hour before bedtime.^{96,109,110}
- ▶ Provide children with a comfortable and quiet sleeping environment.^{122,124-126}

Educators & School Administrators

- ▶ Support families' pursuit of healthy movement behaviours for their children and youth by:
 - ★ Knowing and understanding the 24-Hour Movement Guidelines^{10,11}
 - ★ Embracing opportunities to incorporate healthy and inclusive movement messages, practices and policies into daily school routines and lessons by:
 - Respecting daily physical activity (DPA) policies
 - Ensuring all children have access to daily recess breaks that encourage physical activity
 - Reducing excessive safety restrictions on physical activity on school grounds (e.g., tag, tree climbing)
 - Minimizing long periods of sedentary behaviour and interrupting any long periods with active breaks
 - Scheduling classes to encourage changes in posture
 - Providing options for standing desks in classrooms and libraries¹³⁵
 - Creating a culture that moderates the use of screens in schools
 - Integrating sleep health messages into the school curriculum
 - Supporting children and youth in self-regulating their habitual movement behaviours
 - Modelling healthy movement behaviours and discussing the importance of healthy, habitual movement behaviours
 - Assigning healthy movement behaviour homework – more physical activity, less sedentary behaviour and screen time, and a good night's sleep

- ▶ Ensuring that before- and after-school programming incorporates healthy and inclusive movement messages, practices and policies.





Academics & Researchers

- ▶ Help inform families' pursuit of healthy movement behaviours for their children and youth by:
 - * Addressing evidence gaps in understanding family influence on healthy movement behaviours
 - * Examining family-based interventions that use various behaviour modification techniques to address healthy physical activity, sedentary and sleep behaviours concurrently
 - * Studying the external factors that mediate families' ability to adhere to the 24-Hour Movement Guidelines
 - * Advocating for evidence-informed policies and practices related to the role of the family in healthy physical activity, sedentary and sleep behaviours
 - * Engaging in knowledge translation efforts targeting families, the media, educators and policymakers

Health Care Practitioners

- ▶ Support families' pursuit of healthy movement behaviours for their children and youth by:
 - * Promoting the 24-Hour Movement Guidelines^{10,11} and recommendations from the Canadian Paediatric Society's Position Statement on Digital Media Use^{109,110} during routine visits
 - * Asking about the family's movement behaviours and emphasizing a whole family approach to improving these behaviours
 - * Recommending that family members encourage, facilitate, model, set expectations, and participate in efforts that allow their children to achieve healthy movement behaviours
 - * Becoming familiar with resources that enable families to support healthy movement behaviours
 - * Advocating for preventive health-care tools such as the Rourke Baby Record and Greig Record to include an assessment of the family's role in physical activity, sedentary and sleep behaviours^{109,110,136,137}

Allied professionals and community programming staff

- ▶ Support families' pursuit of healthy movement behaviours for their children and youth by:
 - * Integrating key messages from the 24-Hour Movement Guidelines^{10,11} into community-based programming
 - * Modifying programs for parents by integrating healthy movement recommendations
 - * Incorporating planning activities (e.g., developing sleep routines, screen time planning, physical activity scheduling) in family interventions/service provision
 - * Encouraging and facilitating standing, stretching and quiet movement while clients are waiting or during events

Employers

- ▶ Support families' pursuit of healthy movement behaviours for their children and youth by:
 - * Ensuring healthy 24-hour movement behaviours are part of a child and family health component in workplace wellness initiatives
 - * Allowing flexibility in work hours to enable parents to promote and practice healthy family movement behaviours



Federal,
provincial,
territorial,
municipal as
appropriate

Governments

- ▶ Support families' pursuit of healthy movement behaviours for their children and youth by:
 - * Developing, implementing and evaluating strategies for healthy movement behaviours that draw from the guiding strategy "A Common Vision for Increasing Physical Activity and Reducing Sedentary Living in Canada: Let's Get Moving"¹³⁸
 - * Providing sustained resources and developing policies for the promotion and implementation of the 24-Hour Movement Guidelines in the context of the family¹³⁹
 - * Promoting healthy 24-hour movement behaviours by increasing access to schools, recreation centres and other public spaces outside of school hours
 - * Supporting families' participation in sport and recreation activities¹⁴⁰
 - * Requiring manufacturers of digital screen devices to disclose on product labels the potential harms associated with excessive use
 - * Investing in no-charge active play spaces (especially outdoors) for families with children of all ages
 - * Providing infrastructure and social marketing to support families in adopting active transport practices
 - * Updating educational curricula to better incorporate healthy physical activity, sedentary and sleep behaviours with a family-focused lens and through a whole-school approach
 - * Supporting neighbourhood associations, recreation centres and schools in developing programs to encourage family physical activity
 - * Reviewing and amending bylaws as needed to allow, promote and encourage outdoor play opportunities (e.g., climbing trees, playing street hockey and pick-up ball games, building tree forts, tobogganing)
 - * Providing transit options that reach beaches, hiking trails, parks and other areas that promote healthy movement behaviours
 - * Developing child protection policies that promote independent movement opportunities suited to the capacity of the child and their environment



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References for Consensus Statement

- 1. Carson V, et al.** Systematic review of the relationships between physical activity and health indicators in the early years (0-4 years). *BMC Public Health*. 2017;17(S5):854.
- 2. Poitras VJ, 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(S5):868.
- 3. Chaput JP, et al.** Systematic review of the relationships between sleep duration and health indicators in school-aged children and youth. *Appl Physiol Nutr Metab*. 2016;41(S3):S266-S282.
- 4. Poitras VJ, et al.** Systematic review of the relationships between objectively measured physical activity and health indicators in school-aged children and youth. *Appl Physiol Nutr Metab*. 2016;41(S3):S197-S239.
- 5. Carson V, et al.** Cross-sectional associations between sleep duration, sedentary time, physical activity and adiposity indicators among Canadian preschool children using compositional analyses. *BMC Public Health*. 2017;17(S5):848.
- 6. Carson V, et al.** Systematic review of sedentary behaviour and health indicators in school-aged children and youth: an update. *Appl Physiol Nutr Metab*. 2016;41(S3):S240-S265.
- 7. Saunders TJ, et al.** Combinations of physical activity, sedentary behaviour and sleep: relationships with health indicators in school-aged children and youth. *Appl Physiol Nutr Metab*. 2016;41(S3):S283-S293.
- 8. Kuzik N, et al.** Systematic review of the relationships between combinations of movement behaviors and health indicators in the early years (0 to 4 years). *BMC Public Health*. 2017;17(S5):849.
- 9. Carson V, et al.** Associations between sleep duration, sedentary time, physical activity, and health indicators among Canadian children and youth using compositional analyses. *Appl Physiol Nutr Metab*. 2016;41(S3):S294-S302.
- 10. Tremblay MS, et al.** Canadian 24-Hour Movement Guidelines for the Early Years (0-4 years): An Integration of Physical Activity, Sedentary Behaviour, and Sleep. *BMC Public Health*. 2017;17(S5):874.
- 11. Canadian Society for Exercise Physiology.** Canadian 24-Hour Movement Guidelines for Children and Youth: An Integration of Physical Activity, Sedentary Behaviour, and Sleep. Ottawa; 2016. <https://csepguidelines.ca/children-and-youth-5-17/>.
- 12. Roberts KC, et al.** Meeting the Canadian 24-Hour Movement Guidelines for Children and Youth. *Health Rep*. 2017;28(10):3-7.
- 13. Roman-Viñas B, et al.** Proportion of children meeting recommendations for 24-hour movement guidelines and associations with adiposity in a 12-country study. *Int J Behav Nutr Phys Act*. 2016;13(1):123.
- 14. Janssen I, et al.** Adherence to the 24-Hour Movement Guidelines among 10- to 17-year-old Canadians. *Health Promot Chronic Dis Prev Canada*. 2017;37(11):369-375.
- 15. Tremblay MS, et al.** Fitness of Canadian children and youth: Results from the 2007-2009 Canadian Health Measures Survey. *Health Rep*. 2010;21(1):7-20.
- 16. Craig CL, et al.** Trends in aerobic fitness among Canadian children and adults 1981 to 2007-2009: what can we conclude? *Appl Physiol Nutr Metab*. 2012;37:511-519.
- 17. Tomkinson GR, et al.** Temporal trends in the cardiorespiratory fitness of children and adolescents representing 19 high-income and upper-middle-income countries between 1981 and 2014. *Br J Sports Med*. 2019;53:478-456.
- 18. Colley RC, et al.** Trends in physical fitness among Canadian children and youth. *Health Rep*. 2019;30(10):3-13.
- 19. Lang JJ, et al.** Making a case for cardiorespiratory fitness surveillance among children and youth. *Exerc Sport Sci Rev*. 2018;46(2):66-75.
- 20. Silva DAS, et al.** Cardiorespiratory fitness in children: evidence for criterion-referenced cut-points. *PLoS One*. 2018;13(8):e0201048.
- 21. Lang JJ, et al.** The association between physical fitness and health in a nationally representative sample of Canadian children and youth aged 6 to 17 years. *Health Promot Chronic Dis Prev Canada*. 2019;39(3):104-111.
- 22. Tomkinson GR, et al.** The 20-m shuttle run: assessment and interpretation of data in relation to youth aerobic fitness and health. *Pediatr Exerc Sci*. 2019;31(2):152-163.
- 23. Lang JJ, et al.** Review of criterion-referenced standards for cardiorespiratory fitness: what percentage of international children and youth are apparently healthy? *Br J Sports Med*. 2019;53:953-958.
- 24. United Nations.** UN General Assembly, Convention on the Rights of the Child. United Nations, Treaty Series. 1989. <https://www.unicef.org/child-rights-convention/convention-text-childrens-version>.
- 25. Children First Canada.** The Canadian Children's Charter: A Call to Action to Respect, Protect and Fulfil the Rights of Canada's Children. 2018. <https://childrenfirstcanada.org/childrens-charter-english>.
- 26. ParticipACTION.** 2020 ParticipACTION Report Card on Physical Activity for Children and Youth. 2020. <https://www.participaction.com/en-ca/resources/report-card>.
- 27. UNICEF Canada.** Where Does Canada Stand? The Canadian Index of Child and Youth Well-Being Baseline Report. 2019. https://oneyouth.unicef.ca/sites/default/files/2019-08/2019_Baseline_Report_Canadian_Index_of_Child_and_Youth_Well-being.pdf
- 28. Janssen I, LeBlanc AG.** Systematic review of the health benefits of physical activity and fitness in school-aged children and youth. *Int J Behav Nutr Phys Act*. 2010;7(1):40.
- 29. Sallis JF, et al.** An ecological approach to creating more physically active communities. *Ann Rev Pub Heal*. 2006;27:297-322.
- 30. Owen N, et al.** Adults' sedentary behavior - determinants and interventions. *Am J Prev Med*. 2011;41(2):189-196.
- 31. Grandner MA.** Social-ecological model of sleep health. In: Grandner MA (Ed), *Sleep and Health*. London: Elsevier; 2019:45-53.
- 32. Stokols D.** Establishing and maintaining healthy environments: toward a social ecology of health promotion. *Am Psychol*. 1992;47(1):6-22.
- 33. Bronfenbrenner U, Morris PA.** The bioecological model of human development. In: Damon W (Series Ed.) and Lerner RM (Vol. Ed.), *Handbook of Child Psychology*. New York: Wiley; 2006:793-828.
- 34. Rhodes RE, Quinlan A.** The family as a context for physical activity promotion. In: Beauchamp MR, Eyes MA (Eds.), *Group Dynamics in Exercise and Sport*. 2nd ed. New York: Routledge; 2014:203-221.

- 35. Xu H, et al.** Associations of parental influences with physical activity and screen time among young children: a systematic review. *J Obes.* 2015;2015:546925.
- 36. Pyper E, et al.** Do parents' support behaviours predict whether or not their children get sufficient sleep? A cross-sectional study. *BMC Public Health.* 2017;17:432.
- 37. Rhodes R, et al.** Development of a consensus statement on the role of the family in the physical activity, sedentary, and sleep behaviours of children and youth. *Int J Behav Nutr Phys Act.* 2020.
- 38. Cox, MJ, Paley B.** Families as systems. *Annu Rev Psychol.* 1997;48:43–267.
- 39. Cox, MJ, Paley B.** Understanding families as systems. *Curr Dir Psychol Sci.* 2003:193–196.
- 40. Chaput JP, et al.** Proportion of preschool-aged children meeting the Canadian 24-Hour Movement Guidelines and associations with adiposity: results from the Canadian Health Measures Survey. *BMC Public Health.* 2017;17(S5):829.
- 41. Carver A, et al.** Are children and adolescents less active if parents restrict their physical activity and active transport due to perceived risk? *Soc Sci Med J.* 2010;70(11):1799-1805.
- 42. Davison KK, et al.** Associations among social capital, parenting for active lifestyles, and youth physical activity in rural families living in upstate New York. *Soc Sci Med J.* 2012;75(8):1488-1496.
- 43. Huffman LE, et al.** Associations between parenting factors, motivation, and physical activity in overweight African American adolescents. *Ann Behav Med.* 2018;52(2):93-105.
- 44. Lloyd AB, et al.** Maternal and paternal parenting practices and their influence on children's adiposity, screen-time, diet and physical activity. *Appetite.* 2014;79:149-157.
- 45. Rhodes RE, et al.** Predicting parental support and parental perceptions of child and youth movement behaviors. *Psychol Sport Exerc.* 2019;41:80-90.
- 46. Rhodes RE, et al.** Application of the the Multi-Process Action Control Framework to understand parental support of child and youth physical activity, sleep, and screen time behaviors. *Appl Psychol Heal Well-being.* 2019;11(2):223-239.
- 47. Rhodes RE, et al.** Understanding action control of parent support behavior for child physical activity. *Heal Psychol.* 2016;35:131-140.
- 48. Rhodes RE, et al.** Predicting changes across 12 months in three types of parental support behaviors and mothers' perceptions of child physical activity. *Ann Behav Med.* 2015;49:853-864.
- 49. Edwardson CL, Gorely T.** Parental influences on different types and intensities of physical activity in youth: A systematic review. *Psychol Sport Exerc.* 2010;11:522-535.
- 50. Rhodes RE, et al.** Parental support of the Canadian 24-hour movement guidelines for children and youth: Prevalence and correlates. *BMC Public Health.* 2019;19(1):1385.
- 51. Garriguet D, et al.** Parent-child association in physical activity and sedentary behaviour. *Health Rep.* 2017;28(5):3-11.
- 52. Neshteruk CD, et al.** The influence of fathers on children's physical activity: A review of the literature from 2009 to 2015. *Prev Med.* 2017;102:12-19.
- 53. Canadian Health Measures Survey (CHMS) Custom Analysis.**
- 54. Cislak A, et al.** Family-related predictors of body weight and weight-related behaviours among children and adolescents: A systematic umbrella review. *Child Care Health Dev.* 2012;38:321-331.
- 55. Ash T, et al.** Family-based childhood obesity prevention interventions a systematic review and quantitative content analysis. *Int J Behav Nutr Phys Act.* 2017;14:113.
- 56. Barr-Anderson DJ, et al.** Family-focused physical activity, diet and obesity interventions in African-American girls: A systematic review. *Obes Rev.* 2013;14(1):29-51.
- 57. Brown HE, et al.** Family-based interventions to increase physical activity in children: a systematic review, meta-analysis and realist synthesis. *Pediatr Obes Prev.* 2016:345–360.
- 58. Dellert JC, Johnson P.** Interventions with children and parents to improve physical activity and body mass index: a meta-analysis. *Am J Health Promot.* 2014;28(4):259–267.
- 59. Verjans-Janssen SRB, et al.** Effectiveness of school-based physical activity and nutrition interventions with direct parental involvement on children's BMI and energy balance-related behaviors – a systematic review. *PLoS.* 2018;13(9):1-24.
- 60. Robb MB.** The new normal: parents, teens, screens, and sleep in the United States. San Francisco: Common Sense Media; 2019. <https://www.common sense media.org/research/the-new-normal-parents-teens-and-devices-around-the-world>.
- 61. Lauricella AR, et al.** The common sense census: plugged-in parents of tweens and teens. San Francisco: Common Sense Media; 2016. <https://www.common sense media.org/research/the-common-sense-census-media-use-by-tweens-and-teens-2019>.
- 62. Rideout V.** The common sense census: media use in teens and teens. San Francisco; 2019. https://www.common sense media.org/sites/default/files/uploads/research/census_researchreport.pdf.
- 63. Sleddens EFC, et al.** Bidirectional associations between activity-related parenting practices, and child physical activity, sedentary screen-based behavior and body mass index: a longitudinal analysis. *Int J Behav Nutr Phys Act.* 2017;14:89.
- 64. Thompson DA, et al.** Parenting and preschooler TV viewing in low-income Mexican Americans: development of the parenting practices regarding TV viewing (PPRTV) scale. *J Dev Behav Pediatr.* 2016;37:465-474.
- 65. Kesten JM, et al.** Associations between rule-based parenting practices and child screen viewing: A cross-sectional study. *Prev Med Reports.* 2015;2:84-89.
- 66. Tombeau Cost K, et al.** Association of parental and contextual stressors with child screen exposure and child screen exposure combined with feeding. *JAMA Netw Open.* 2020;3(2):e1920557.
- 67. Robinson JL, et al.** Relationship between parental estimate and an objective measure of child television watching. *Int J Behav Nutr Phys Act.* 2006;3:43.
- 68. Brindova D, et al.** How parents can affect excessive spending of time on screen-based activities. *BMC Public Health.* 2014;14:1261.
- 69. Bounova A, et al.** Home and neighborhood environment predictors of adolescents' screen viewing. *J Phys Act Heal.* 2016;13:1310-1316.

- 70. Billows M, et al.** Family disorganization, sleep hygiene, and adolescent sleep disturbance. *J Clin Child Adolesc Psychol.* 2009;5:745-752.
- 71. Jones CHD, Ball H.** Exploring socioeconomic differences in bedtime behaviours and sleep duration in english preschool children. *Infant Child Dev.* 2014;23:518-531.
- 72. Li S, et al.** Risk factors associated with short sleep duration among Chinese school-aged children. *Sleep Med.* 2010;11(9):907-916.
- 73. Chen T, et al.** Sleep duration in Chinese adolescents: biological, environmental, and behavioral predictors. *Sleep Med.* 2014;15:1345-1353.
- 74. Myoungok J, Whittemore R.** The family management style framework for families of children with obesity. *J Theory Constr Test.* 2014;19:5-15.
- 75. Davison KK, et al.** Reframing family-centred obesity prevention using the Family Ecological Model. *Public Health Nutr.* 2012;16:1861-1869.
- 76. Bronfenbrenner U.** *The Ecology of Human Development: Experiments by Nature and Design.* Cambridge, MA: Harvard University Press; 1979.
- 77. Tremblay MS, et al.** Position Statement on Active Outdoor Play. *Int J Env Res Public Health.* 2015;12(6):6475-6505.
- 78. Sterdt E, et al.** Correlates of physical activity of children and adolescents: A systematic review of reviews. *Heal Educ J.* 2014;73:72-89.
- 79. Mendonça G, et al.** Physical activity and social support in adolescents: A systematic review. *Health Educ Res.* 2014;29:822-839.
- 80. Laird Y, et al.** The role of social support on physical activity behaviour in adolescent girls: A systematic review and meta-analysis. *Int J Behav Nutr Phys Act.* 2016;13:79.
- 81. Boxberger K, Reimers AK.** Parental correlates of outdoor play in boys and girls aged 0 to 12: a systematic review. *Int J Env Res Public Health.* 2019;16:190.
- 82. Gordon-Larsen P, et al.** Determinants of adolescent physical activity and inactivity patterns. *Pediatrics.* 2000;105:e83.
- 83. Rothman L, et al.** The decline in active school transportation (AST): A systematic review of the factors related to AST and changes in school transport over time in North America. *Prev Med.* 2018;111:314-322.
- 84. Xu H, et al.** Associations of parental influences with physical activity and screen time among young children: A systematic review. *J Obes.* 2015;2016:546925.
- 85. Cleland V, et al.** A longitudinal study of the family physical activity environment and physical activity among youth. *Am J Health Promot.* 2011;25:159-161.
- 86. Crawford D, et al.** The longitudinal influence of home and neighbourhood environments on children's body mass index and physical activity over 5 years: The CLAN study. *Int J Obes.* 2010;34:1177-1187.
- 87. Carlson JA, et al.** Built environment characteristics and parent active transportation are associated with active travel to school in youth age 12-15. *Br J Sport Med.* 2014;48:1634-1639.
- 88. Carson V, et al.** Parents' perception of neighbourhood environment as a determinant of screen time, physical activity and active transport. *Can J Public Health.* 2010;101:124-127.
- 89. Cutumisu N, et al.** Influence of area deprivation and perceived neighbourhood safety on active transport to school among urban Quebec preadolescents. *Can J Public Health.* 2014;105:e376-382.
- 90. Esteban-Cornejo I, et al.** Parental and adolescent perceptions of neighborhood safety related to adolescents' physical activity in their neighborhood. *Res Q Exerc Sport.* 2006;87:191-199.
- 91. Ghekiere A, et al.** Insights into children's independent mobility for transportation cycling—Which socio-ecological factors matter? *J Sci Med Sport.* 2017;20:267-272.
- 92. Blum RM, Rinehart Mann P.** *Reducing the Risk: Connections That Make a Difference in the Lives of Youth.* Bethesda; 2012. <https://files.eric.ed.gov/fulltext/ED412459.pdf>.
- 93. Faulkner G, et al.** School travel and children's physical activity: a cross-sectional study examining the influence of distance. *BMC Public Health.* 2013;13(1):1166.
- 94. Riazi NA, et al.** Correlates of children's independent mobility in Canada: a multi-site study. *Int J Environ Res Public Health.* 2019;16(16):2862.
- 95. World Health Organization.** WHO Guidelines on physical activity, sedentary behaviour and sleep for children under 5 years of age. 2019. <https://apps.who.int/iris/handle/10665/311664>.
- 96. Reilly JJ, et al.** GRADE-ADOLEPMENT process to develop 24-hour movement behavior recommendations and physical activity guidelines for the under 5s in the UK, 2019. *J Phys Act Health.* 2020;17(1):101-108.
- 97. American Academy of Pediatrics – Council on Communications and Media.** Media and young minds. *Pediatrics.* 2016;138(5):e20162591.
- 98. Australian Department of Health.** Australian 24-Hour Movement Guidelines for Children and Young People (5-17 Years) – An Integration of Physical Activity, Sedentary Behaviour and Sleep. 2019. <https://www1.health.gov.au/internet/main/publishing.nsf/Content/health-24-hours-phys-act-guidelines>.
- 99. New Zealand Ministry of Health.** Sit less, move more, sleep well: active play guidelines for under-fives. 2017. <https://www.health.govt.nz/publication/sit-less-move-more-sleep-well-active-play-guidelines-under-fives>.
- 100. Okely AD, et al.** A collaborative approach to adopting/adapting guidelines - The Australian 24-Hour Movement Guidelines for the Early Years (birth to 5 years): An Integration of Physical Activity, Sedentary Behaviour, and Sleep. *BMC Public Health.* 2017;17(S5):869.
- 101. Kesten JM, et al.** Associations between rule-based parenting practices and child screen viewing: A cross-sectional study. *Prev Med Reports.* 2015;2:84-89.
- 102. Saleem M, et al.** Factors associated with excessive TV viewing in school children of Wah Cantt, Pakistan. *Rawal Med J.* 2014;39:323-326.
- 103. Goh SN, et al.** Sociodemographic, home environment and parental influences on total and device-specific screen viewing in children aged 2 years and below: an observational study. *BMJ Open.* 2016;6:e009113.
- 104. Verloigne M, et al.** Family- and school-based correlates of energy balance-related behaviours in 10-12-year-old children: a systematic review within the ENERGY (European Energy balance Research to prevent excessive weight Gain among Youth) project. *Public Heal Nutr.* 2012;15:1380-1395.
- 105. van Zutphen M, et al.** Association between the family environment and television viewing in Australian children. *J Paediatr Child Health.* 2007;43:458-463.

- 106. Cheng JK, et al.** Parental guidance advised: associations between parental television limits and health behaviors among obese children. *Acad Pediatr.* 2015;15:204–209.
- 107. De Lepeleere S, et al.** Do specific parenting practices and related parental self-efficacy associate with physical activity and screen time among primary schoolchildren? A cross-sectional study in Belgium. *BMJ Open.* 2005;5:e007209.
- 108. Downing KL, et al.** Associations of Parental Rules and Socioeconomic Position With Preschool Children's Sedentary Behaviour and Screen Time. *J Phys Act Health.* 2015;12:515–521.
- 109. Ponti, M, et al.** Digital Media: Promoting healthy screen use in school-aged children and adolescents. 2019. <https://www.cps.ca/en/documents/position/digital-media>.
- 110. Ponti M, et al.** Screen time and young children: Promoting health and development in a digital world. *Paediatr Child Health.* 2017;22(8):461-468.
- 111. Cui Z, et al.** Temporal trends and recent correlates in sedentary behaviours in Chinese children. *Int J Behav Nutr Phys Act.* 2011;8:93.
- 112. de Jong E, et al.** Association between TV viewing, computer use and overweight, determinants and competing activities of screen time in 4- to 13-year-old children. *Int J Obes.* 2013;37:47–53.
- 113. Johnson L, et al.** The association of parent's outcome expectations for child TV viewing with parenting practices and child TV viewing: an examination using path analysis. *Int J Behav Nutr Phys Act.* 2015;12:70.
- 114. Carson V, Janssen I.** Associations between factors within the home setting and screen time among children aged 0-5 years: a cross-sectional study. *BMC Public Health.* 2012;12:539.
- 115. Hoyos Cillero I, Jago R.** Sociodemographic and home environment predictors of screen viewing among Spanish school children. *J Public Health.* 2011;33:392–402.
- 116. Christakis DA, et al.** Television, video, and computer game usage in children under 11 years of age. *J Pediatr.* 2004;145:652–656.
- 117. Robinson JL, et al.** Relationship between parental estimate and an objective measure of child television watching. *Int J Behav Nutr Phys Act.* 2006;3:43.
- 118. Cameron AJ, et al.** Television in the bedroom and increased body weight: potential explanations for their relationship among European schoolchildren. *Pediatr Obes.* 2013;8:130–141.
- 119. Hesketh K, et al.** Mediators of the relationship between maternal education and children's TV viewing. *Am J Prev Med.* 2007;33:41–47.
- 120. Jiang XX, et al.** Recreational screen-time among Chinese adolescents: a cross-sectional study. *J Epidemiol.* 2014;24:397–403.
- 121. Saelens BE, et al.** Home environmental influences on children's television watching from early to middle childhood. *J Dev Behav Pediatr.* 2002;23:127–132.
- 122. Buxton OM, et al.** Sleep in the modern family: Protective family routines for child and adolescent sleep. *Sleep Health.* 2015;1:15–27.
- 123. John B.** Sleep-patterns, sleep hygiene behaviors and parental monitoring among Bahrain-based Indian adolescents. *J Fam Med Prim Care.* 2015;4:232–237.
- 124. Mindell JA, Williams A.** Benefits of a bedtime routine in young children: Sleep, development, and beyond. *Sleep Med Rev.* 2018;40:93-108.
- 125. Hirshkowitz M, et al.** National Sleep Foundation's updated sleep duration recommendations: final report. *Sleep Heal.* 2015;1(4):233-243.
- 126. Paruthi S, et al.** Recommended amount of sleep for pediatric populations: a consensus statement of the American Academy of Sleep Medicine. *J Clin Sleep Med.* 2016;12:785–786.
- 127. Allen SL, et al.** ABCs of SLEEPING: A review of the evidence behind pediatric sleep practice recommendations. *Sleep Med Rev.* 2016;29:1-14.
- 128. Brambilla P, et al.** Sleep habits and pattern in 1-14 years old children and relationship with video devices use and evening and night child activities. *Ital J Pediatr.* 2017;43(1):7.
- 129. Plancoulaine S, et al.** Gender-specific factors associated with shorter sleep duration at age 3 years. *J Sleep Res.* 2015;24:610-620.
- 130. Adam EK, et al.** Sleep timing and quantity in ecological and family context: A nationally representative time-diary study. *J Fam Psychol.* 2007;21:4–19.
- 131. BaHammam A, et al.** Sleep duration and its correlates in a sample of Saudi elementary school children. *Singapore Med J.* 2006;47:875.
- 132. Chahal H, et al.** Availability and night-time use of electronic entertainment and communication devices are associated with short sleep duration and obesity among Canadian children. *Pediatr Obes.* 2013;8:42–51.
- 133. Nuutinen T, et al.** Do computer use, TV viewing, and the presence of the media in the bedroom predict school-aged children's sleep habits in a longitudinal study? *BMC Public Health.* 2013;13:684.
- 134. Continente X, et al.** Media devices, family relationships and sleep patterns among adolescents in an urban area. *Sleep Med.* 2017;32:28–35.
- 135. Minges KE, et al.** Classroom standing desks and sedentary behavior: a systematic review. *Pediatrics.* 2016;137(2):e20153087.
- 136. Greig AA, et al.** An update to the Greig Health Record: Position Statement. *Paediatr Child Heal.* 2016;21(5):265-268.
- 137. Rourke L.** Rourke Baby Records. 2017. <http://www.rourkebabyrecord.ca/default>.
- 138. Public Health Agency of Canada.** A Common Vision for Increasing Physical Activity and Reducing Sedentary Living in Canada: Let's Get Moving. 2018. <https://www.canada.ca/en/public-health/services/publications/healthy-living/lets-get-moving.html>.
- 139. Faulkner G, et al.** Canadian 24-Hour Movement Guidelines for Children and Youth: Exploring the perceptions of stakeholders regarding their acceptability, barriers to uptake, and dissemination. *Appl Physiol Nutr Metab.* 2016;41(S3):S303-S310.
- 140. Jones LE, et al.** Child cash benefits and family expenditures: evidence from the National Child Benefit. *Can J Econ.* 2019;52(4):1433-1463.

Getting Families

Active

Together

Report Card Grading Scheme



A **B** **C** **D** **F** **Inc**

A+ 94-100%

B+ 74-79%

C+ 54-59%

D+ 34-39%

A 87-93%

B 67-73%

C 47-53%

D 27-33%

F 0-19%

A- 80-86%

B- 60-66%

C- 40-46%

D- 20-26%

A grade of "Inc" indicates that there was insufficient data (or data of poor quality) to assign a letter grade.

Daily Behaviours

These indicators speak to specific movement behaviours that occur over a 24-hour period



Overall Physical Activity

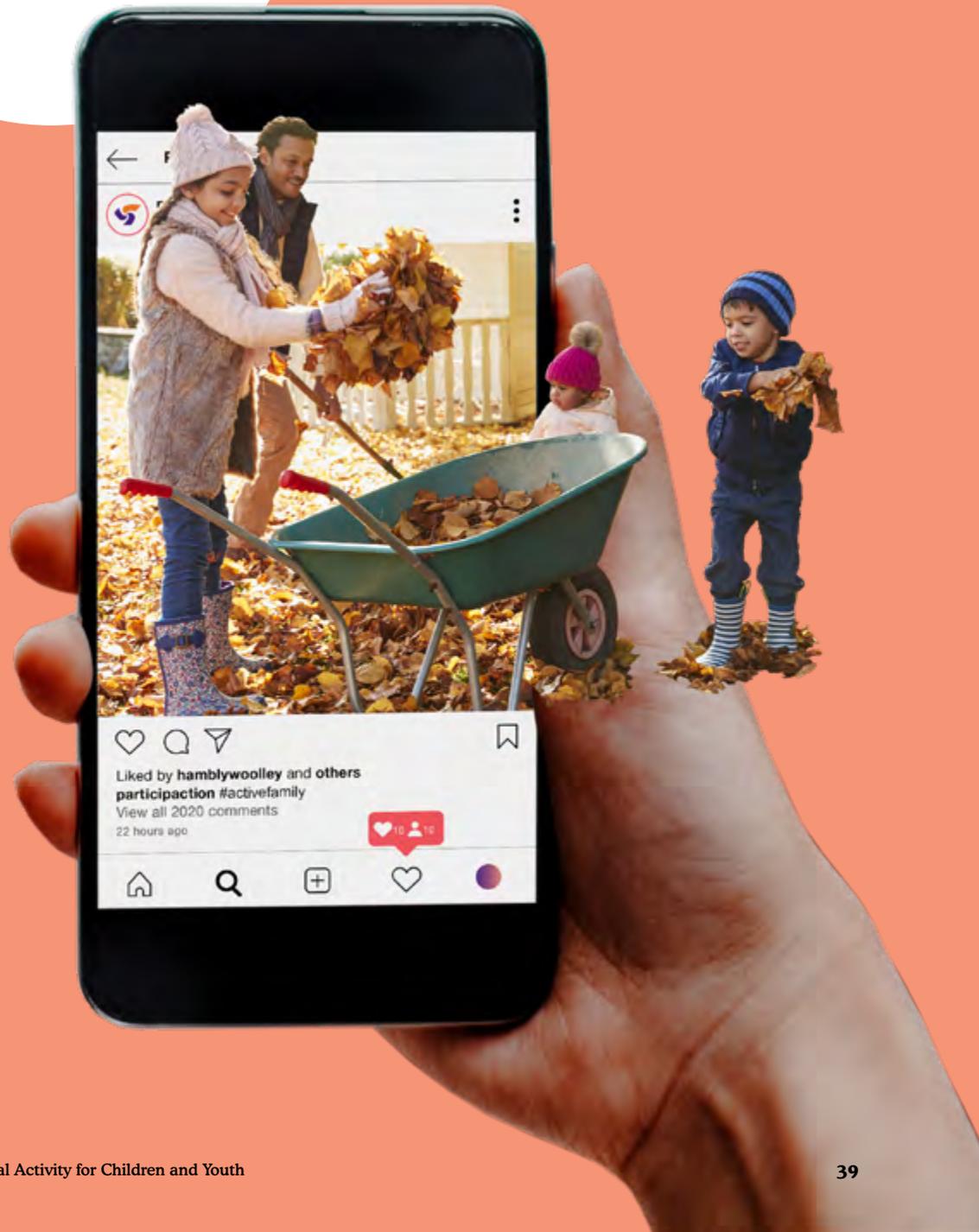


This year's grade is a D+ for the second consecutive time because only 39% of children and youth meet the physical activity recommendation within the Canadian 24-Hour Movement Guidelines.^{2,3}

Year	2010	2011	2012	2013	2014	2015	2016	2018	2020
Grade	F	F	F	D-	D-	D-	D-	D+	D+
Benchmark	Percentage of children and youth who meet the physical activity recommendation within the Canadian 24-Hour Movement Guidelines for Children and Youth (at least 60 minutes of daily MVPA, on average). ^{2,3}								



D+



Key Findings

▶ 39% of 5- to 17-year-olds in Canada meet the physical activity recommendation within the Canadian 24-Hour Movement Guidelines for Children and Youth (2016-17 Canadian Health Measures Survey [CHMS], Statistics Canada).^{Custom analysis} No significant changes in the percentage of children and youth meeting the 60-minutes-per-day recommendation have been observed between 2007 and 2017. This finding is true regardless of how the data are analyzed (i.e., total sample vs. split by age group and gender).

★ Figure 2 and Table 1 highlight various age- and gender-related disparities, with boys engaging in more physical activity than girls, and children (5-11 years) engaging in more physical activity than youth (12-17 years) (2016-17 CHMS, Statistics Canada).^{Custom analysis}

▶ 25% of 10- to 17-year-olds are meeting the physical activity recommendation within the Canadian 24-Hour Movement Guidelines for Children and Youth (2018 Health Behaviour in School-Aged Children survey [HBSC, PHAC]). This is similar to the prevalence (24%) reported in the previous cycle (2014) of the HBSC.^{Custom analysis}

▶ 41% of 5- to 19-year-olds take at least 12,000 steps daily on average, which approximates the physical activity recommendation within the Canadian 24-Hour Movement Guidelines for Children and Youth (Canadian Physical Activity Levels Among Youth study [CANPLAY], Canadian Fitness and Lifestyle Research Institute [CFLRI]).⁴⁶

▶ 5- to 19-year-olds in Canada take 11,300 steps daily on average (2014-16 CANPLAY, CFLRI).⁴⁷

Figure 2. Weighted percentage (%) of children and youth (5-17 years) meeting the physical activity recommendation (2016-17 CHMS, Statistics Canada).^{Custom analysis}

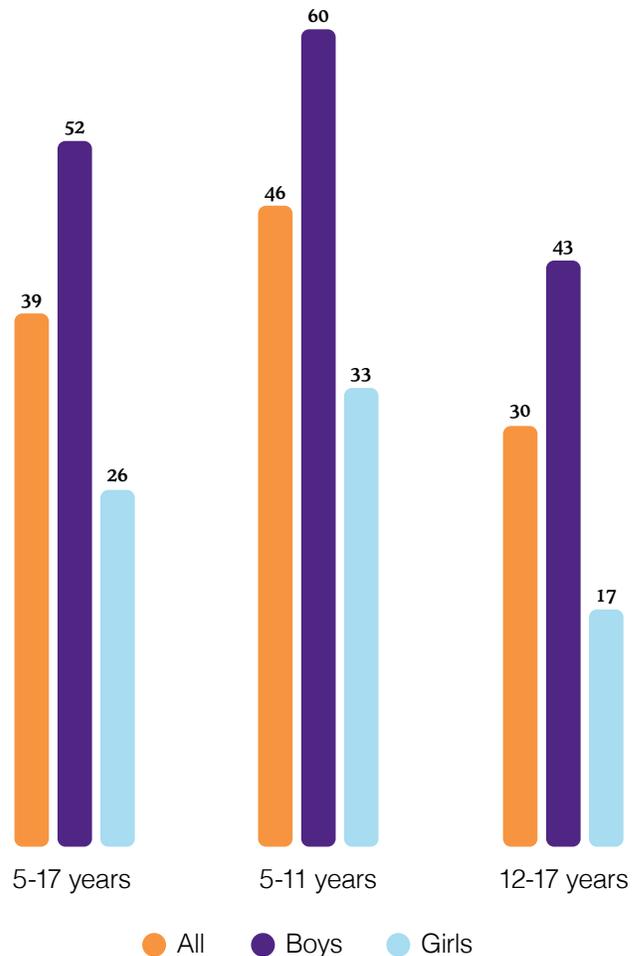


Table 1. Physical activity grades assigned by age and gender.

	All	Boys	Girls
5- to 17-year-olds	D+	C	D-
5- to 11-year-olds	C	B-	D
12- to 17-year-olds	D	C-	F

Research Gaps

- ▶ More research is needed to determine how much light-intensity physical activity is needed within a 24-hour period for optimum health.
- ▶ Future studies need to better address whether the association between physical activity and health outcomes varies by type or domain of physical activity.
- ▶ Development, validation and refinement is needed of questionnaires that capture physical activity from different domains (including home, school, sport and leisure time).
- ▶ Many children and youth have an average daily MVPA that falls just short of the 60-minutes-per-day target. Future research should aim to understand what percentage of children and youth are 5, 10 or 20 minutes short of meeting the target.
- ▶ More research is needed to determine how to effectively promote physical activity among vulnerable groups (e.g., children and youth living with medical conditions).



Recommendations

- ▶ Funding from various levels of government should continue to be committed to the surveillance of physical activity in children and youth by province/territory.
- ▶ Physical activity promotion efforts should focus on reducing inequalities and inequities (e.g., age, gender, ethnicity, socio-economic status).
- ▶ Improve surveillance protocols and implement consistent criteria for “meeting the guidelines” to allow for improved comparisons across years.
- ▶ Promote physical activity early and often, and identify many ways to incorporate purposeful and incidental daily physical activity.
- ▶ Consider important age- and sex-related differences in overall levels of physical activity; these differences are masked in this indicator’s overall grade of D+.

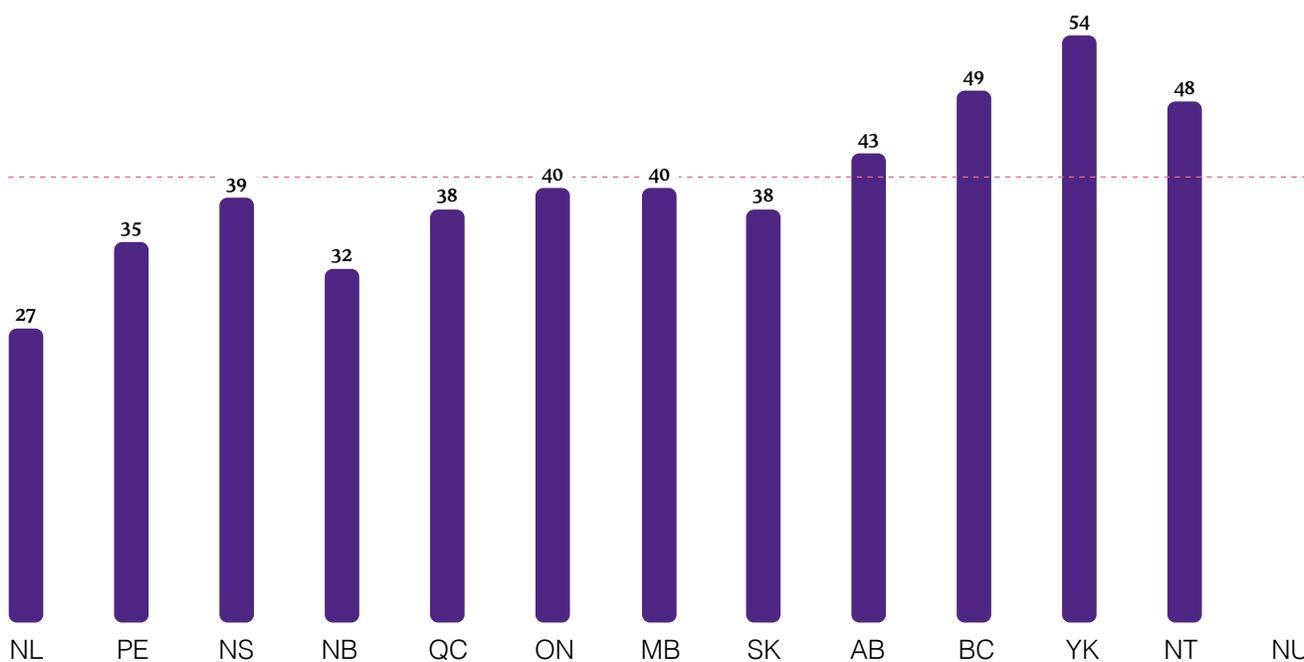
Literature Synthesis

MVPA can be defined as an activity with an energy cost that is at least four times greater than the energy required to sit quietly.⁴⁸ The Canadian 24-Hour Movement Guidelines for Children and Youth recommend that 5- to 17-year-olds accumulate at least 60 minutes of daily physical activity at this intensity level.^{2,3} According to the latest cycle of nationally representative data from the CHMS (2016-17 CHMS, Statistics Canada), approximately 39% of 5- to 17-year-olds in Canada are achieving this benchmark,^{Custom analysis} and across all data cycles of the CHMS (2007-17), there has been no meaningful change in this prevalence of guideline adherence.⁴⁹ The longest-running pedometer study in Canada (2005-16 CANPLAY, CFLRI) confirms the presence of a relatively stable trend in physical activity over time, reporting that the average number of steps taken daily by 5- to 19-year-olds has remained at around 11,500 over the past 10 years.⁴⁷

Figure 3 summarizes the percentage of Canadian children and youth, by province and territory, who meet the step count target of at least 12,000 steps daily on average, a benchmark that approximates the recommended 60 minutes of MVPA. Generally, the proportion of children and youth in Newfoundland and Labrador (27%) and New Brunswick (32%) who meet this target is considerably lower than the national average (41%). By contrast, 5- to 19-year-olds in western and northern Canada – British Columbia (49%) and the Yukon (54%) in particular – tend to exceed the national average.⁴⁶

Figure 3. Proportion (%) of 5- to 19-year-olds in Canada taking at least 12,000 steps daily on average, by province/territory (2014-16 CANPLAY, CFLRI).⁴⁶

Notes: The red, dashed line represents the national average (41%); data were unavailable for Nunavut.



Global Trends in Youth Physical Inactivity

A recently published, large-scale study by the World Health Organization (WHO) includes survey data on 1.6 million youth and is the first to report on physical inactivity levels across 146 countries, summarizing global, regional and national trends in physical inactivity from 2001 to 2016.⁵⁰ According to the study, the large majority (81%) of 11- to 17-year-olds are insufficiently active (accumulating less than 60 minutes of daily MVPA on average).⁵⁰ Although the prevalence of physical inactivity has decreased slightly for boys between 2001 and 2016 (80% in 2001 vs. 78% in 2016), there is no statistically detectable change for girls between 2001 and 2016 (85% in both years).⁵⁰

Although these estimates are arguably the best available at the global level, there is some dissonance when other surveillance approaches are considered.⁵¹ For example, according to the third release of the Global Matrix in late 2018, which used a Report Card grading approach to assess physical activity across 49 countries (see *The Global Matrix 3.0* below), children and youth in low-income countries are more physically active than their counterparts in high-income countries.^{52,53,54,55} The WHO study, however, suggests that countries like Canada, Finland and the United States are in the top 10 for countries with the lowest proportions of physical inactivity and, by extension, in the top 10 for countries with the highest proportions of children and youth meeting the physical activity guidelines. Notwithstanding these data issues, the main finding that most youth – in Canada and around the world – are physically inactive suggests that their current and future health may be at risk given the link between physical activity and health (see *Why is Physical Activity Important?* on page 12).

The Global Matrix 3.0

The Global Matrix 3.0 of Report Card grades on physical activity for children and youth was released on November 27, 2018, in Adelaide, Australia.^{52,53,54,55,56} The report by the Active Healthy Kids Global Alliance (AHKGA) compared data from 49 countries on six continents to assess global trends in childhood physical activity in developed and developing nations. The analysis revealed that modern lifestyles – increases in screen time, the growing urbanization of communities and the rise in automation of tasks that previously were manual – are contributing to a pervasive public health problem that must be recognized as a global priority.⁵⁶

Canada was in the 65th percentile rank (18/49) overall, based on an average of all 10 indicator grades (**Behavioural:** Overall Physical Activity, Organized Sport and Physical Activity, Active Play, Active Transportation, Sedentary Behaviours; **Settings and Sources of Influence:** Family and Peers, School, Community and Environment, and Government; **Other:** Physical Fitness).⁵⁷ Canada's average for the Behavioural indicators ranked below the 50th percentile (29/49), but the average for the Settings and Sources of Influence indicators was near the 75th percentile (14/49).⁵⁷ Relative to other countries in the Global Matrix 3.0, Canada is among the leaders for Organized Sport and Physical Activity, and Community and Environment; however, Canada is lagging behind on many other indicators, especially the Behavioural indicators.⁵⁷ More details on Canada and the other participating countries in the Global Matrix 3.0 are available through several open-access papers.^{52,53,54,55}

The Global Matrix 4.0 will be released in 2022, and AHKGA expects up to 75 countries to participate. For more information about AHKGA and the Global Matrix, visit www.activehealthykids.org.

Contributing Factors and Disparities

Younger children are generally more active than older children, with 52% of 5- to 10-year-olds taking at least 12,000 steps daily (a threshold that approximates 60 minutes of MVPA) compared to 26% of 15- to 19-year-olds (2014-16 CANPLAY, CFLRI).⁴⁶ Furthermore, data show that more boys (49%) than girls (32%) take at least 12,000 steps daily (2014-16 CANPLAY, CFLRI).⁴⁶ More recent data confirm these disparities: boys engage in more physical activity than girls, and younger children (5-11 years) engage in more physical activity than older children (12-17 years) (see Figure 2 and Table 1) (2016-17 CHMS, Statistics Canada).^{Custom analysis} Socio-economic status disparities also continue to exist: children and youth of parents with a university education are more likely to take at least 12,000 steps daily compared to their counterparts with parents who have completed high school or a college education. Additionally, a greater proportion of children and youth in higher-income households (\geq \$60,000 per year) meet this threshold compared to children and youth in lower-income households (\$20,000-\$29,999 per year) (2014-16 CANPLAY, CFLRI).⁴⁶ International data confirm an association between socio-economic status and physical activity.^{58,59} Other research shows that children who do not meet the physical activity guidelines (\geq 60 minutes of daily MVPA) also have a high body mass index, have an electronic device in the bedroom (e.g., television) and engage in high levels of sedentary time.^{60,61}



#Screen free time

Chronic Medical Conditions and Disabilities

Children living with chronic medical conditions and disabilities spend less time engaging in physical activity and more time in screen-based, sedentary pursuits.^{62,63,64,65} This may be in part due to parents' uncertainty about what types of physical activity are appropriate for their children with medical conditions.^{66,67} However, physical activity is safe for most,^{68,69,70} and its benefits continue to be recognized across various clinical groups. For example, recent research with children living with chronic medical conditions and disabilities shows that:

- ▶ Participating in organized sports at least two times per week is associated with higher levels of daily physical activity, health-related fitness outcomes (i.e., strength, agility, aerobic fitness) and social acceptance.^{71,72}
- ▶ Low-physically active children with congenital heart disease have greater arterial stiffness compared to high-physically active children with congenital heart disease.⁷¹
- ▶ There is a bidirectional relationship between social functioning and physical activity among children with autism, whereby social functioning influences physical activity and physical activity influences social functioning.⁷³
- ▶ Higher physical activity levels ($\geq 12,000$ steps per day) are linked with lower vocal tic severity and improved quality of life for children with Tourette syndrome.²⁹



Given the known risks of adopting a physically inactive lifestyle, there is a push within the literature to understand how to effectively promote physical activity among these vulnerable groups. Based on existing evidence, two Canadian research groups have compiled and published physical activity recommendations applicable to a variety of medical conditions among youth (e.g., heart disease, some cancers). One group offers practical recommendations for clinicians to support their patients' participation in sport and leisure,⁶⁹ while the other teaches practitioners how to prescribe and deliver exercise as medicine.⁷⁰ These recommendations will help inform future research and applied work regarding best practices for physical activity counselling and exercise interventions.

Active Play



This year's grade is an F, which represents a decline from the D assigned in 2018. Available data reveal that only 21% of 5- to 11-year-olds engage in active play and non-organized/unstructured leisure activities for more than 1.5 hours per day on average (2016-17 CHMS, Statistics Canada).^{Custom analysis} Additional data suggest that students in grades 6 to 10 play outdoors for 15 minutes per day, on average (2018 HBSC, PHAC).^{Custom analysis} These data prevent the assignment of a higher grade this year.

Year	2010	2011	2012	2013	2014	2015	2016	2018	2020
Grade	F	F	F	Inc	Inc	Inc	D+	D	F
Benchmark	Percentage of children and youth who engage in active play and non-organized/unstructured leisure activities for several hours (> 2) a day.*								

* It should be noted that the target of several hours of active play per day is arbitrary, though based on expert opinion. Further research is required to establish a benchmark that is linked to health outcomes.

Key Findings

- ▶ 21% of 5- to 11-year-olds in Canada spend >1.5 hours a day in unorganized physical activity, according to their parents (2016-17 CHMS, Statistics Canada).^{Custom analysis}
- ▶ Children and youth in grades 6 to 10 in Canada report playing outdoors for 15 minutes per day, on average (2018 HBSC, PHAC).^{Custom analysis}
- ▶ Children and youth in Canada spend approximately 2 hours per day outdoors (2014-15 CHMS, Statistics Canada).^{Custom analysis}
 - ★ 5- to 6-year-olds who are cared for in a non-school setting (some form of childcare outside of the home and outside of a school setting) spend 2.1 hours per day outdoors, according to their parents; those cared for at home spend 1.8 hours per day outdoors.
 - ★ 6- to 11-year-olds spend 2.2 hours per day outdoors, according to their parents.
 - ★ 12- to 14-year-olds report spending approximately 1.7 hours per day outdoors.
- ▶ Based on objective measurement (accelerometers, global positioning system [GPS] and global information systems [GIS]), 10- to 13-year-olds in Kingston, Ontario, spend approximately 33 minutes per day in active outdoor play.⁷⁴
- ▶ 62% of 5- to 19-year-olds in Canada participate in outdoor play during the afterschool period, according to their parents (2014-16 CANPLAY, CFLRI).^{Custom analysis}
 - ★ These children and youth take approximately 2,500 more steps daily than those who do not participate in these activities.
- ▶ Based on parent-reported data, 5- to 11-year-olds in Canada spend:
 - ★ 3.8 hours per week, on average, in physical activity during free time at school (2016-17 CHMS, Statistics Canada).^{Custom analysis}
 - ★ 3.9 hours per week, on average, in unorganized physical activity outside of school (2016-17 CHMS, Statistics Canada).^{Custom analysis}
- ▶ 75% of 5- to 19-year-olds in Canada participate in unorganized physical activities or sports during the afterschool period, according to their parents (2014-16 CANPLAY, CFLRI).^{Custom analysis}
 - ★ These children and youth take approximately 1,900 more steps daily than those who do not participate in these activities.





Research Gaps

- ▶ The benchmark of several hours of active play per day is arbitrary, though based on expert opinion; therefore, further research is required to establish a benchmark that is linked to health outcomes.
- ▶ A standardized, cost-effective, population-based measurement approach for active play is needed to improve comparisons across studies.
- ▶ It is important to understand how play varies with age, and to ensure that assessment tools appropriately reflect changes in perception of play with age.
- ▶ More research is needed on the contribution to play within various venues (e.g., outdoors, indoors, at home, at school, within community locations).
- ▶ Research is needed on how levels of active play vary by features of the built environment (e.g., greenness, safety, proximity to parks).

Recommendations

- ▶ Promote and support outdoor – and, when possible, nature-based – play opportunities given their association with both increased physical activity levels and improved mental health outcomes.
- ▶ Nurture frequent active play opportunities: given that children learn through play, this will not only support children’s development but will also keep them healthy.

Literature Synthesis

Play is a concept that traditionally has been difficult to define. Today, there is general consensus that active play typically occurs outdoors and refers to “a form of gross motor or total body movement in which young children exert energy in a freely chosen, fun, and unstructured manner.”⁷⁵ There are various types of play, including free-style play (fantasy role-play), build-it play (e.g., building a sandcastle), mirror-me play (children mimicking adult behaviour) and muddy boots play (e.g., hide-and-seek).⁷⁶ While outdoor active play is not the only form of active play, it is a powerful source of daily light- and moderate-intensity physical activity among school-aged children, with recent research showing that every hour spent outdoors is associated with higher physical activity and less sedentary time in both boys and girls.⁷⁷ Additional benefits of outdoor play include lower overall body fat,⁷⁸ decreased risk of severe childhood obesity,⁷⁹ greater health of white matter (i.e., the “information super-highway” that facilitates communication within the brain)⁸⁰ and better social skills (e.g., co-operation, calmness, being openly expressive).⁸¹ In a multinational survey of 12 countries, greater time spent outdoors was associated with healthier dietary patterns (e.g., regular consumption of vegetables, fruit, whole grains) in both boys and girls.⁸² While most research on outdoor play has been conducted with children, youth also engage in several different types of unstructured physical activities (e.g., going to the gym, playing street hockey).



The Powerful Role of Parents

Parents act as gatekeepers to their child's outdoor play. Therefore, it is no surprise that parents' attitudes toward the importance of outdoor active play and perceptions of their environment can influence their child's time spent in outdoor active play. In a recent study with children and parents in the Vancouver area, parents' attitudes about their neighbourhood's walkability (availability of parks, sidewalks, crosswalks) and crime safety (perceived risk of "stranger danger") influenced how far they allowed their children to roam the neighbourhood unsupervised.⁸³ The importance of parents in facilitating children's outdoor play is further evident in a systematic review including 21 peer-reviewed publications, whereby five parental correlates were associated with children's amount of outdoor play: mother's ethnicity, mother's employment status, parents' education level, the importance parents assign to outdoor play and the perceived social cohesion in the neighbourhood.⁸⁴ In other words, parents play an important role in supporting and promoting children's outdoor play.

Measurement of Active Play

For many years there was no gold standard method of measurement for quantifying active outdoor play. To address this gap, researchers from Queen's University developed a measurement approach to assess the time children spend participating in outdoor active play in addition to other forms of physical activity (organized sports, active travel and curriculum-based physical activity).⁸⁵ For their measurement approach, the researchers combined data from accelerometers, GPS and activity logs (i.e., a record of bed and wake times, times when neither the accelerometer nor GPS watch was worn, and start and end time of organized sports and outdoor chores) to create an algorithm that estimated active outdoor play. By combining all three sources, researchers were able to capture data on outdoor active play based on what the children themselves identified as play. This prevented the researchers from biasing the data with their own views on what kind of physical activity constitutes active play. This novel measurement approach will provide researchers with a new opportunity to better identify and quantify children's time spent in active play as well as other types of physical activity.

Evaluation of the “Make Room for Play” Campaign

From January to March 2015, ParticipACTION ran the campaign “Make Room for Play,” which aired on television and online (<https://www.youtube.com/watch?v=Lk-AdtfkpTc>). The goal of this campaign was to increase parental awareness of the importance of active play.⁸⁶ In the video campaign, children are seen engaging in active play while a black screen progressively reduces the amount of room available for them to play. The words “Screen time is taking away play time” then appear in the black area of the screen, followed by “Make room for play.” The ad ends with the words “ParticipACTION – Don’t visit our website.” Four different 30-second ads, each featuring a different form of active play (playground play, ball hockey, basketball, jump rope), were created in English and French. When the general population and caregivers in Canada (English and French speakers) were sampled to assess the impact of the campaign, 26% recalled the ad unaided, and 46% recalled the ad when aided (i.e., shown a picture of the ad).⁸⁶ Among caregivers, those who recalled the ad (unaided or aided) were more likely to try to reduce screen time among their children, create opportunities for their children to engage in play, put effort into engaging in active play with their children, and start engaging in more physical activity themselves.⁸⁶



Contributing Factors and Disparities

Survey data on approximately 450 children (9-11 years) from the United Kingdom showed that boys, children from lower socio-economic status families and children who spent less than two hours on their computer on a school day had higher odds of spending more than one hour outside after school compared to girls, children from high socio-economic status families and children who spent more than two hours on their computer.⁸⁷ In terms of Canadian data, there are several age- and gender-related disparities in active play:

- ▶ On average, boys in grades 6 to 8 and 9 to 10 report playing outdoors for 19 minutes per day and 15 minutes per day, respectively (2018 HBSC, PHAC).^{Custom analysis}
- ▶ On average, girls in grades 6 to 8 and 9 to 10 report playing outdoors for 15 minutes per day and 10 minutes per day, respectively (2018 HBSC, PHAC).^{Custom analysis}
- ▶ On average, boys in grades 6 to 8 and 9 to 10 report engaging in leisure-time exercise for 14 minutes per day and 15 minutes per day, respectively (2018 HBSC, PHAC).^{Custom analysis}
- ▶ On average, girls in grades 6 to 8 and 9 to 10 report engaging in leisure-time exercise for 11 minutes per day and 12 minutes per day, respectively (2018 HBSC, PHAC).^{Custom analysis}





Active Transportation

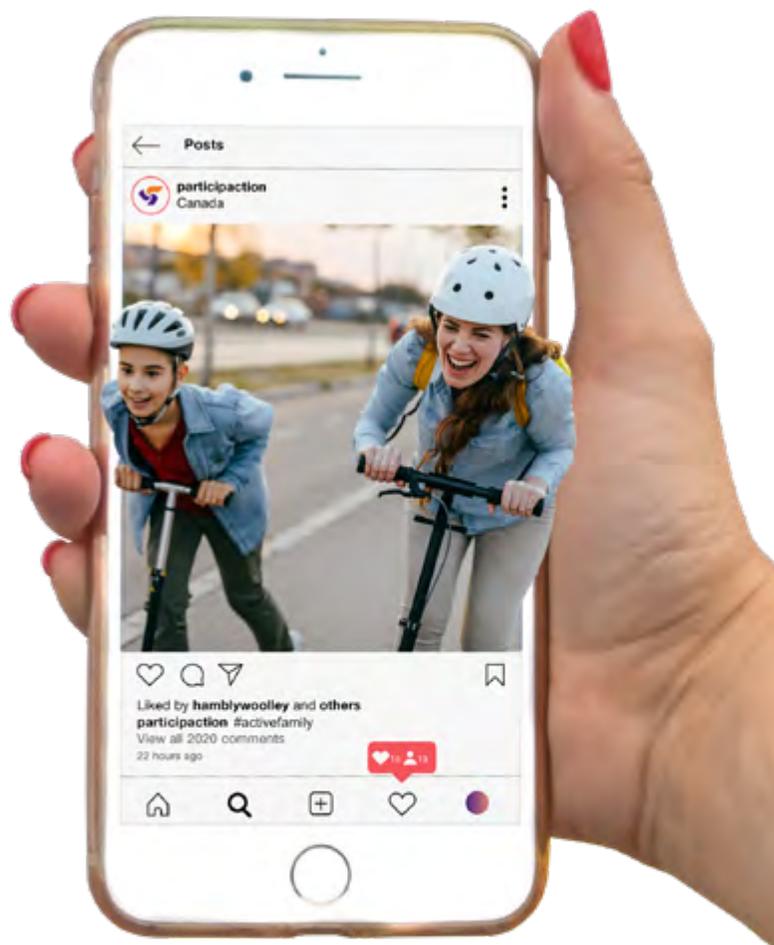


This year's grade remains a D- because data show that only 21% of 5- to 19-year-olds typically use active modes of transportation.

Year	2010	2011	2012	2013	2014	2015	2016	2018	2020
Grade	D	D	D+	D	D	D	D	D-	D-
Benchmark	Percentage of children and youth who typically use active transportation to get to and from places (e.g., school, park, mall, friend's house).								

Key Findings

- ▶ Based on parent- and self-report data in 5- to 19-year-olds in Canada, 21% typically use active modes of transportation (e.g., walk, bike), 63% use inactive modes (e.g., car, bus) and 16% use a combination of active and inactive modes of transportation to travel to and from school (2014-16 CANPLAY, CFLRI).^{Custom analysis}
 - ✦ 21% of 5- to 10-year-olds typically use active modes of transportation.
 - ✦ 24% of 11- to 14-year-olds typically use active modes of transportation.
 - ✦ 17% of 15- to 19-year-olds typically use active modes of transportation.
- ▶ 26% of 10- to 17-year-olds in Canada report using active modes of transportation on the main part of their trip to school, and report spending 14 minutes per day on average in active travel to all destinations (2018 HBSC, PHAC).
- ▶ 12- to 17-year-olds in Canada report spending an average of 18 minutes per day in active transportation (2016-17 CHMS, Statistics Canada).^{Custom analysis}
- ▶ While physical activity among adults tends to be higher in more walkable neighbourhoods, the same is not true for children. A study that attached the new Canadian Active Living Environment Database (Can-ALE) to the CHMS found that walkability was positively associated with accelerometer-measured physical activity in youth and adults, but not in children aged 3 to 11 years. This study also found that walkability was associated with transportation-based physical activity, but not recreational physical activity, in youth and adults.⁸⁸
- ▶ Students in grades 4 to 6 from three Canadian cities (Ottawa, Trois-Rivières, Vancouver) report taking 11.4 active trips to and from various locations (e.g., school, friend's house, parks/playground) per week, on average (2016-17 Active Transportation, Independent Mobility and Physical Activity Among School Children study).⁸⁹





Research Gaps

- ▶ National-level surveillance is needed on how frequently children and youth engage in active travel to and from destinations other than school.
 - ▶ Researchers should consider using objective measures of active transportation (e.g., GPS loggers) in their studies.
 - ▶ Active school travel intervention research is needed in Canada that includes appropriate time for follow-up, standardized outcome measures, and potential moderators and mediators of travel behaviour change.⁹⁰
 - ▶ Research is needed that focuses on older children and the feasibility of interventions to promote active school travel among teenagers, as much of the currently available research in active transportation has focused on young children and the elementary school setting.
 - ▶ A child's independent mobility range (i.e., their freedom to move around in public space without adult supervision) is positively associated with their active transportation and overall physical activity levels.^{91,92} More research is needed on how to facilitate children's independent mobility.
 - ▶ An assessment of how mixed modes of transportation (e.g., walking to a train station) contribute to the accumulation of daily physical activity would be helpful for policy and transport planning.
- ## Recommendations
- ▶ Parents should consider letting their children walk or bicycle to destinations that are within a few kilometres of home rather than driving them to those destinations.
 - ▶ Create a culture of active transportation, similar to many European and African nations⁹³ where active transportation is the norm; this may involve alleviating parental safety concerns (e.g., "stranger danger") by informing them of the low risks involved.⁹⁴
 - ▶ Safety concerns of parents remain a predominant barrier to active transportation. Engineering to increase traffic control devices (e.g., traffic lights, signs, crosswalks), enforcing lower speeds around schools, and increasing supervision (e.g., traffic guards) continue to be strongly recommended. Educational initiatives may also be helpful in promoting the broad benefits of active travel and in reframing parental perceptions of risk.
 - ▶ To reduce vehicle congestion, motor vehicle collisions and exposure to air pollution, schools should develop an active school travel plan that encourages children to use active modes of transportation.
 - ▶ Consider the use of "walking school buses" (i.e., group of children walking to school with one or more adults) to support families in adopting active transport while sharing the responsibility among parents/guardians to lessen any negative impact/inconvenience.



Literature Synthesis

Active transportation involves walking and/or wheeling to/from destinations. It can be an important source of MVPA for children and youth;⁹⁵ however, recent research suggests that in the average child it contributes less to overall MVPA when compared to outdoor active play, curriculum-based physical activity, and organized sport.⁹⁶ Statistics show that over 65% of trips made by children (e.g., to/from home, friends’ homes, school, parks and green spaces) involve a vehicle.⁹⁷ This statistic does not appear to be improving; in fact, recent HBSC data show that active transportation has slightly decreased since 2010 (Figure 4).^{Custom analysis} This is concerning given that children and youth who walk or cycle to and from school are more physically active compared to children who use passive school transport (e.g., motorized vehicles).^{98,99,100} More specifically, girls and boys who walk or cycle to and from school accumulate an additional 4.7 and 2.4 minutes of daily MVPA, respectively.¹⁰¹

Figure 4. Proportion (%) of students in grades 6 to 10 who use active transportation to school, from 2010 to 2018 (2018 HBSC, PHAC).^{Custom analysis}

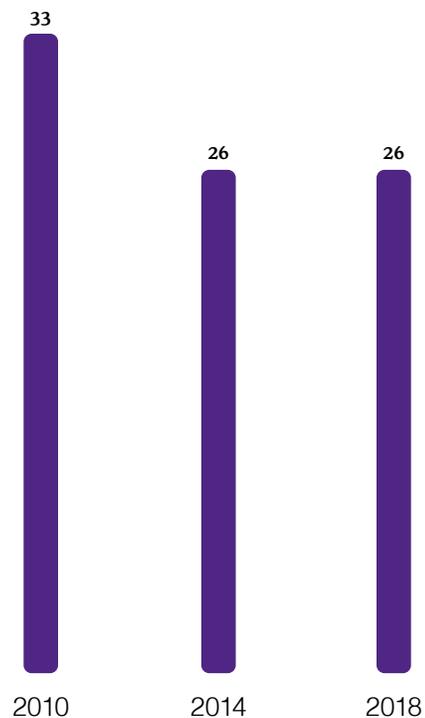
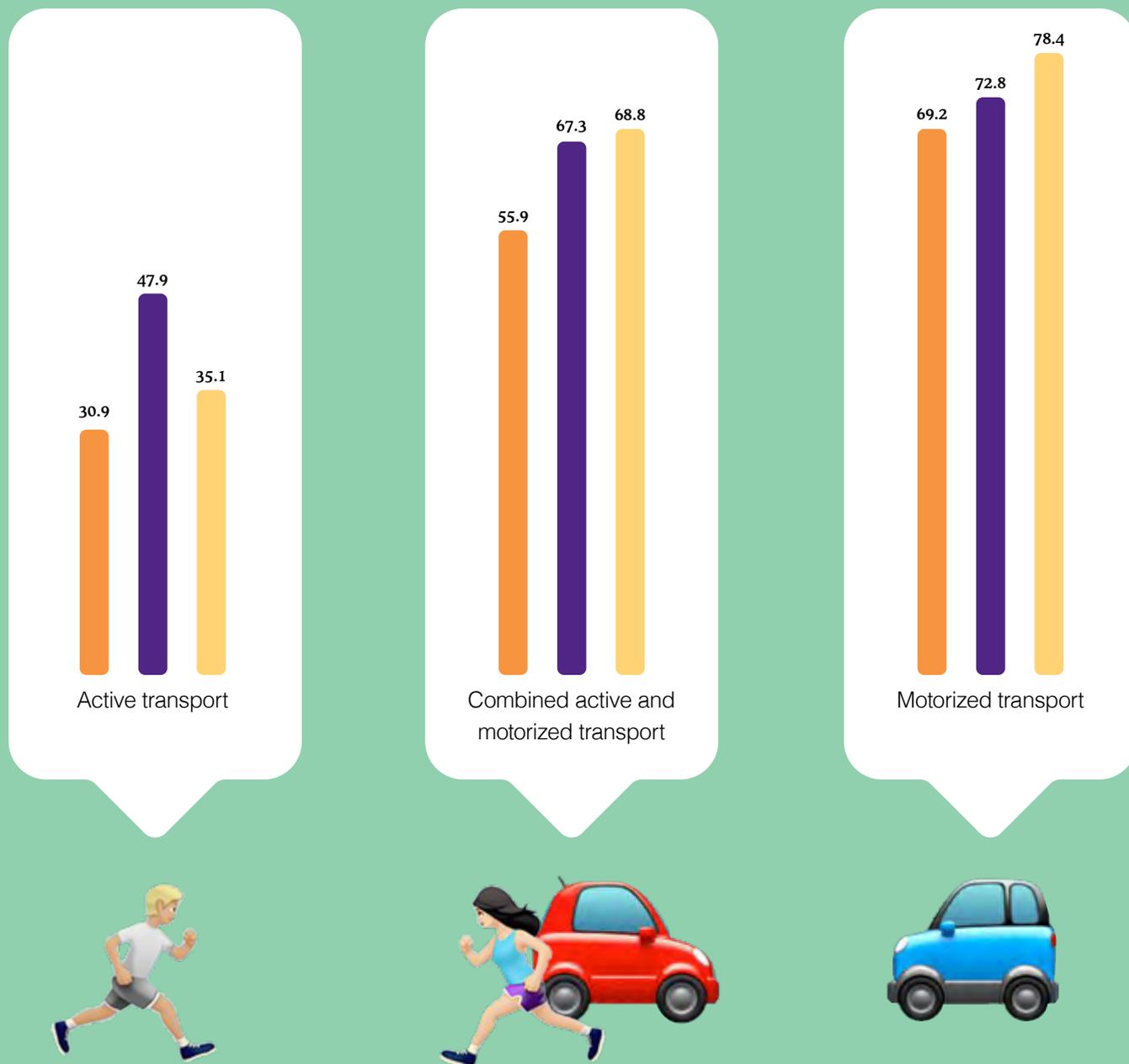


Figure 5. Proportion (%) comparing adolescent and parental responses regarding weight of school bag affecting active travel, by adolescents' mode of transport to school.¹⁰³



- **Child** "I have too much to carry to walk to school"
- **Child** "I have too much to carry to cycle to school"
- **Parent** "My child has too much to carry to walk or cycle to school"

Barriers to Active Transportation

To increase the proportion of children and youth who use active modes of transportation, researchers have identified important barriers. A study of approximately 1,300 children aged 9 to 14 years from southern Ontario sheds light on differences between parent- and child-perceived barriers to active travel.¹⁰² Physical environment (e.g., distance from home) as well as interpersonal (e.g., parent education) and intrapersonal (e.g., child's gender and age) factors were identified. Parents' perceptions of barriers had a greater influence on children's active school travel than children's perceptions. Parent-perceived barriers to children's active travel to school include distance (i.e., too far/takes too much time), whereas child-perceived barriers include a lack of trees. In another study, the weight of adolescents' school bags was perceived by both parents and adolescents as a barrier to active travel, with perceptions differing by mode of transport (Figure 5).¹⁰³ Interestingly, actual school bag weight (ranging from 0.8-13.3 kg) did not differ by mode of transport to school, suggesting that perceptions – not actual weight – were more important in affecting active travel.

Safety of the commute is another major barrier to active school transportation, with pedestrian-motor-vehicle collisions occurring most frequently when there are no traffic control devices (e.g., traffic lights, signs)¹⁰⁴ or when there are fewer speed bumps.¹⁰⁵ Somewhat counterintuitively, cycling on divided roads without barriers (as opposed to with barriers) is associated with lower risk of collision,¹⁰⁶ which may be a consequence of cyclists choosing roads that are in more traffic-calmed areas.

Another safety concern for active transportation is exposure to air pollution. Ultrafine particulate air pollution has been identified as an environmental factor that contributes to adverse health effects in children.¹⁰⁷ Despite this concern, a recent study based out of London, Ontario, showed that students who walked to and from school were exposed to less particulate air pollution compared with those who rode in cars or in a school bus.¹⁰⁸ Though school buses serve as a means to reduce the number of vehicles on the road and therefore can reduce overall air pollution levels, efforts should be made to retire diesel buses and replace them with newer versions that run on compressed natural gas or electricity (hybrid vehicles) to further reduce childhood exposure to air pollution.¹⁰⁸

Contributing Factors and Disparities

Previous Report Cards list several factors that are related to active transportation in children and youth (e.g., age, gender, walking distance to school, parental support).⁵ More recent research continues to confirm these factors: older children, children without siblings, households with no vehicles, and children who live closer to school are more likely to use active travel.¹⁰² New data from a national survey of students in grades 6 to 10 in Canada (2018 HBSC, PHAC)^{Custom analysis} reveal that boys continue to engage in slightly more active travel to all destinations than girls (15.0 vs. 13.3 minutes per day in grades 6 to 8 boys and girls, respectively; 15.2 vs. 13.6 minutes per day in grades 9 to 10 boys and girls, respectively).

Organized Sport



This year's grade is a B and has not changed in three consecutive Report Cards. Data reveal that the majority of Canadian children and youth participate in organized sport.

Year	2010	2011	2012	2013	2014	2015	2016	2018	2020
Grade	C	C	C	C	C+	B-	B	B	B
Benchmark	Percentage of children and youth who participate in organized sport programs.								

Key Findings

- ▶ Approximately three-quarters of children and youth in Canada participate in organized physical activity or sport:
 - ★ 77% of 5- to 19-year-olds participate in organized physical activities or sports, according to their parents (2014-16 CANPLAY, CFLRI).¹⁰⁹
 - ★ 66% of students in grades 6 to 10 currently participate in individual and/or team sports, based on self-report data (2018 HBSC, PHAC).^{Custom analysis}
- ▶ 5- to 11-year-olds accumulate approximately 17 minutes per day of physical activity through participation in organized lessons, or league or team sports, according to their parents (2016-17 CHMS, Statistics Canada).^{Custom analysis}
- ▶ 12- to 17-year-olds report spending approximately 34 minutes per day in organized/unorganized sport and exercise during leisure time (2016-17 CHMS, Statistics Canada).^{Custom analysis}

Research Gaps

- ▶ Understanding the contribution of school-based vs. community-based sport participation is important, as is identifying potential gender and age disparities within these key settings.
- ▶ There is a need for more data on physical activity and participation in sport and/or recreation among Indigenous children and youth. In addition, tracking should be conducted on a regular basis of progress on the sport and recreation recommendations in the Truth and Reconciliation Commission report.
- ▶ More research is needed to examine the effectiveness of programs that subsidize sport participation for children and youth living in low-income families (e.g., KidSport).
- ▶ Further understanding is required of children's and youths' engagement in sport in rural and remote regions of the country.

Recommendations

- ▶ Support sport policymakers and practitioners with tools and information on applying shared principles, strategies and interventions across community sport and recreation, education and public health.
- ▶ Expose children to a variety of different sports (“sport sampling”) as opposed to early sport specialization, given that data show sport sampling is more favourable for lifelong physical activity.
- ▶ Ensure sport offerings are inclusive of children with disabilities.
- ▶ Provide sport offerings that are attractive to children of new immigrant families and those from a variety of ethnic, socio-economic and cultural backgrounds.



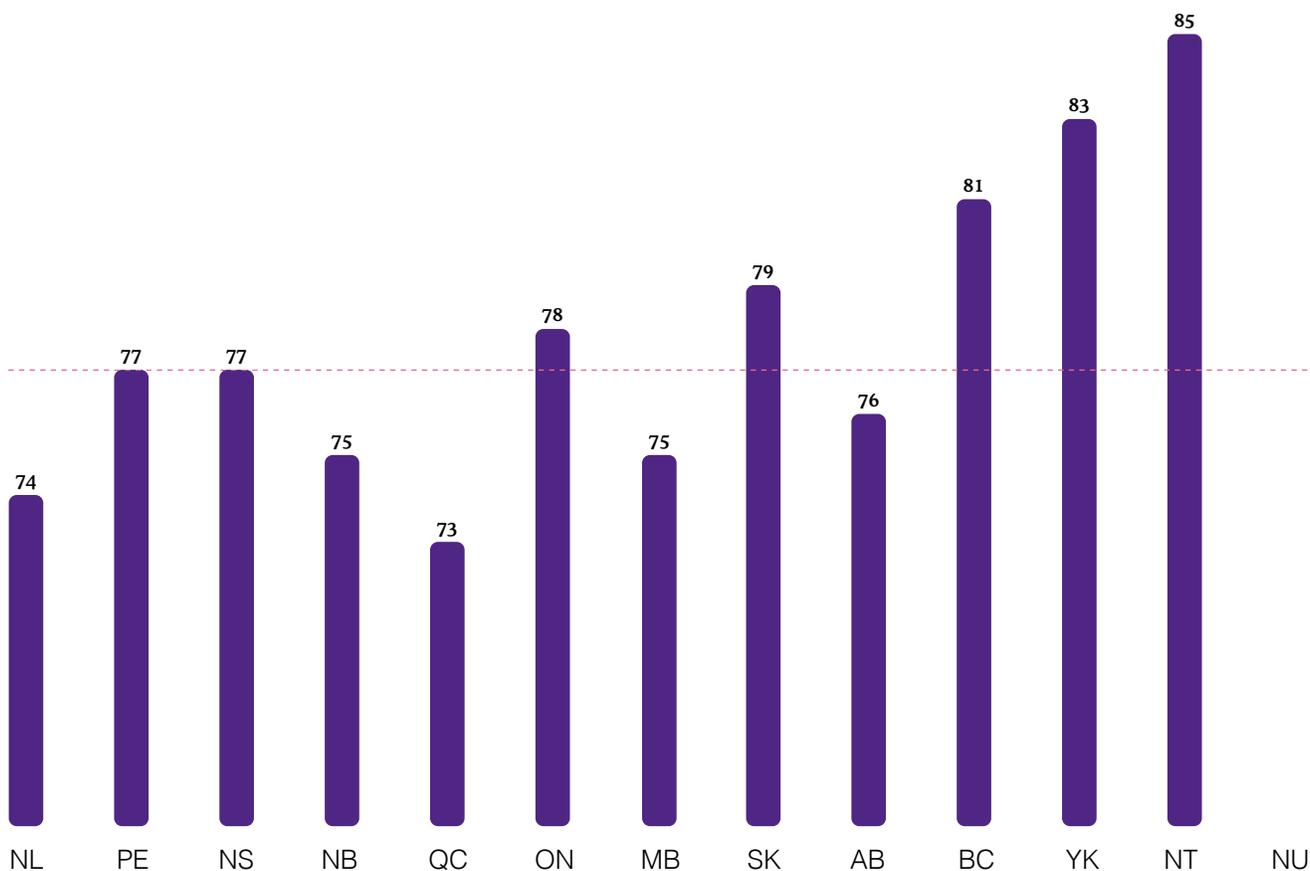
Literature Synthesis

Most children and youth in Canada participate in sports (Figure 6). This is encouraging given that organized sport participation has numerous short- and long-term benefits. For example, organized sport participation is associated with active play,¹¹⁰ lower odds of engaging in unhealthy lifestyle habits (e.g., intake of unhealthy food and beverages, high screen-based activity, substance use),¹¹¹ better pro-social behaviour and fewer internalizing problems (e.g., emotional problems),¹¹² lower body mass index and better physical fitness scores,¹¹³ and better health-related quality of life.¹¹⁴ Evidence from a 28-year longitudinal study showed that females who

participated in organized sport as children had approximately 2 times greater odds of engaging in healthy habits in adulthood than females who did not participate in organized sport as children.¹¹⁵ Other longitudinal research shows that children who did not participate in organized sport (or participated only once or twice) exhibited higher emotional distress, shyness and social withdrawal later in life than their counterparts.¹¹⁶ Despite these benefits, some children and youth do not participate in organized sport because of barriers, such as time, cost, lack of opportunity/accessibility, lack of perceived ability, and others' perceptions (e.g., fear of being judged/embarrassed).¹¹⁷

Figure 6. Proportion (%) of 5- to 19-year-olds in Canada participating in organized physical activity or sport according to their parents, by province/territory and region (2014-2016 CANPLAY, CFLRI).

Notes: The red, dashed line represents the national average (77%); data were unavailable for Nunavut.





Concussions

Sport participation is the leading cause of concussion among students in grades 6-10 (2018 HBSC, PHAC). Data show that 11.0% of students in grades 6 to 10 had suffered a concussion within the previous 12 months, with 8.6% having a single concussion and 2.3% having two or more concussions (2018 HBSC, PHAC).^{Custom analysis} Among concussion sufferers, 69.1% occurred while students were playing a sport, with 32.7% occurring during a sport that involved intentional contact and 26.4% occurring in a sport that did not involve intentional contact.

New research findings have added to an established body of literature documenting the harmful consequences of concussion for children and youth. For instance, youth with a sport-related concussion missed significantly more days of school than their peers who suffered a sport-related fracture.¹¹⁸ In another study, parents of youth with a history of concussion reported that their children had greater physical, cognitive, depressive and anxiety symptoms than did parents of youth who had an orthopedic injury; yet there was no difference in self-reported symptoms or cognitive testing between youth with a history of concussion and youth who had an orthopedic injury.¹¹⁹

Determinants of Sport-Related Concussions

Research has been conducted to explore the determinants of sport-related concussion and its associated symptoms among children and youth. Youth athletes who reported poor sleep quality had significantly greater concussion symptom severity at three-month follow-up and took longer to recover from sport-related concussion than those who reported good sleep quality.¹²⁰ Other evidence shows that while disallowing body checking resulted in a 56% lower rate of all injury among non-elite 13- and 14-year-old male ice hockey players from the provinces of British Columbia and Alberta, there was not a significantly lower rate of concussion.¹²¹ Further, a study showed that the concussion rate among youth male ice hockey players who failed to reach the Canadian recommendations of 60 minutes of MVPA per day was more than double the concussion rate of ice hockey players who met the physical activity recommendations.¹²²

Using Physical Activity to Help Recover from a Concussion

Maintaining a physically active lifestyle can enhance recovery from concussion. An exercise-based active rehabilitation intervention increased quality of life and decreased anger levels of youth who were slow to recover from concussion,¹²³ while a mindfulness-based yoga intervention with youth with persistent concussion symptoms resulted in trends of increased self-efficacy in academic, social and emotional areas.¹²⁴ When it comes to acute sport-related concussion, one study reported that engaging in aerobic exercise at three or seven days following concussion rather than within one day was associated with a reduced probability of faster full return to both sport and school.¹²⁵ At the same time, other research found that youth athletes who accumulated a high (vs. low) amount of time in MVPA over the first three days following a concussion took significantly more time to be cleared to return to play.¹²⁶ The Canadian Guideline on Concussion in Sport¹²⁷ (released in July 2017)

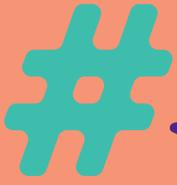
was informed by the Berlin Consensus Statement on Concussion in Sport, which recommended that athletes rest for 24-48 hours following acute concussion.¹²⁸ This recommendation is consistent with other evidenced-based recommendations, including the American Medical Society for Sports Medicine position statement on concussion in sport, which concluded that, after a brief period of rest, acutely concussed athletes could gradually increase physical and cognitive activity as long as concussion symptoms did not re-emerge or worsen.¹²⁹

Contributing Factors and Disparities

Though no gender-related disparities exist in overall sport participation rates, there are age- and socio-economic-related disparities: 5- to 14-year-olds are more likely to participate in sports than 15- to 19-year-olds, and children and youth living in the highest-income households (\geq \$100,000 per year) are most likely to play sports.¹⁰⁹ Regional disparities also exist: sport participation is higher among children and youth living in the Northwest Territories (85%) compared to the national average (77%).¹⁰⁹ New 2016-17 CHMS data show that:

- ▶ Girls with no siblings or one sibling participated in more organized sports, lessons and leagues compared to girls with two or more siblings.^{Custom analysis}
- ▶ Girls in two-parent households participated in more organized sports, lessons and leagues compared to girls in one-parent households.^{Custom analysis}





Physical Education



The benchmarks for this indicator relate to the proportion of children and youth who receive at least 150 minutes of physical education (PE) per week during class time at school, the proportion of high school students taking PE, and the proportion of children and youth who receive daily physical activity (DPA). This year's grade for the Physical Education indicator is a D+, which is a slight decline from the C- assigned in 2018. Recent 2016-17 CHMS data reveal that 36-37% of children and youth are receiving 150 minutes of physical activity per week at school, while there are no new data for the other benchmarks.

Year	2010	2011	2012	2013	2014	2015	2016	2018	2020
Grade	-	-	-	-	-	-	-	C-	D+
Benchmark	<ul style="list-style-type: none"> ▶ Percentage of students in grades K-8 receiving at least 150 minutes of PE per week. ▶ Percentage of high school students taking PE. ▶ Percentage of students in grades K-8 receiving DPA in provinces that have DPA policies. 								

Key Findings

- ▶ 37% of 5- to 11-year-olds in Canada receive at least 150 minutes of physical activity per week during class time at school, according to their parents (2016-17 CHMS, Statistics Canada).^{Custom analysis}
 - ★ No observed differences exist between the proportion of boys (35%) and girls (38%) aged 5-11 years who receive at least 150 minutes of physical activity per week during class time at school (2016-17 CHMS, Statistics Canada).^{Custom analysis}
- ▶ 36% of 12- to 17-year-olds in Canada report getting at least 150 minutes of physical activity per week during class time and free time at school (2016-17 CHMS, Statistics Canada).^{Custom analysis}
 - ★ No observed differences exist between the proportion of boys (36%) and girls (37%) aged 12-17 years who receive at least 150 minutes of physical activity per week during class time and free time at school (2016-17 CHMS, Statistics Canada).^{Custom analysis}
- ▶ 41% of students in grades 6 to 10 in Canada accumulate at least 150 minutes of physical activity per week during class time at school (2018 HBSC, PHAC).^{Custom analysis}
- ▶ 61% of students in grades 9 to 12 in British Columbia, Alberta, Nunavut, Ontario and Quebec are taking a PE class in the current school year (2016-17 COMPASS, University of Waterloo).^{Custom analysis}
- ▶ On an average school day, students in grades 6 to 10 in Canada accumulate 26 minutes of physical activity during class time (2018 HBSC, PHAC).^{Custom analysis}



- ▶ According to parent-reported data, 5- to 11-year-olds spend 45 minutes per day participating in physical activity at school during free time, and 25 minutes per day participating in physical activity at school during class time (2016-17 CHMS).^{Custom analysis}
- ▶ 12- to 17-year-olds spend 25 minutes per day participating in physical activity at school, based on self-report (2016-17 CHMS, Statistics Canada).^{Custom analysis}

Research Gaps

- ▶ Research is needed to examine the disconnect between PE/DPA policies and low adherence rates.
- ▶ Research is necessary to examine objectively measured physical activity levels in PE class, as it is challenging for parents to know, and therefore accurately report, how much activity their children are accumulating in the school setting.
- ▶ Accurate understanding of the uptake and implementation of DPA in schools is warranted.
- ▶ More recent numbers are needed on the proportion of Canadian students receiving instruction from PE specialists (i.e., those specifically trained in PE).

Recommendations

- ▶ Schools should treat PE and DPA with the same respect as they do core subjects such as math, science and social studies.
- ▶ Focus on enjoyment and inclusiveness rather than on competition and specialization while ensuring high-quality PE by trained and competent teachers.
- ▶ Prioritize efforts to increase PE frequency and enhance the PE curriculum to support children's and youths' movement behaviours and learning.
- ▶ Invest in training generalist teachers in PE-specific skills to facilitate their self-efficacy for instruction as well as the quality of the curriculum.

Literature Synthesis

Canadian children and youth have plenty of opportunities to be physically active during class time at school such as with PE class, DPA (i.e., physical activity during classroom instructional time) and special movement-oriented school events (e.g., outdoor field trip, dance assembly). PE is recognized as a key component that substantially contributes to children's and youth's accumulation of MVPA,^{96,130,131} reduces sedentary time during the school day,^{130,131} and equips children and youth with fundamental motor skills needed to live an active lifestyle.¹³¹

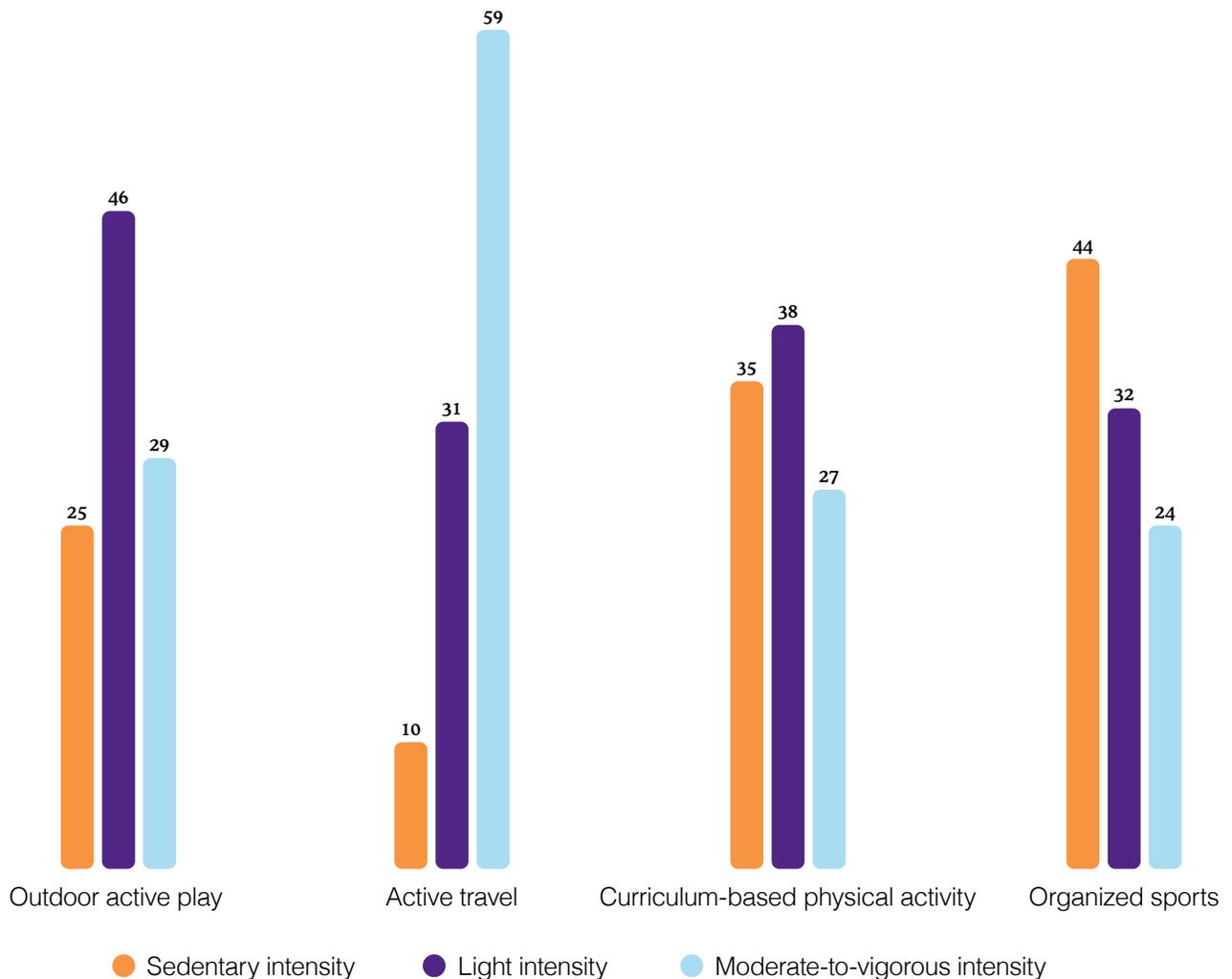


How Much Physical Activity Do Children Accumulate in Curriculum-Based Activities?

Several studies have investigated the amount of physical activity that students accumulate during school curriculum as well as students' frequency/duration of PE lessons. For example, Canadian researchers found that 10- to 13-year-olds from Ontario accumulated about 130 minutes per week of curriculum-based physical activity during the school year.⁹⁶ Results also showed that children spent less time participating in curriculum-based physical activity (26 min/day) than they did

participating in outdoor active play (36 min/day) and organized sports (40 min/day), and that only 27% of curriculum-based physical activity time was devoted to moderate- to vigorous-intensity movement (Figure 7). In another study, children were more likely to meet the physical activity recommendation of at least 60 minutes of MVPA per day when they participated in PE for at least two days per week or engaged in more than 90 minutes per week in PE.¹³⁰

Figure 7. Proportion (%) of total time spent by 10- to 13-year-olds in outdoor active play, active travel, curriculum-based physical activity, and organized sports, by different movement intensities.⁹⁶



The 'What' and 'Where' of PE Lessons

There is emerging evidence on the types of activities during PE lessons (e.g., team ball games, gymnastics, track and field) that are most effective in increasing physical activity, especially MVPA.^{131, 132} A study conducted with Japanese primary school students found that total time spent in MVPA was significantly longer when children were participating in ball games compared to gymnastics and track and field.¹³¹ Findings from a systematic review lend further support for the relationship between team ball games and MVPA; students were consistently more active during team ball games compared to other types of activities, such as dance and gymnastics.¹³² The context of where PE occurs has also been shown to influence MVPA. Secondary school students spent significantly more time in MVPA during outdoor PE lessons compared to indoor PE lessons.¹³²

Psychological Benefits of Physical Activity during PE Classes

MVPA during PE class has been associated with numerous psychological benefits, such as higher beliefs regarding abilities to achieve goals/success, interest in tasks and increased enjoyment.¹³³ Students' positive experiences in PE class are often triggered by attractiveness of the task, social belonging, perceived competence, and autonomy concerning emotional experience.¹³³ Thus, an environment in which students feel independent, competent and connected with their peers is crucial in facilitating positive experiences.



Contributing Factors and Disparities

Despite a lack of gender difference observed in national-level parent- and self-reported physical activity at school (2016-17 CHMS),^{Custom analysis} other research has identified the presence of some gender-, ethnicity- and age-related disparities:

- ▶ Boys engage in more MVPA during PE lessons than girls.^{130,131,132,134}
- ▶ Boys spend more time being active during PE lessons (28 minutes per day) than girls (24 minutes per day).⁹⁶
- ▶ Caucasian students spend more time being active during PE lessons than African Canadian students.¹³²
- ▶ Primary school children in lower grades spend more time engaged in MVPA during PE class than children in higher grades.¹³¹
- ▶ Younger students (6-10 years) participate more frequently and for longer durations in PE per week compared to older students (11-17 years).¹³⁰

Inconsistencies between studies are likely attributable to a range of differences between studies, including (but not limited to) differences in measurement technique (e.g., accelerometer vs. self- or parent-reported), populations of study (e.g., national sample vs. smaller regional samples) and mode of data collection (e.g., in-person vs. computer vs. telephone interviewing).



Sedentary Behaviours



The grade this year is a D+. This improvement from a D in 2018 does not represent an increase in the proportion of children and youth meeting screen time guidelines. Rather, the grade change reflects the fact that this indicator grade (as well as others) in the 2018 Report Card was informed by data on preschoolers (3- to 4-year-olds) in addition to data on children and youth (5- to 17-year-olds). In 2018, the proportion of preschoolers who met their age-specific screen time recommendation was less than the proportion of children and youth (13% for preschoolers vs. 33% for 5- to 9-year-olds and 53% of 10- to 17-year-olds), bringing the overall weighted proportion of 3- to 17-year-olds meeting their age-specific benchmarks to 29%. Data from various sources (2016-17 CHMS, 2018 HBSC, 2014-17 Canadian Assessment of Physical Literacy [CAPL] and 2016-17 Cohort Study for Obesity, Marijuana Use, Physical Activity, Alcohol Use, Smoking and Sedentary Behaviour [COMPASS]) suggest that the proportion of 5- to 17-year-olds meeting their age-specific benchmark is 38%.

Year	2010	2011	2012	2013	2014	2015	2016	2018	2020
Grade	F	F/Inc*	F/Inc*	F	F	D-	F	D	D+
Benchmark	Percentage of children and youth who meet the screen time recommendation within the Canadian 24-Hour Movement Guidelines for Children and Youth (no more than two hours of recreational screen time per day on average). ^{2,3}								

* In 2011 and 2012, there were two separate indicators: Screen-Based Sedentary Behaviours and Non-Screen Sedentary Behaviours. Following 2012, these indicators were collapsed into a single indicator.

Key Findings

- ▶ There is considerable variability by dataset and age group in the proportion of children and youth in Canada who meet the screen time recommendation made in the Canadian 24-Hour Movement Guidelines for Children and Youth:
 - ★ 76% of 5- to 11-year-olds (2016-17 CHMS, Statistics Canada),^{Custom analysis} with more girls than boys in this age group meeting the recommendation (80% vs. 71%) (2016-17 CHMS, Statistics Canada)^{Custom analysis}
 - ★ 28% of 12- to 17-year-olds (2016-17 CHMS, Statistics Canada),^{Custom analysis} with more girls than boys in this age group meeting the recommendation (30% vs. 25%) (2016-17 CHMS, Statistics Canada)^{Custom analysis}
 - ★ 25% of students in grades 6 to 10 (2018 HBSC, PHAC)^{Custom analysis}
 - ★ 54% of 8- to 12-year-olds (2014-17 CAPL, HALO)^{Custom analysis}
 - ★ 6% of students in grades 9 to 12 from representative samples in British Columbia, Alberta, Nunavut, Ontario and Quebec (2016-17 COMPASS, University of Waterloo)^{Custom analysis}
- ▶ 5- to 11-year-olds and 12- to 17-year-olds in Canada spend 1.9 and 3.8 hours per day, respectively, in screen-based sedentary behaviours (2016-17 CHMS, Statistics Canada).^{Custom analysis}
- ▶ Students in grades 6 to 10 in Canada spend 4.6 hours per day in screen time pursuits (2018 HBSC, PHAC).^{Custom analysis}
- ▶ 77% of 5- to 19-year-olds in Canada report watching TV, playing computer or video games, or reading during the afterschool period (from the end of school until dinner) (2014-16 CANPLAY, CFLRI).^{Custom analysis}
- ▶ 12- to 17-year-olds in Canada report spending 0.7 hours per day reading (2016-17 CHMS, Statistics Canada).^{Custom analysis}

- ▶ In a study involving 480 Canadian children and youth (4-17 years) with disabilities (e.g., cerebral palsy, spinal cord injury), approximately 17% reported meeting the screen time recommendation within the Canadian 24-Hour Movement Guidelines for Children and Youth.¹³⁵

Research Gaps

- ▶ Most of the available data focuses on TV, computer and video game use, and little is known about the amount of time children and youth spend on smartphones and specific applications.
- ▶ Current data on daily screen use is based on self- or parent-report surveys, which have a high risk of bias. New technologies allow for the objective measurement of screen-based sedentary behaviours, which could lead to more accurate measurement of these behaviours among children and youth.
- ▶ More research is needed on the impact of replacing screen-based sedentary behaviours with non-screen-based sedentary behaviours such as reading or playing games.
- ▶ Researchers need to develop and validate a standardized questionnaire that captures aspects of sedentary behaviour including screen time, passive travel, sitting at school, etc.

Recommendations

- ▶ Involve all family members in the creation of a family media plan that includes setting limits around screen viewing, prioritizing screen-free family time, removing screens from children's bedrooms and having screen-free family meals.
- ▶ All family members should be mindful of their own time spent on screens, as this may influence other members' screen time behaviour.
- ▶ Be present and engaged when screen viewing, and avoid using multiple screens at once ("stacking").

Literature Synthesis

Sedentary behaviour refers to any waking behaviour characterized by low energy expenditure (≤ 1.5 metabolic equivalents) while in a sitting, reclining or lying posture.¹³⁶ Common examples include engaging in screen-based pursuits (e.g., watching television, browsing the Internet, playing video games, doing homework on a computer, using social media) while seated, traditional desk-and-chair-based work at school, reading a book while seated, completing schoolwork at home while seated, and traveling to/from school via school bus or car.

Screen time is ubiquitous. According to population data, children and youth both in Canada and abroad are spending excessive amounts of daily time being sedentary (≥ 8 hours per day).¹³⁷ Statistics from the United States show that 53% of children have their own smartphone by age 11, and this statistic increases to 69% by age 12.¹³⁸ In Canada, approximately 50% of 11- to 15-year-olds report using social media to communicate with close friends ‘several times each day’ or ‘almost all the time throughout the day’ (Table 2).

Table 2. Proportion (%) of 11- to 15-year-olds who have online contact (e.g., texting, Facebook, Twitter, Instagram) with groups of people (2018 HBSC, PHAC).^{Custom analysis}

	Does not apply	Almost never	At least every week	Daily or almost daily	Several times each day	Almost all the time throughout the day
Close friends	6.4	6.6	15.2	22.1	20.4	29.3
Friends from a larger friend group	11.3	16.9	22.4	19.6	15.3	14.6
Other people (e.g., parents, siblings, teachers)	15.0	18.7	22.9	18.4	12.2	12.7

Contributing Factors and Disparities

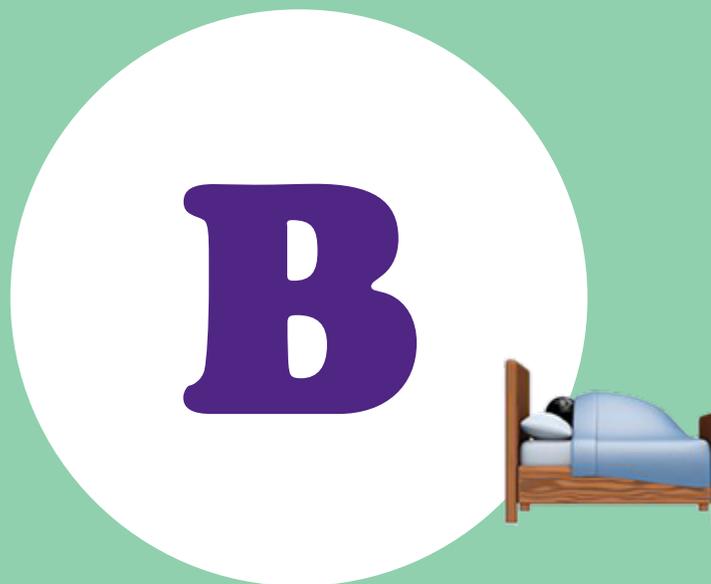
Previous systematic reviews have found that screen-based sedentary behaviours are negatively associated with children's and youths' physical, cognitive, emotional and social development.¹³⁹ New evidence continues to confirm findings from previous research. For example, greater screen time among children and youth is linked with poor child development,¹⁴⁰ lower social connectedness,¹⁴¹ lower social skills,^{315,142} poor academic achievement,¹⁴³ greater adiposity,¹⁴⁴ lower well-being,¹⁴⁵ insufficient sleep,¹⁴⁶ and greater risk of depression and anxiety.^{147,148} Research also shows that social media use is negatively associated with sleep duration, school connectedness and academic performance.^{149,150} Findings from a three-year longitudinal study examining the impact of sedentary behaviour on academic achievement of over 4,000 secondary school students show that specific screen-based sedentary pursuits (e.g., watching/streaming television shows/movies) decrease the likelihood of surpassing English standards, whereas engaging in communication-based sedentary activities (e.g., texting, messaging, emailing) decreases the likelihood of surpassing math standards.¹⁴³

To date, most studies and public health surveillance have relied on self-report and/or parent-report measures to assess screen time in children and youth. However, these subjective instruments (e.g., questionnaires) are prone to some inherent limitations, including social desirability response bias, recall bias and potential under-reporting screen use. Objective measures for estimating screen time are needed to provide complementary, and potentially more accurate, insights. Researchers world-wide are beginning to develop and test objective methods of screen time assessment, such as custom-built smartphone applications for adults.¹⁵¹ For children aged 3 to 5 years, scientists at Deakin University in Australia and the University of Strathclyde in the United Kingdom are examining the feasibility of using wearable cameras to assess screen time.¹⁵²

Family characteristics linked with children's and youths' increased screen time include high parental screen time, low parental confidence to limit children's screen time, and little/no parental screen time monitoring and restriction.^{153,154,155} Cannabis use is also linked with sedentary behaviour; a large study involving 46,957 Canadian youth found a positive association between cannabis use and total screen-based sedentary behaviour.¹⁵⁶ In a representative sample of Canadian students in grades 7 to 12, smoking cannabis was linked with increased risk of poor compliance to screen time recommendations.¹⁴⁵



Sleep



This year's grade is a B, which represents a slight decline from the B+ assigned in 2018. Available data suggest that approximately 70% of children and youth meet their age-specific sleep recommendations.

Year	2010	2011	2012	2013	2014	2015	2016	2018	2020
Grade	–	–	–	–	–	–	B	B+	B
Benchmark	Percentage of children and youth who meet the sleep duration recommendation within the Canadian 24-Hour Movement Guidelines for Children and Youth (5- to 13-year-olds: 9-11 hours per night, on average; 14- to 17-year-olds: 8-10 hours per night, on average). ^{2,3}								

Key Findings

- ▶ Almost 70% of school-aged children and youth in Canada meet the sleep duration recommendation within the Canadian 24-Hour Movement Guidelines for Children and Youth:^{2,3}
 - ★ 74% of 5- to 17-year-olds (2014-15 CHMS, Statistics Canada)^{Custom analysis}
 - ★ 65% of students in grades 6 to 10 (2018 HBSC, PHAC)^{Custom analysis}
- ▶ Sleep duration in Canadian children and youth is approximately 8-9 hours per night:
 - ★ 5- to 11-year-olds are asleep for 9.7 hours, according to their parents (2014-15 CHMS, Statistics Canada).^{Custom analysis}
 - ★ 12- to 17-year-olds are asleep for 8.2 hours, based on self-report (2014-15 CHMS, Statistics Canada).^{Custom analysis}
 - ★ Students in grades 6 to 10 self-report that they sleep for 8.9 hours per night on average (2018 HBSC, PHAC).^{Custom analysis}
- ▶ 38% of students in grades 6 to 10 in Canada have trouble falling asleep at bedtime or staying asleep during the night, at least sometimes (2018 HBSC, PHAC).^{Custom analysis}
- ▶ 74% of students in grades 6 to 10 in Canada find it difficult to stay awake during their normal waking hours, at least sometimes (2018 HBSC, PHAC).^{Custom analysis}



Research Gaps

- ▶ Research is needed to test the cost-effectiveness of public health policy recommendations aimed at improving sleep and health outcomes in children and youth.
- ▶ Existing sleep surveillance data of Canadian children and youth are based on parental or self-reports. Objective monitoring of sleep with the use of actigraphy/accelerometry is needed to have a better picture of sleep health of young Canadians.
- ▶ A consensus needs to be reached on the characteristics used to assess sleep health of the pediatric population. Some key characteristics of sleep health include sleep duration, sleep quality, sleep timing, sleep consistency and the absence of sleep disorders.
- ▶ Sleep questions used in national health surveys need to be updated and validated to reflect new research.

Recommendations

- ▶ Canada needs a national media campaign that aims to change the social norm around sleep as being a waste of time toward a social norm where sleep is seen as a daily behaviour that is as important for good health as a healthy diet and physically active lifestyle.
- ▶ Middle and high schools should not start classes earlier than 8:30 a.m., to accommodate the well-known circadian phase delay of up to two hours that occurs in middle childhood.
- ▶ Daylight savings time should be eliminated because it is disruptive to sleep and linked to accidents and adverse effects on health.
- ▶ Extracurricular activities for adolescents should end no later than 9:00 p.m., as that would help them meet sleep duration recommendations.
- ▶ Sleep health literacy should be integrated into school curriculums, as this would help students build the foundations of life-long health.

Better Sleep for Kids

Literature Synthesis

Sleep is essential for the health, development and daily functioning of children and adolescents. Healthy sleep encompasses many dimensions, including adequate duration, good quality, appropriate timing and the absence of sleep disorders.¹⁵⁷ However, insufficient sleep has become common in today's society, and the most recent findings indicate that approximately one-fourth to one-third of Canadian children and youth sleep less than recommended for optimal health.^{158,159} Furthermore, recent Canadian data on 6- to 79-year-olds show that the prevalence of insomnia is increasing.¹⁶⁰ These statistics are not encouraging because a growing body of scientific evidence shows that lack of sleep threatens the academic success, health and safety of children and youth.^{161,162,163}

Reasons for not sleeping enough are multiple and complex, and vary widely among people.¹⁶⁴ Factors associated with insufficient sleep can include socio-demographic factors, lack of time, excessive screen use, caffeine consumption, lack of parental monitoring, work/school demands or social activities. The ideal amount of sleep required each night can vary between individuals due to genetic factors and other reasons, and it is important to adapt our recommendations on a case-by-case basis.¹⁶⁵ Sleep duration recommendations (public health approach) are well suited to provide guidance at the population level; however, as the ideal amount of sleep required each night can vary between individuals, recommendations provided at the individual level (e.g., in clinic) should be adjusted on a case-by-case basis. Despite the fact that there is no "magic number" for the ideal amount of sleep, we need to continue to promote sleep health for all Canadians, as it is an important public health issue that needs to be addressed.¹⁶⁵



The concept of sleep health is gaining momentum globally. Rather than "medicalizing" sleep with a focus on sleep disorders and their treatment, there is growing interest in sleep health promotion for all and on the prevention of health problems by keeping healthy people healthy.^{157,166} In Canada, sleep health is increasingly becoming part of a holistic vision of health, and this provides a metric for health promotion efforts.¹⁶⁶ One of the outcomes of this evolving understanding of sleep health in Canada has been the release in 2016 of the world's first integrated 24-hour movement guidelines for the pediatric population.^{2,3} They were the first systematic review-informed sleep guidelines in Canada, and provided important benchmarks for surveillance. They also integrated sleep health with other movement behaviours by putting emphasis on movement across the full 24-hour period rather than on individual intensities of movement. The future of pediatric sleep health in Canada is thus bright, and we need to align our efforts and continue to push for the integration of 24-hour movement behaviours in the public health arena.

Sleep and the Family Unit

Family systems are dynamic and include reciprocal interactions among family members at night and during the day. When children have difficulty sleeping, they often awaken parents, thereby impacting the parents' sleep and possibly daytime functioning. Parental behaviours can also disrupt children's sleep patterns. Thus, children's sleep cannot be understood in isolation and it is important to view sleep from a family context. In general, parents who value the importance of sleep are more likely to have children who have a good night's sleep.¹⁶⁷

Parental knowledge of children's sleep has recently been examined in a systematic review.¹⁶⁸ In general, parent knowledge of children's sleep needs, routines and problems was poor. Greater accuracy was reported for items pertaining to healthy sleep practices at bedtime and daytime symptoms in comparison with items pertaining to child sleep problems during the night. More knowledgeable parents were more likely to report that their children had healthy sleep practices.¹⁶⁸ This finding is in line with recent results showing that parents with better sleep knowledge, higher income and higher education were more likely to report that their children had earlier bedtimes and wake-up times, and more consistent sleep routines.¹⁶⁹

Table 3: Proportion (%) of students in grades 6 to 10 who report using digital devices within one hour of going to bed (2018 HBSC, PHAC), by frequency. Custom analysis

	Never	1 or 2 nights a week	3 or 4 nights a week	5 or 6 nights a week	Nightly
Cellphone	21.2	9.6	8.5	9.5	51.0
TV	45.7	19.1	10.1	7.1	18.0
Computer/tablet	41.2	18.1	11.2	8.7	20.0
Multi-device use (cellphone, TV, computer/tablet)	7.3	9.2	10.1	12.5	60.9

Contributing Factors and Disparities

While there are no sex-related differences in sleep duration in school-aged children and youth (2009-11 and 2012-13 CHMS),^{Custom analysis} children sleep less as they get older (i.e., 5- to 11-year-olds get 9.6 hours of sleep per night on average compared to 8.3 hours per night among 12- to 17-year-olds).¹⁷⁰ Looking at trends over time, data from the United States reveal that declines in sleep duration over the past several years have been more pronounced in girls, racial/ethnic minorities and those from low socio-economic backgrounds. Whether this is also the case in Canada is currently unclear.¹⁵⁸



Top 5 tips for better sleep

1

Ensure children go to bed and wake up at consistent times that allow them to obtain age-appropriate amounts of sleep.

2

Develop a relaxing bedtime routine (e.g., bathing, music, reading).

3

Limit access to digital devices (e.g., cellphones, TVs) during and after bedtime by removing from children's bedrooms (Table 3).

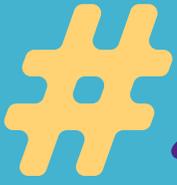
4

Encourage children to be physically active every day (ideally outside).

5

Make sure the child's bedroom is dark, quiet, comfortable and cool.





24-Hour Movement Behaviours



This year's grade remains an F because less than a fifth of children and youth in Canada meet all three recommendations pertaining to physical activity, screen time and sleep within the Canadian 24-Hour Movement Guidelines for Children and Youth.^{2,3}

Year	2010	2011	2012	2013	2014	2015	2016	2018	2020
Grade	-	-	-	-	-	-	-	F	F
Benchmark	Percentage of children and youth who meet the physical activity, screen time and sleep recommendations within the Canadian 24-Hour Movement Behaviour Guidelines for Children and Youth. ^{2,3}								

Key Findings

- ▶ Less than a fifth of children and youth in Canada meet all three recommendations within the Canadian 24-Hour Movement Guidelines for Children and Youth:
 - ★ 15% of 5- to 17-year-olds (2014-15 CHMS, Statistics Canada)^{Custom analysis}
 - ★ 10% of students in grades 6 to 10 (2018 HBSC, PHAC)^{Custom analysis}
- ▶ 39% and 41% of students in grades 6 to 10 meet only one and two of three recommendations, respectively (2018, HSBC, PHAC).^{Custom analysis}
- ▶ In a study involving 480 Canadian children and youth (4-17 years) with disabilities (e.g., cerebral palsy, spinal cord injury), less than 1% meet all three recommendations within the Canadian 24-Hour Movement Guidelines for Children and Youth.¹³⁵

Research Gaps

- ▶ Objective measurement of all movement behaviours is needed to improve our understanding of the number of children and youth meeting the Canadian 24-Hour Movement Guidelines for Children and Youth.
- ▶ Research is needed that examines intermediate combinations of movement behaviours (e.g., high physical activity + low sedentary behaviour + high sleep vs. low physical activity + high sedentary behaviour + low sleep).

Recommendations

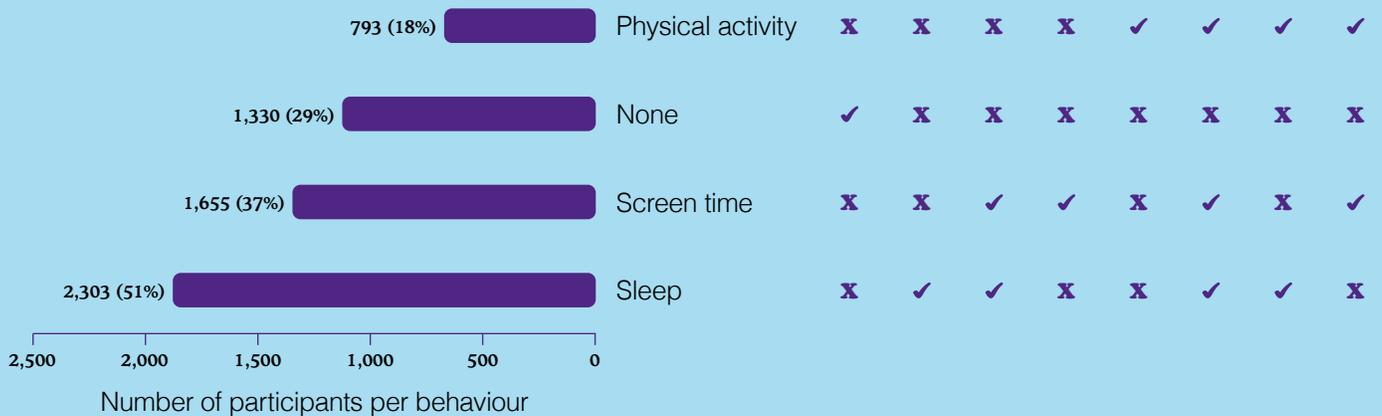
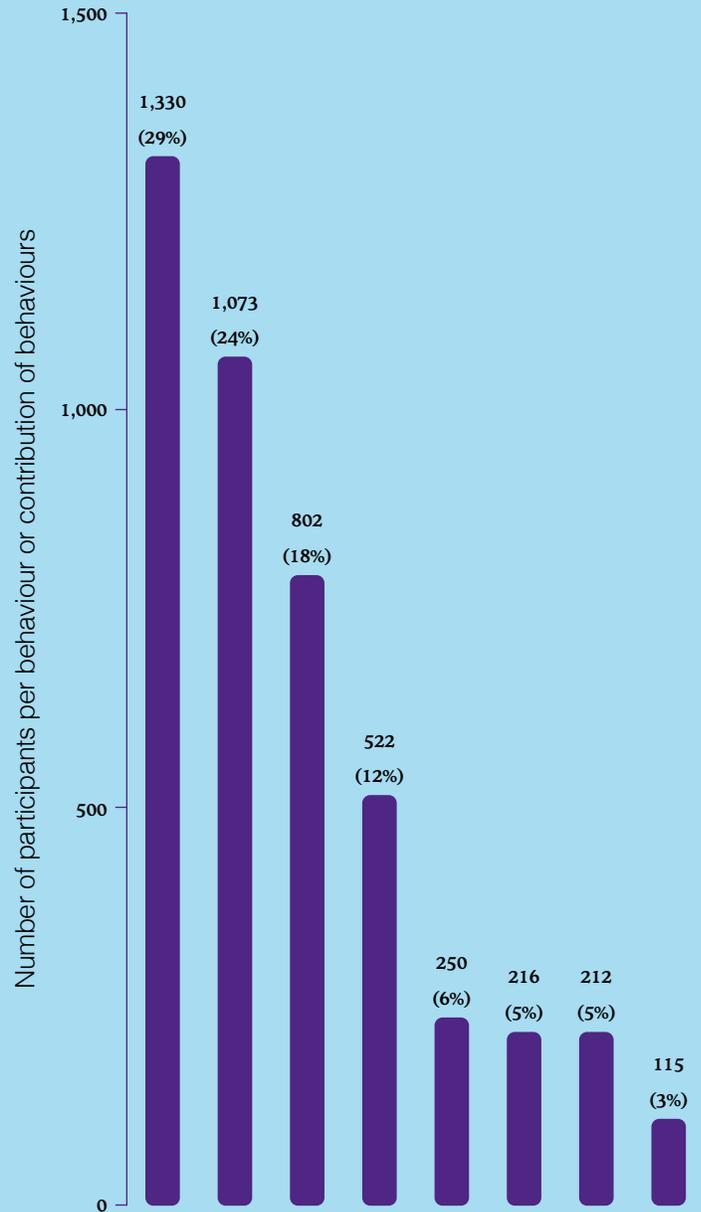
- ▶ Speak to parents, teachers and clinicians about children's physical activity, sedentary and sleep behaviours and how these behaviours contribute to the children's overall health and well-being.
- ▶ Encourage parents to implement specific plans (how, when, where) that support children's movement behaviours.

Literature Synthesis

The Canadian 24-Hour Movement Guidelines for Children and Youth (5-17 years) are the first evidence-based guidelines that target an entire day (24 hours).^{2,3} These guidelines recommend that children and youth accumulate at least 60 minutes per day of MVPA, no more than 2 hours per day of recreational screen time (while limiting sitting for extended periods), and 8 to 11 hours of sleep per night (9-11 hours for those aged 5-13 years and 8-10 hours for those aged 14-17 years). Prior to the release of these guidelines in 2017, the benefits of being physically active, reducing sedentary time and screen time, and obtaining adequate sleep were for the most part evaluated in isolation.¹⁷¹ Today, with the development of the movement guidelines, there is an emphasis on understanding the health benefits and consequences of when children and youth meet – or do not meet – each movement behaviour recommendation within a 24-hour period.

Research on children's and youths' movement behaviours continually shows that children and youth who meet combinations of higher physical activity, lower levels of sedentary behaviour and screen time, and adequate sleep have better health outcomes. For example, a recent study examining longitudinal impacts of the movement behaviours on academic achievement of Canadian youth showed that students who adhered to a greater number of recommendations performed better than students who adhered to fewer recommendations.¹⁷²

Figure 8. Proportion of children meeting different combinations of movement behaviour recommendations.¹⁷⁴ Vertical bars represent the number of participants meeting recommendations for the individual movement behaviour or combination of behaviours, and the horizontal bars represent the number of participants meeting recommendations for a particular movement behaviour.



Adolescent Brain Cognitive Development Study

The Adolescent Brain Cognitive Development (ABCD) study is the longest long-term study on brain development and child health in the United States. Using the ABCD baseline data involving approximately 4,500 children (9-10 years), researchers from HALO published two papers exploring the relationships between meeting the movement behaviour recommendations and health outcomes. In the first study, children who met all three movement behaviour recommendations had higher global cognition scores than children who did not meet any recommendations.¹⁷³ In fact, global cognition was positively linked with each additional recommendation met. This study also showed that only 5% of children met all three movement behaviours. Figure 8 shows a breakdown of the proportion of children who met different combinations of movement behaviour recommendations. In the second study, children who met all three recommendations were found to have lower scores of impulsivity – one’s tendency to act without thinking – than children who did not meet any recommendations.¹⁷⁴

Movement Guidelines Momentum

Canada was the first country to develop and release integrated movement guidelines for 5- to 17-year-old children and youth^{2,3} as well as for the early years (0-4 years old).⁴ The utility of this integrated approach is demonstrated by the subsequent development and release of 24-Hour Movement Guidelines for the early years in Australia, New Zealand and South Africa,⁴ and by the World Health Organization. Furthermore, the Public Health Agency of Canada (PHAC) recently developed a conceptual framework, which covers the full spectrum of physical movement.¹⁷⁵ The framework broadened the scope of physical activity surveillance to include all movement behaviours (light physical activity, MVPA, sedentary time, sleep), and applies a socio-ecological approach accounting for the societal environments in which movement behaviours take place.¹⁷⁵



Contributing Factors and Disparities

Table 4 summarizes the time boys and girls spent in different physical activities, sedentary behaviour and sleep throughout a typical 24-hour period (1,440 minutes per day)(2018 HBSC, PHAC).^{Custom analysis} The

data generally show that boys engage in more physical activity and have higher levels of sedentary screen time than girls, and that sleep duration is relatively equal across different age and gender groups.

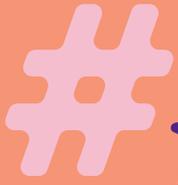
Table 4. Time (mins/day) spent in different physical activities, sedentary behaviour and sleep throughout a typical 24-hour period, by age and gender (2018 HBSC, PHAC).^{Custom analysis}

	Grades 6-8 Boys	Grades 6-8 Girls	Grades 9-10 Boys	Grades 9-10 Girls
Outdoor play	18.7	14.8	14.7	9.7
Exercise in leisure time	13.6	11.4	14.7	11.8
Active travel to all destinations	15	13.3	15.2	13.6
Sports and programs	17.1	15.9	16.2	14.8
Physical activity during class time	27.2	24	28.1	23.7
Sedentary screen time	287	245	315	271
Sleep duration	550	551	511	506
Other	511.4	564.6	525.1	589.4

Individual Characteristics

These indicators speak to specific skills or attributes that impact children's movement behaviours





Physical Literacy



For the third time in a row, this year's grade remains a D+ because available data suggest that slightly less than half of children are meeting the recommended levels of physical literacy.

Year	2010	2011	2012	2013	2014	2015	2016	2018	2020
Grade	–	–	–	–	–	Inc	D+	D+	D+
Benchmark	Percentage of children and youth who meet the recommended levels of physical competence, knowledge and understanding, motivation and confidence and daily behaviours needed for a physically active lifestyle.								

Key Findings

- ▶ 36% of 8- to 12-year-olds in Canada assessed by CAPL meet or exceed the minimum level recommended for physical literacy (2014-17 CAPL, HALO):¹⁷⁶
 - ★ 37% meet or exceed the minimum level recommended for the physical competence domain of physical literacy.
 - ★ 29% meet or exceed the minimum level recommended for the daily behaviour domain of physical literacy.
 - ★ 34% meet or exceed the minimum level recommended for the motivation and confidence domain of physical literacy.
 - ★ 39% meet or exceed the minimum level recommended for the knowledge and understanding domain of physical literacy.
- ▶ **Note: If readers are aware of, or have access to, physical literacy data that would help to inform this grade, please contact ParticipACTION (info@participaction.com).**

Research Gaps

- ▶ The sensitivity and specificity of tools that measure physical literacy should be evaluated with children who demonstrate low levels of physical literacy, as well as those who live with physical disabilities.¹⁷⁷
- ▶ More evidence is required to support the role of physical literacy as a determinant of overall health.¹⁷⁸
- ▶ There is a need for more physical literacy research among specific populations (e.g., new Canadians, low socio-economic status, children with a disability) to better inform targeted interventions.¹⁷⁹
- ▶ More research on physical literacy and sport injury prevention/management would benefit young athletes.¹⁸⁰
- ▶ There is very little data on the physical literacy of Canadian children. Further assessment is required using validated measures of physical literacy among children and youth.
- ▶ Self-report questionnaires that assess physical literacy are needed.
- ▶ Development of tools that assess physical literacy in young children are required.

Smarter

Health

Recommendations

- ▶ Interventions addressing physical literacy development should focus on combined physical and psychosocial factors as well as individual characteristics. For example:
 - ★ Programs should not only focus on developing fundamental movement skills, but also on targeting physical competence as a whole (e.g., strength, agility, endurance).^{177,181}
 - ★ Leaders should use evidence-based, motivational strategies that are theoretically supported to promote confidence in children during active play.¹⁸² Fostering motivation and confidence is especially important for children who have limitations in physical competence.¹⁸³
 - ★ During competitive games, the social environment should prioritize teamwork and fun over scoring and winning.¹⁸²
- ▶ Assessors should anticipate the possibility of missing physical literacy data, especially when using objective devices (e.g., pedometers) to measure daily behaviour.¹⁸⁴
- ▶ Using a combination of physical literacy assessment tools may provide a more holistic and accurate representation of physical literacy.¹⁸⁵
- ▶ **Passport for Life** by Physical Health and Education (PHE) Canada:
www.passportforlife.ca
- ▶ **Physical Literacy Assessment for Youth (PLAY)** by Canadian Sport 4 Life (CS4L):
www.play.physicalliteracy.ca
- ▶ **Canadian Assessment of Physical Literacy, 2nd Edition (CAPL-2)** by HALO:
www.capl-eclp.ca

Peer-reviewed reports on the reliability, validity and feasibility of the PLAY and CAPL tools have continued to be published since the release of the 2018 Report Card. For PLAY, research shows that the PLAYfun tool is a valid measure of motor competence,¹⁸⁷ and that scores on the PLAYfun tool are positively associated with objectively measured physical activity.¹⁸⁸ Research conducted with children and youth in northern Canada shows that motor competence of physical literacy is most accurately assessed using the PLAYfun tool and two raters.¹⁸⁹ For CAPL, researchers responded to the recognized need to reduce participant/administrative burden and improve theoretical alignment with the development and launch of CAPL-2. Validity testing on CAPL-2 supports the development of a more concise tool (i.e., no anthropometric assessments, shorter questionnaire) and the revised weighting of the total CAPL score to reflect equal importance of the physical competence, daily behaviour, and motivation and confidence domains.^{190,191} Table 5 includes an up-to-date comparison of the physical literacy assessments most widely used in Canada, adapted from previous research.¹⁹²

Literature Synthesis

According to the International Physical Literacy Association, physical literacy is defined as “the motivation, confidence, physical competence, knowledge and understanding to value and take responsibility for engagement in physical activities for life.”¹⁸⁶ Researchers have employed a wide range of methods to assess children’s and youths’ physical literacy.¹⁸⁵ There are three predominant tools available:

Table 5. A comparison of the predominant physical literacy assessment tools in Canada.

Assessment Tool	Passport for Life	PLAY (PLAYfun)	CAPL-2
Organization	PHE Canada	Canadian Sport 4 Life	HALO
Ages/grades	Grades 3 to 12	Ages 7+	Ages 8 to 12
Applications	Formative assessment in (physical) education; engagement and awareness	Program evaluation and research; formative assessment, screening, surveillance, engagement	Advocacy, monitoring and evaluation; surveillance
Assessment categories	Fitness skills, movement skills, active participation, living skills	Competence, comprehension and confidence (related to 18 movement tasks)	Physical competence (30%), daily behaviour (30%), motivation and confidence (30%), knowledge and understanding (10%)
Assessment measures	Objective measures (using four-staged rubrics) for fitness skills and movement skills; self-reports for active participation (without performance measures) and living skills (using four-staged rubrics)	Objective measures (using two- and four-staged rubrics) for competence and comprehension; objective measures (using an analytic rating scale) for confidence	Objective measures (using four-staged rubrics) for physical competence (based on a battery of fitness assessments) and daily behaviour (based on daily step count and self-reported MVPA); self-reports for knowledge and understanding and for motivation and confidence (based on questionnaire responses)
Performance descriptors	Fitness skills, movement skills and living skills: performance is labelled as “Emerging,” “Developing,” “Acquired” or “Accomplished” Active participation: performance is not measured but information related to diverse activities and environment is summarized	Competence: performance is labelled as “Developing” (which includes “Initial” – 0 to 25% and “Emerging” – 25 to 50%) or “Acquired” (which includes “Competent” – 50 to 75% and “Proficient” – 75 to 100%) Comprehension: performance is labelled as “Prompt,” “Mimic,” “Describe” or “Demo” Confidence: performance is labelled as low, medium or high	Physical competence, daily behaviour, motivation and confidence, knowledge and understanding: performance is labelled as “Beginning,” “Progressing,” “Achieving” or “Excelling”
Assessment time (for one assessor with one class)	Three class periods	Undefined (estimated to be at least four class periods)	Three class periods*
Assessment materials	Activity space (e.g., gymnasium); balls and cones, computers with internet access	Activity space (e.g., gymnasium); balls, cones and sticks	Activity space (e.g., gymnasium); balls and cones, computers with internet access
Targeted assessors	PE teacher or generalist teacher	Trained professionals (e.g., sport and recreation practitioners, PE teachers)	Physical activity professionals, CAPL-2 trained appraisers, PE teachers*

* CAPL-2 suggests a minimum of two assessors are necessary – one female and one male.

The number of research studies on physical literacy continues to grow. In October 2018, 14 papers from the Royal Bank of Canada Learn to Play – Canadian Assessment of Physical Literacy study (RBC – Learn to Play CAPL) were published in a supplemental issue of *BMC Public Health*.¹⁹³ Data in each paper included approximately 10,000 children aged 8 to 12 years, recruited from several provinces across Canada. Selected findings from these works include the following:

- ▶ Approximately 13-18% of children fall within the “excelling” level (i.e., “*exceeds minimum level recommended*”) for physical competence, daily behaviour, motivation and confidence, and knowledge and understanding, with most children falling within the “progressing” level (i.e., “*similar to typical performance of same-age peers*”).¹⁷⁶
- ▶ Motivational factors for engaging in physical activity are strongly associated with cardiorespiratory endurance.¹⁹⁴
- ▶ Cardiorespiratory fitness is strongly and favourably associated with all components of physical literacy.¹⁹⁵
- ▶ Physical literacy domain scores for physical competence and for motivation and confidence are higher for children meeting physical activity or sedentary behaviour guidelines (vs. those not meeting either guideline).¹⁹⁶

Teaching Physical Literacy

Recent literature has focused on best practices for designing interventions to improve physical literacy. A group of Canadian researchers found that children taught by a generalist (vs. a PE specialist) were less likely to reach recommended levels of motivation and confidence.¹⁹⁷ Other research highlights that community-based physical literacy programs should be inclusive (i.e., participant-centred), collaborative, welcoming, and responsive to the needs of the community served.¹⁹⁸ In recent years, recreational physical literacy programs aimed at being inclusive to children with and without medical conditions or disabilities have been implemented and evaluated, with positive experiences being reported by those involved (e.g., children, staff).¹⁸²

Physical Literacy and Vulnerable Children

For children living with any of a variety of medical conditions, physical literacy can reduce burden of disease.¹⁷⁹ Studies examining physical literacy development of vulnerable children show that:

- ▶ Preadolescent children living with mental health disorders, particularly attention deficit hyperactivity disorder (ADHD), show low levels of overall physical literacy.¹⁹⁹
- ▶ For preadolescent children living with intestinal failure, existing medical factors (e.g., external medical devices) negatively impact their motor competence and, subsequently, their self-efficacy for physical activity.²⁰⁰
- ▶ Canadian children living with epilepsy have significantly lower CAPL scores and lower physical competence (i.e., agility, movement skills and endurance) than their age-matched peers.²⁰¹



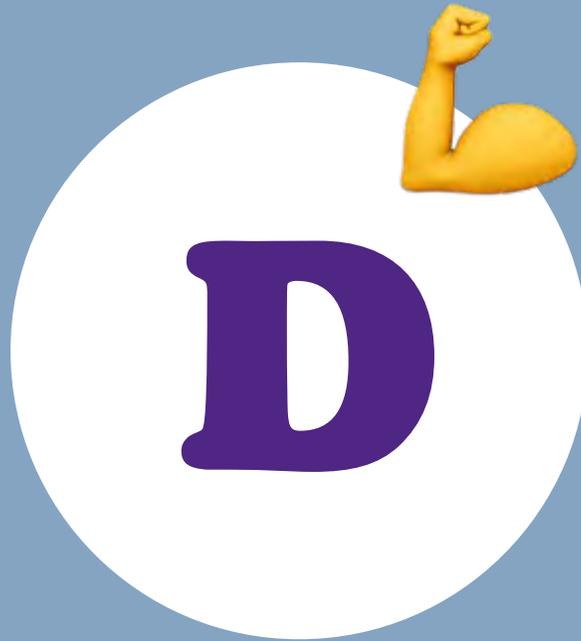
Contributing Factors and Disparities

Research on approximately 10,000 children (8-12 years) highlights small gender-related disparities:¹⁷⁶ compared to girls, boys tend to have slightly higher scores for total physical literacy (63.1 vs. 62.2 out of 100), physical competence (19.9 vs. 19.3 out of 32), daily behaviour (18.6 vs. 18.5 out of 32), and motivation and confidence (12.7 vs. 12.2 out of 18). Conversely, girls tend to have higher knowledge and understanding scores than boys (12.2 vs. 11.8 out of 18).¹⁷⁶ It is important to

note that these differences are small and therefore are unlikely to impact health outcomes. One gender-related difference that can be interpreted as important is the difference in sit-and-reach flexibility scores, with girls scoring higher than boys (30.9 cm vs. 25.4 cm). Other research shows that children from small northern remote Indigenous communities have higher PLAYfun scores compared to previous studies conducted with children from southern populations.¹⁸⁹



Physical Fitness



The year's grade is a D based on available cardiorespiratory fitness data. Although data are available for muscular strength and endurance, and for flexibility, a lack of evidence-based benchmarks prevent these data from informing the grade.

Year	2010	2011	2012	2013	2014	2015	2016	2018	2020
Grade	-	-	-	-	-	-	-	D	D
Benchmark	<ul style="list-style-type: none"> ▶ Average percentile of cardiorespiratory fitness achieved based on age- and sex-specific international normative data. ▶ Percentage of children and youth who meet criterion-referenced standards for muscular strength. ▶ Percentage of children and youth who meet criterion-referenced standards for muscular endurance. ▶ Percentage of children and youth who meet criterion-referenced standards for flexibility. 								

Key Findings

- ▶ 9- to 12-year-olds in Canada are at the 28th percentile, on average, for cardiorespiratory fitness (shuttle run in 20-metre laps) based on age- and sex-specific international normative data (2014-17 CAPL, HALO).²⁰²

Research Gaps

- ▶ More research is needed on how musculoskeletal strength and endurance impact important health behaviours (e.g., sleep).²⁰³
- ▶ More research is needed to understand how levels of sedentary behaviour and physical activity throughout the school day influence musculoskeletal and cardiorespiratory fitness.
- ▶ Future researchers should aim to develop criterion-referenced standards.
- ▶ Future studies are needed to examine the validity of the modified Canadian Aerobic Fitness Test (mCAFT) step test in children and youth.
- ▶ More population-level research is needed to understand fitness (characteristic) and physical activity (behaviour) temporal changes among children and youth.

Recommendations

- ▶ Parents, teachers and healthcare practitioners should encourage children to participate in a range of activities that support the development of cardiorespiratory and musculoskeletal fitness.
- ▶ Researchers should continue to assess the physical fitness of Canadian children and youth.
- ▶ Investigate and share information on best practices for improving physical fitness in children and youth.

Literature Synthesis

Physical fitness is a collection of attributes that include cardiorespiratory fitness, muscular strength and endurance, and flexibility.²⁰⁴ These attributes are indicative of one's ability to perform sustained physical activity. Physical fitness is not only a predictor of children's and youths' sporting and athletic abilities, but also of their current and future overall health.^{205,206,207,208}

Greater cardiorespiratory fitness is associated with lower body mass index,²⁰⁹ lower body fat percentage²¹⁰ and higher quality of life²¹¹ in children and youth. Greater cardiorespiratory fitness and muscular strength are associated with healthier body composition,²¹² and lower risk of metabolic syndrome²¹³ and disability²¹⁴ later in life. Though physical fitness has a strong genetic component, it can be improved through physical activity.^{215,216} For example, a recent 26-week family-based physical activity intervention showed that providing parents with tools to promote their children's physical activity resulted in a significant increase in the children's MVPA and cardiorespiratory fitness.²¹⁶ Physical fitness is therefore often used as an objective measure of recent physical activity habits.²⁰⁸



Cardiorespiratory Fitness

Compared to other attributes of physical fitness, cardiorespiratory fitness – the body’s ability to supply oxygen to the muscles during physical activity²¹⁷ – is the most commonly researched attribute. According to recent CHMS data,²⁰⁴ physical fitness levels among children and youth have generally remained stable between 2007 and 2017, though lower cardiorespiratory fitness over this time period was identified among 8- to 14-year-old boys (Figure 9a), but not among 8- to 14-year-old girls (Figure 9b). Girls tend to have lower levels of fitness than boys.^{204,218} Based on data from approximately 8,800 Canadian children (8-13 years), cardiorespiratory fitness is inversely related to obesity (measured by body mass index and waist circumference).²¹⁹ In addition, indicators of the 20-metre shuttle run adequately identified children with obesity. For example, girls and boys who ran slower than 9.0 km per hour and completed less than 15 laps were more likely to be obese, regardless of age, time spent engaged in screen-based behaviours, and physical activity levels.

Muscular Strength and Endurance

A systematic review of 87 research studies found that muscular strength is positively associated with physical activity, including objective physical activity, MVPA, vigorous physical activity intensity, and sport participation.²⁰³ There was limited support for an association between muscular strength and sedentary behaviour, and an insufficient number of available studies examining the relationship between muscular strength and sleep.²⁰³

Contributing Factors and Disparities

According to the 2016-17 CHMS data, girls have higher flexibility than boys across all age groups, whereas boys have greater grip strength than girls across all age groups.²⁰⁴ Cardiorespiratory fitness was higher among boys compared to girls at and above 11 years of age, and higher among boys and girls who met the physical activity recommendations (vs. those who did not).²⁰⁴

Figure 9a. Trends (means) in cardiorespiratory fitness from 2007 to 2017 (cycles 1, 2 and 5 of CHMS) for boys, by age group.²⁰⁴

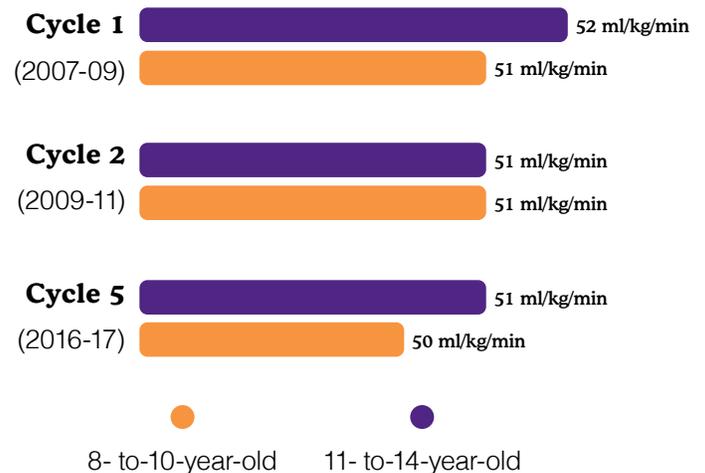
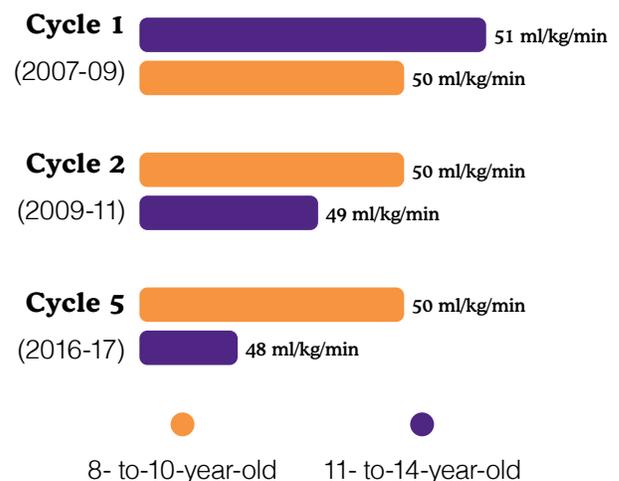


Figure 9b. Trends (means) in cardiorespiratory fitness from 2007 to 2017 (cycles 1, 2 and 5 of CHMS) for girls, by age group.²⁰⁴

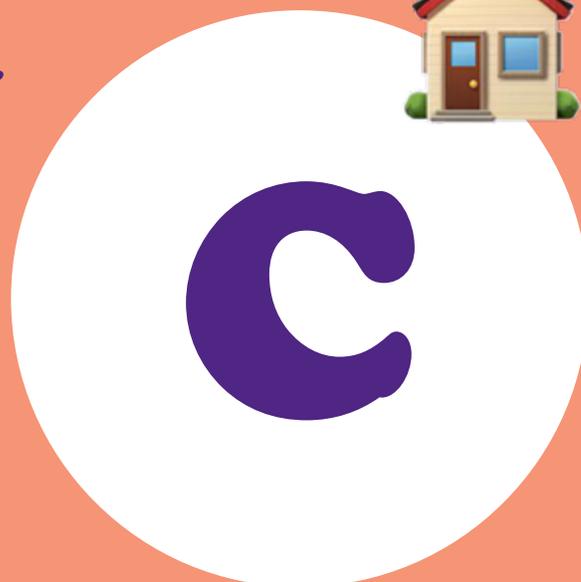


Spaces & Places

These indicators speak to specific settings that impact children's movement behaviours



Household



The benchmarks for this indicator* relate to family physical activity and peer influence. This year's grade is a C, which represents a slight decline from the C+ assigned in 2018. New data show that approximately 23.2% and 44.4% of parents regularly support their children's and youths' light physical activity and MVPA, respectively, and 16-17% of adults aged 18 to 59 years meet the Canadian Physical Activity Guidelines for Adults²²⁰ of at least 150 minutes of MVPA per week. Similar to previous years, the grade is informed only by family physical activity data due to the lack of available data on peer influence.

*This indicator was called Family & Peers in previous iterations of the Report Card.

Year	2010	2011	2012	2013	2014	2015	2016	2018	2020
Grade	Family Physical Activity				C	C+	C+	C+	C+
	D	D+	D+	C					
Benchmark	Peer Influence				C	C+	C+	C+	C+
	Inc	Inc	Inc	Inc					

- ▶ Percentage of parents who facilitate physical activity and sport opportunities for their children (e.g., volunteering, coaching, driving, paying for membership fees and equipment).
- ▶ Percentage of parents who meet the Canadian Physical Activity Guidelines for Adults.²²⁰
- ▶ Percentage of parents who are physically active with their kids.
- ▶ Percentage of children and youth with friends and peers who encourage and support them to be physically active.
- ▶ Percentage of children and youth who encourage and support their friends to be physically active.

Key Findings

- ▶ 16% of 18- to 39-year-olds and 17% of 40- to 59-year-olds in Canada meet the Canadian Physical Activity Guidelines for Adults, which recommend at least 150 minutes of weekly MVPA.²²¹ More non-parents are meeting the Canadian Physical Activity Guidelines for Adults when compared to parents (23% vs. 13%) (2016-17 CHMS).^{Custom analysis}
- ▶ Among a representative sample of Canadian parents, 44.4% and 23.2% reported providing support for children's and youths' light physical activity and MVPA, respectively.²²²
- ▶ 92% of students in grades 9 to 12 in British Columbia, Alberta, Nunavut, Ontario and Quebec report having parents/step-parents/guardians who support them in being physically active (2016-17 COMPASS, University of Waterloo).^{Custom analysis}
- ▶ 73% of students in grades 9 to 12 in British Columbia, Alberta, Nunavut, Ontario and Quebec report having parents/step-parents/guardians who encourage them to be physically active (2016-17 COMPASS, University of Waterloo).^{Custom analysis}
- ▶ 36% of parents in Canada with 5- to 17-year-olds report playing active games often or very often with them (based on a subsample of the 2014-15 Physical Activity Monitor [PAM], CFLRI).^{Custom analysis}
- ▶ In a nationally representative sample of more than 1,300 biological parent-child pairs, every 20-minute increase in parental MVPA was associated with a 5- to 10-minute increase in the MVPA of their 6- to 11-year-old child, independent of parental support for physical activity (2007-13 CHMS, Statistics Canada).²³⁴
- ▶ 37% of students in grades 6 to 10 in Canada report that of the friends with whom they spend most of their leisure time, most participate in organized sports with others (2018 HBSC, PHAC).^{Custom analysis}
- ▶ Among students in grades 9 to 12 in Alberta and Ontario, for each additional physically active friend they had, adherence to the physical activity recommendation (at least 60 minutes of daily MVPA) within the Canadian 24-Hour Movement Behaviour Guidelines for Children and Youth increased by 6%.²²³
- ▶ Among students in grades 5 to 12 in Prince Edward Island (2014-15 School Health Planning and Evaluation System – Prince Edward Island [SHAPES-PEI]):^{Custom analysis}
 - ★ 92% report that their parents/guardians are supportive or very supportive (e.g., equipment purchases, transportation to team games) of their physical activity.
 - ★ 82% report that their parents/guardians encourage or strongly encourage them to be physically active.
 - ★ 42% and 48% report that their mother and father, respectively, are physically active.
 - ★ 95% report that they have at least one close friend who is physically active.



Research Gaps

- ▶ Future research is needed to determine whether physical activity programs geared toward the entire family result in better benefits than programs focused on individuals.
- ▶ More research is needed to identify how peer and family influences develop and change throughout the course of childhood and adolescence.
- ▶ Future research should examine the link between peer influence and structured and unstructured physical activities.

Recommendations

- ▶ Programs that encourage families to be active together should be better supported (see Cover Story).
- ▶ National data are required on how the physical activity of children and youth is influenced by their peers.

Literature Synthesis

Family and peers play an important role in shaping children's and youths' health behaviours.^{224,225,226,227,228} The majority of research in this area has focused on the role of parents on children's physical activity, while fewer studies have focused on siblings and peers.

Influence of Parents on Physical Activity

Recent research continues to show that parents may encourage (or discourage) physical activity behaviours of their children through a variety of mechanisms^{229,230,231} including:

- ▶ parental logistical support (e.g., enrolment in sports, transportation to activities)
- ▶ encouragement (e.g., praise about health behaviours, spectating)
- ▶ parental regulatory support (e.g., enforcing rules, setting limits)
- ▶ parental role modelling (e.g., parents' own physical activity and sedentary behaviours)
- ▶ co-participation in physical activity (e.g., family exergaming)

Building upon previous literature, a new systematic review of reviews reports that parental encouragement and support can increase physical activity and reduce sedentary time in children.²³² Canadian data from two separate studies show differences in the proportion of parents supporting each of the 24-hour movement behaviours.^{222,233} In one study, 86% of Canadian parents had intentions to support their children's sleep, 62% to reduce their children's screen-based behaviours, and 61% to 65% to support their children's physical activity (light and moderate).²³³ However, there was a noticeable intention-behaviour gap; only 80% of intentions were translated into parental support behaviours for optimizing sleep, 68% for reducing screen time, and 31% to 56% for fostering physical activity.²³³ In terms of parent-child physical activity participation, some recent work has examined family exergaming – games in which players are physically active in response to on-screen virtual activity. Family exergaming could potentially help to increase physical activity in Canadian children by displacing sedentary activities, especially on the weekends and during inclement weather conditions.²³⁴

Influence of Siblings on Physical Activity

Concerning other family members, some research highlights the unique role of siblings, who may exhibit elements of parental influence (e.g., provide supervision of younger children during parent/caregiver absence) and peer influence (e.g., serve as a similar-age companion for active transportation or sport participation). Findings of a new systematic review and meta-analysis suggest that 2- to 18-year-old children with siblings have healthier physical activity patterns compared to only-children.²²⁴ In particular, MVPA levels were higher in children with siblings (on average, by five minutes of MVPA per day) and there was a potential dose-response relationship, whereby accumulated minutes of MVPA increased with the number of siblings in the household. Findings were mixed in terms of sibling influence on sedentary behaviour and light-intensity physical activity. Suggested mechanisms for sibling influence include encouraging active transportation and sport participation, serving as peer models and providing additional supervision in physical activity.²²⁴

The findings of this systematic review regarding the influence of siblings on children's and youths' physical activity behaviour are different than findings of national-level data in Canada (see *Contributing Factors and Disparities* below), which show that siblings have little influence. These mixed findings may be due to differences in various factors such as measurement technique (e.g., accelerometer vs. self- or parent-reported) and mode of data collection (e.g., in-person vs. computer vs. telephone interviewing).

Influence of Peers on Physical Activity

Among students in grades 5 to 8 in Alberta, positive associations exist between aspects of children's peer social environment (e.g., physical activity levels of friends, number of school friends) and frequency of meeting the physical activity

recommendation.²²⁸ Another Alberta-based study, this time involving only students in Grade 5, found that school friends exhibit more similarity in their pedometer-measured physical activity than non-school friends.²³⁵ The difference in physical activity between close female friends was 160-260 steps per day lower than the difference in step count between female non-friends.²³⁷

Studies demonstrate that the most common mechanisms of peer influence – peer support and peer modelling – are applicable to different domains (e.g., sport clubs, outside of sport clubs, outdoor play). In a nationwide sample of approximately 3,500 primary and secondary school children and adolescents (aged 6-17) in Germany, peer support and peer modelling were positively associated with extracurricular physical activity participation.²²⁶ A study conducted with German children aged 4-6 years found peer modelling to be especially relevant for physical activity in sport clubs, while peer support was identified as a significant predictor of outdoor play in this age group.²³⁶

Contributing Factors and Disparities

Findings from recent 2016-17 CHMS data^{Custom analysis} show that having a sibling is positively associated with physical activity for boys aged 12-17 years. Data also show that physical activity levels do not differ between 5- to 17-year-olds according to whether they are in a single- or two-parent household structure; however, there is an effect for 3- to 4-year-olds, in that those living in households with two parents are more active than those living in households with one parent. No significant differences exist in the proportion of children aged 3 to 11 years meeting the daily MVPA recommendation of ≥ 60 minutes according to number of siblings in the household, or single- vs. two-parent household.

#School



The benchmarks for this indicator relate to PE and physical activity opportunities at school, school policy and programming, and school infrastructure. This year’s grade remains a B-. While available data on PE opportunities and school infrastructure are encouraging, a large proportion of schools in Canada have only partially implemented physical activity-related policies, which prevents the assignment of a higher grade this year.

Year	2010	2011	2012	2013	2014	2015	2016	2018	2020
Grade	PE & Physical Activity Participation at School & in Childcare Settings C-/C* C-/B* C/B* C								
	School Policy & Programming C/C** C/B** C-/B** C				C+	C+	B	B-	B-
	School Infrastructure & Equipment B B B+ B+								
Benchmark	<ul style="list-style-type: none"> ▶ Percentage of schools with active school policies (e.g., daily PE, DPA, recess, “everyone plays” approach, bike racks at school, traffic calming on school property, outdoor time). ▶ Percentage of schools where the majority (≥ 80%) of students are taught by a PE specialist. ▶ Percentage of schools where the majority (≥ 80%) of students are offered at least 150 minutes of PE per week. ▶ Percentage of schools that offer physical activity opportunities (excluding PE) to the majority (≥ 80%) of their students. ▶ Percentage of parents who report their children and youth have access to physical activity opportunities at school in addition to PE classes. ▶ Percentage of schools with students who have regular access to facilities and equipment that support physical activity (e.g., gymnasium, outdoor playgrounds, sporting fields, multipurpose space for physical activity, equipment in good condition). ▶ Percentage of schools reporting that competing priorities (e.g., for resources, equipment, facilities) and/or attitudes (e.g., teachers, parents, children) are <i>not</i> major barriers to PE delivery and physical activity promotion at school. 								
	<p>* From 2005 to 2012, there were two separate indicators: Physical Education and Sport & Physical Activity Opportunities at School. In 2013, these indicators were collapsed into a single indicator.</p> <p>** From 2009 to 2012, there were two separate indicators: School Policy and Sport & Physical Activity Opportunities at School. In 2013, these indicators were collapsed into a single indicator.</p>								

Key Findings

- ▶ 48% of school administrators in Canada report having a fully implemented policy to provide daily PE to all students (2015 Opportunities for Physical Activity at School Study [OPASS], CFLRI).²³⁷
- ▶ 46% of school administrators in Canada report having a fully implemented policy to provide mandated DPA to all students (2015 OPASS, CFLRI).²³⁷
- ▶ 39% of school administrators in Canada indicate that they are quite or considerably concerned about liability, which may cause the school to limit the kinds of physical activity in which students can participate (2015 OPASS, CFLRI).^{Custom analysis}
- ▶ 74% of school administrators in Canada report that they use a PE specialist to teach PE in their high school, and 44% of schools indicate that they use a teacher who has at least one elective credit in PE (2015 OPASS, CFLRI).²³⁸
- ▶ Of those who indicate that their school uses a PE specialist, 16% indicate that less than half of students receive PE directly from this individual, 19% of schools indicate that many or most of their students receive PE from this specialist, and 65% indicate that almost all students receive PE from this specialist.²³⁸
- ▶ Of those schools in Canada that report they use a PE specialist, a typical student receives PE from this specialist less than once a week in 6% of the schools, once or twice a week in 45% of schools, three to four times a week in 27% of schools, and every day in 22% of schools.²³⁸
- ▶ The following proportion of schools/school boards/ministries in Canada report that they have fully or partially implemented policies related to physical activity (2015 OPASS, CFLRI):²³⁷
 - ★ 77% provide age- and stage-appropriate developmental physical activity and sport programs.
 - ★ 73% provide a range of physical activities for students.
 - ★ 62% hire teachers with university qualifications to teach PE or physical activity.
 - ★ 59% ensure ongoing funding for adequate equipment for student needs.
 - ★ 28% ensure National Coaching Certification Program qualifications for coaches.
 - ★ 25% provide opportunities for active transportation for students to/from school.
- ▶ 80% of school administrators indicate that their schools or school boards have agreements with a municipality regarding the shared use of school or municipal facilities, whereas 46% indicate that they have agreements regarding shared programming and resources (2015 OPASS, CFLRI).²³⁹
- ▶ 81% of school administrators report that their schools or school boards have agreements with sport organizations or physical activity clubs about the use of school facilities, whereas 51% have agreements regarding shared programming and resources (e.g., instructors, officials, equipment) (2015 OPASS, CFLRI).²³⁹
- ▶ School administrators in Canada report that a number of amenities are available on-site at school, including equipment for physical activity (97%), gymnasiums (94%), playing fields (88%), other green spaces or play areas (88%), paved areas used for active games (80%), outdoor basketball hoops (78%) and areas with playground equipment (71%) (2015 OPASS, CFLRI).²⁴⁰

- ▶ School administrators in Canada report the following (2015 OPASS, CFLRI):
 - ✱ Their students have access to bicycle racks (80%) and change rooms (74%) during school hours.²⁴¹
 - ✱ A number of facilities are available off-site near schools, including other green spaces (89%), playing fields (84%), skating rinks (82%), areas with playground equipment (78%), baseball diamonds (75%) and walking/bicycling trails (74%).²⁴²
 - ✱ Students' needs for PE and extracurricular physical activity programs are met quite or very well when it comes to the availability of indoor facilities (76%) and outdoor facilities (65%) located on school grounds.²⁴³
 - ✱ Students' needs for other types of physical activity and play are met quite or very well when it comes to indoor facilities (46%) and outdoor facilities (59%) located on school grounds.²⁴³
- ▶ School administrators report that the following are “not very much of a barrier” or “not a barrier at all”: competing emphasis on other school subjects (33%), competing demands for facilities (38%), lack of equipment (54%) and lack of qualified coaches or trained staff (54%).²⁴⁴
- ▶ School administrators indicate that the following are “not very much of a barrier” or “not a barrier at all”: negative attitudes and lack of support from teachers (63%), negative attitudes and lack of support from students (65%) and negative attitudes and lack of support from parents (67%).²⁴⁴

Research Gaps

- ▶ There is a need to understand how different school schedules (e.g., different start time, different recess numbers and lengths, etc.) influence students' movement behaviours during the school day and outside school hours.
- ▶ Research is needed to explore the characteristics of school-based physical activity policies to identify which policies support children's movement and which require additional attention.

Recommendations

- ▶ Schools should give students a voice and involve them in the development of their physical activity curriculum, policies and outdoor play spaces.
- ▶ Indoor recesses caused by inclement weather should not be spent on screens. Consider other indoor options that will get students moving more (e.g., free play in gym, active games in classroom).
- ▶ Schools should move away from a “risk assessment” approach toward a “risk-benefit assessment” approach when assessing the safety of their physical activity play spaces and opportunities. A good starting point would be to use *The Risk Benefit Assessment for Outdoor Play: A Canadian Toolkit*, which is available at www.outdoorplaycanada.ca/wp-content/uploads/2020/02/risk-benefit-assessment-for-outdoor-play-a-canadian-toolkit.pdf.

Literature Synthesis

During the months of September to June, children and youth spend approximately seven hours per weekday at school. Schools are uniquely positioned to positively influence levels of physical activity as they reach the vast majority of children and youth, regardless of gender, race, ethnicity or family circumstances. Thus, it is not surprising that many policies and research studies have targeted the school environment to improve healthy behaviours in children and youth. Integrating physical activity into the school day is associated with a number of benefits. For example, providing children with longer recess times (≥ 20 min per day)²⁴⁵ and more ways to be active (e.g., hula-hooping, trampolining)²⁴⁶ are each associated with lower rates of obesity. In addition, providing physical activity breaks during class time is associated with improved classroom behaviour (e.g., staying on task)²⁴⁷ and enhanced academic performance.^{248,249}

Canadian Childcare Centres: Policy Update

Children's physical activity and, in some instances, allowed screen time within childcare centres is legislated at the provincial level in Canada. In the past five years, eight of the 13 provinces and territories have updated their physical activity legislation.²⁵⁰ To date, all provinces and territories have legislation that includes general recommendations regarding physical activity and time allocated for outdoor play (weather permitting). However, differences exist among provinces regarding this legislation. For example, only the Northwest Territories and Nunavut state specific requirements for the amount of time (30 minutes per day) allocated to physical activity, whereas Ontario, Prince

Edward Island and the Yukon state that children should be provided with opportunities for active or vigorous play but do not outline a specific duration. With regard to outdoor play, most provinces and territories state that children should be provided with outdoor play time, but only Ontario and Nova Scotia provide specific requirements for the amount of time allocated to outdoor play (~ 2 hours per day). Outdoor play space requirements also vary between provinces, with Alberta, Quebec and New Brunswick specifying smaller outdoor space requirements (≥ 4 m² per child) than British Columbia, Saskatchewan, Manitoba, Nova Scotia and Prince Edward Island (≥ 7 m² per child). New Brunswick was the only province that had regulations regarding screen viewing time, which state that television watching should not be part of daily programming for children. All other provinces and territories provide no guidance regarding screen viewing (e.g., television, computers, tablets).

Policy Implementation at the School Level

Research shows that teachers are more likely to implement physical activity policies into their classrooms if they confidently know how to implement those policies;²⁵¹ even a single physical activity training session is enough for teachers to successfully integrate physical activity into classroom time.²⁵² From the perspective of students, primary school students surveyed across northwestern Ontario said they are more likely to engage in physical activity if the activity is enjoyable and provides a sense of accomplishment/leads to skill-building. In contrast, students said they are less likely to engage in physical activity if they feel uncomfortable due to being less fit or less skilled than their peers.²⁵³

School-Based Physical Activity Interventions

Interventions implemented in schools to promote physical activity have shown mixed results, with some showing an increase in physical activity²⁵⁴ and others showing no change.²⁵⁵ A major difference between successful and unsuccessful physical activity interventions appears to be teacher buy-in to the program.^{252,255,256} For example, an American study that explored the characteristics of school programs that successfully implemented student-oriented physical activity programs (outside of PE classes) found that having a champion (i.e., teachers who were strong advocates of physical activity programming) was central to the success of both program implementation and long-term sustainability.²⁵⁶ In addition, research shows that teaching students (grades 5 to 6) about healthy behaviours while providing them with a sense of ownership of their behaviours and actions leads them to maintain these positive behaviours, as well as positively impacts the health behaviours of their families.²⁵⁷ Encouraging students to be their own champions is also important for the adoption and maintenance of positive physical activity behaviours long-term.

Contributing Factors and Disparities

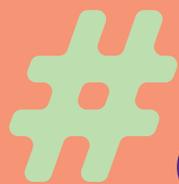
Data from CFLRI show several regional differences with respect to availability of facilities on school grounds.²⁴⁰ Schools in the largest communities are less likely than those in smaller communities to report the availability of skating rinks, and schools with the largest population sizes are least likely to report availability of areas with playground equipment compared to schools with smaller populations.²⁴⁰ CFLRI data also show that compared to the national average:²⁴⁰

- ▶ Schools in the Atlantic region are less likely to report the availability of baseball diamonds on school grounds.
- ▶ Schools in the west are more likely to report the availability of baseball diamonds, playing fields, areas with playground equipment, and bicycle racks on school grounds.
- ▶ Schools in Quebec are more likely to report the availability of dance studios and skating rinks, yet fewer schools in Quebec report the availability of playing fields and other green spaces or play areas with equipment for physical activity, and baseball diamonds.
- ▶ Schools in Ontario are more likely to report the availability of playing fields, but fewer report skating rinks and areas with playground equipment on school grounds.

School Time

Active Time





Community & Environment



The benchmarks for this indicator relate to community policy and programming, availability of infrastructure (e.g., parks, playgrounds), and neighbourhood safety and the natural environment. This year's grade remains a B+ and has not changed from the previous Report Card. Available data show that many municipalities in Canada have important infrastructure needs (e.g., maintenance, repair, improvements) that prevent the indicator from being assigned a higher grade.

Year	2010	2011	2012	2013	2014	2015	2016	2018	2020
Grade	Community Policy & Programming				B+	B+	A-	B+	B+
	D/B+*	D/B+*	D/B+*	B					
	Availability of Facilities, Programs, Parks & Playgrounds								
	B	A-	A-	A-					
Natural Environment									
	B	B	B+	B+					
School Infrastructure & Equipment									
	—	Inc**	Inc**	Inc**					
Benchmark	<ul style="list-style-type: none"> ▶ Percentage of children or parents who perceive their community/municipality is doing a good job at promoting physical activity (e.g., variety, location, cost, quality). ▶ Percentage of communities/municipalities that report they have policies promoting physical activity. ▶ Percentage of communities/municipalities that report they have infrastructure (e.g., sidewalks, trails, paths, bike lanes) specifically geared toward promoting physical activity. ▶ Percentage of children or parents who report having facilities, programs, parks and playgrounds available to them in their community. ▶ Percentage of children or parents who report living in a safe neighbourhood where they can be physically active. ▶ Percentage of children or parents who report having well-maintained facilities, parks and playgrounds in their community that are safe to use. 								
<p>* In the years prior to 2013, there were two separate indicators: Municipal Policies & Regulations and Community Programming. In 2013, these indicators were collapsed into a single indicator: Community Policy & Programming.</p> <p>** This indicator has been in the Report Card since 2011 and was called Nature & the Outdoors until this year.</p>									

Key Findings

- ▶ Among municipalities in Canada with at least 1,000 residents, as many as one-third have policies that relate to physical activity (2015 Survey of Physical Activity Opportunities in Canadian Communities [SPAOCC], CFLRI):
 - ★ Between one-quarter and one-third have a policy requiring safe pedestrian and bicycle routes when:
 - developing new areas in their community (38%)²⁵⁸
 - reconstructing roads in their community (34%)²⁵⁸
 - retrofitting existing communities (25%)²⁵⁸
 - ★ 35% have formal strategies for physical activity and sport opportunities for residents in the community.²⁵⁹
 - ★ 24% have a formal transportation master plan.²⁶⁰
 - ★ 22% have a formal plan regarding active transportation.²⁶⁰
- ▶ Among municipalities in Canada with at least 1,000 residents, the majority report the presence of facilities that support community physical activity and sport (2015 SPAOCC, CFLRI):
 - ★ 93% have parks and green spaces.²⁶¹
 - ★ 90% have baseball or softball diamonds.²⁶¹
 - ★ 88% have ice rinks.²⁶¹
 - ★ 84% have soccer or football fields.²⁶¹
 - ★ 82% have a walkable or pedestrian-friendly downtown core.²⁶²
 - ★ 81% have community centres, halls or shared facilities.²⁶¹
 - ★ 79% have tennis or racquetball courts.²⁶¹
 - ★ 78% have multi-use trails which are closed to vehicles.²⁶²



- ★ 75% have school safety zones with reduced speed limits.²⁶²
- ★ 73% have basketball courts.²⁶¹
- ★ 73% have playing and climbing structures.²⁶¹
- ★ 67% have arenas.²⁶¹
- ★ 65% have gyms.²⁶¹
- ★ 62% have crossing guards at intersections.²⁶²
- ▶ 86% of municipalities in Canada with at least 1,000 residents collaborate with schools or school boards when developing physical and sport opportunities (2015 SPAOCC, CFLRI).²⁶³

- ▶ Among municipalities in Canada with at least 1,000 residents, approximately half report having important infrastructure needs (2015 SPAOCC, CFLRI):
 - ★ 59% report that improvements in the networking of trails, paths and sidewalks represent an important infrastructure need in the community.²⁶⁴
 - ★ Close to half of administrators report that repair, maintenance and improvements to existing facilities are important, including:²⁶⁴
 - the repair of outdoor sport and recreational facilities (46%)
 - improved linkages of bicycle pathways and lanes with roadways (46%)
 - repair of indoor sport and recreational facilities (43%)
 - maintenance of walking, bicycling and multi-purpose trails (43%)
 - maintenance of playgrounds and green spaces (42%)
- ▶ Among municipalities in Canada with at least 1,000 residents, 65% of municipal administrators report that more walking, bicycling or multi-purpose trails are the most pressing infrastructure need for increasing physical activity. Other pressing needs within many communities include more indoor sport and recreation facilities (54%), more outdoor sport and recreation facilities (49%) and more playgrounds and green spaces (30%) (2015 SPAOCC, CFLRI).²⁶⁴
- ▶ Less than 20% of parents report that crime, traffic or poorly maintained sidewalks are an issue in their neighbourhood (based on a subsample of the 2014-15 PAM, CFLRI).
- ▶ 71% of children and youth in grades 6 to 10 in Canada agree or strongly agree that there are good places in their neighbourhood to spend their free time (e.g., leisure centres, parks) (2018 HBSC, PHAC).^{Custom analysis}
- ▶ 81% of children and youth in grades 6 to 10 in Canada agree or strongly agree that it is safe for younger children to play outside during the day (2018 HBSC, PHAC).^{Custom analysis}
- ▶ Among municipalities in Canada with at least 1,000 residents, 26% strongly agree that low levels of lighting on sidewalks and streets discourages walking or bicycling at night.²⁶⁴
- ▶ Among municipalities in Canada with at least 1,000 residents, 14% strongly agree that the amount of crime on streets discourages walking or bicycling.²⁶⁴
- ▶ The homicide rate in Canada in 2016 for all ages (1.68 per 100,000) is essentially unchanged from 2015 (1.70 per 100,000) (2015-16 Uniform Crime Reporting Survey [UCRS], Statistics Canada).²⁶⁵

Outdoor Play

- ▶ Although police-reported violent crime has declined overall, sexual violations against children increased by 30% in 2016 (14.66 per 100,000 in 2015 vs. 19.06 per 100,000 in 2016), with luring a child via a computer being the second largest group of violations (21% or 1,295 incidents) (2015-16 UCRS, Statistics Canada).²⁶⁶
 - ★ The rate of luring a child via a computer in 2016 (3.57 per 100,000) is 19% higher than in 2015 (3.00 per 100,000) (2015-16 UCRS, Statistics Canada).²⁶⁵
 - ★ **Note:** It is important to note that, for the violations included in “sexual violations against children,” differences in police-reported statistics between geographic areas or across time may be influenced by levels of reporting to police, as well as by single incidents that include several victims. In addition, certain police services dedicate special units to investigate these types of crime, which can also impact differences by geographic areas or changes over time. Similar to sexual assaults in general, the number of sexual violations against children is also expected to be an underestimate due to compounding factors that are likely to impact reporting, such as reliance on an adult to bring the incident to the attention of police. In addition, sexual offences against children can be delayed in coming to the attention of the police and those reported may have occurred in previous years.²⁶⁶
- ▶ The child abduction rate (by non-parents/non-guardians) in Canada in 2016 for children and youth under 14 years of age (0.32 per 100,000) is 14% lower than in 2015 (0.37 per 100,000) (2015-16 UCRS, Statistics Canada).²⁶⁵

Research Gaps

- ▶ Municipal policies may have a significant impact on the development of environments that provide sustainable opportunities for individuals to engage in healthy, active lifestyles. Little is known about how community planning in Canada integrates strategies to promote physical activity. Official community plans of cities could be systematically examined to identify policies supportive of physical activity and/or gaps in policy provision that can be rectified.²⁶⁷
- ▶ In general, most Canadians report the presence of facilities that support community physical activity and sport. Research is needed that examines how to promote greater uptake of those community-based programs and facilities.
- ▶ Health economic analyses and policy evaluations that incorporate case studies and natural experiments are needed in order to translate research on the built environment into the development of effective policy and planning initiatives that promote healthy active living.

Recommendations

- ▶ Communities should dedicate part of their capital plan to recreation facility revitalization.
- ▶ All parents and children should have access to inclusive out-of-school-time physical activity programs.²⁶⁸
- ▶ Municipal policies or bylaws that restrict physical activity or outdoor play for children and youth should be revisited for their appropriateness and severity in curtailing use of outdoor community spaces for physical activity.

Literature Synthesis

A child's community and environment, and the cultural norms surrounding these, can positively influence their physical activity. Identifying factors such as community, environment and cultural norms are therefore important to understand how physical activity of children and youth can be improved in Canada.

Diversity and Physical Activity

Understanding whether ethnically diverse communities differ in physical activity can help inform future health promotion strategies. A recent study of physical activity habits of children across Canada showed that girls speaking languages other than English or French at home were less active than their Anglophone and Francophone peers.²⁶⁹ Similar observations have been made in other countries; non-Dutch children tend to be more sedentary than their Dutch counterparts.²⁷⁰ In the United States, a recent assessment of programs and policies designed to promote physical activity in children showed that these initiatives were associated with improvements in physical activity among non-Hispanic children, but were not effective among Hispanic children.²⁷¹ Together, these data suggest that cultural and community-level factors need to be considered when designing physical activity-based community initiatives.



Indigenous Populations

Health promotion strategies targeting early childhood are one suggested method for mitigating the negative health effects of intergenerational trauma exposure among Indigenous people in Canada.²⁷² A recent study that involved in-depth interviews with parents identified the importance of integrating knowledge about Indigenous ways of life, including traditional foods and physical activities (e.g., hunting, dancing, traditional games connected to the land and the outdoors), into such health promotion strategies.²⁷² Similarly, caregivers interviewed across six First Nation communities in northeastern Ontario reported that physical activity patterns among children were different from previous generations, in that colonialist activities such as technology-oriented sedentary time was replacing outdoor play and activities.²⁷³ In fact, physical activity programming that takes place in the natural environment can support youth in feeling connected to their culture and identities.²⁷² Ultimately, understanding how physical activity fits in an Indigenous health promotion context is important in promoting and maintaining physical activity among Indigenous children and youth.²⁷⁴



#Healthy

#Movement

Green Space in the Built Environment and Physical Activity in Children and Youth

Access to nature and green space is strongly associated with positive physical health and greater physical activity.²⁷⁵ Among a sample of high school students in Quebec, the number of parks or green spaces within a 750-metre radius of school was positively related to physical activity during leisure time in both girls and boys.²⁷⁶ Similarly, green space was found to be related to afterschool leisure-time physical activity among 10- to 12-year-old Dutch school children.²⁷⁷ In 2019, a systematic review highlighted evidence of positive relationships between certain attributes of the neighbourhood built environment, including access to a yard and increased green space, and time spent by children and youth in outdoor play.²⁷⁸

Community- and Environment-Based Initiatives to Promote Physical Activity Among Children and Youth

A number of studies have focused on creative ways to promote physical activity within neighbourhoods and communities. Play Streets, or streets that are temporarily closed to traffic to create safe outdoor play areas, are showing promise for increasing physical activity levels and instilling a sense of community among children.^{279,280}

The Act-i-pass program is one example of a community-based initiative. Since September 2014, this initiative has offered complimentary passes to various recreational centres (e.g., the YMCA) and programs (e.g., dance and organized sport programs) to Grade 5 students in London, Ontario.²⁸¹ Today, this initiative is still ongoing. Evaluation of the program's impact found that children who received the access pass were much more physically active toward the end of the school year than they were at the beginning of the year.²⁸¹ This increase in physical activity levels was seen even in groups of students

who were typically less interested in engaging in physical activity, including girls, visible minorities and newcomers to Canada. Part of its success may be due to the fact that the program incentivizes students to access opportunities for physical activity in a geographic area beyond the confines of their neighbourhood, as it has been suggested that children may prefer to access physical activity resources outside of their home neighbourhood.²⁸²

Contributing Factors and Disparities

Children's beliefs about barriers to physical activity are related to their physical activity levels.²⁸³ A 2018 study of 8- to 14-year-olds in Ontario explored community and environmental factors related to children's perceptions of barriers to physical activity in their neighbourhoods.²⁸⁴ Findings showed that girls, children belonging to visible minority groups and children in low-income families were more likely than their counterparts to report barriers to physical activity. Additional findings revealed that children tended to identify different barriers to physical activity based on the type of environment in which they lived. For example, children living in large suburban cities were more likely to say they felt crime was a barrier to being active in their neighbourhood compared to children living in small rural towns. Indeed, community and environmental contexts may considerably shape child perceptions of barriers to physical activity. Therefore, to reduce health behaviour inequality, it is important that physical activity promotion efforts are designed with the unique needs of different groups of children in mind.

Strategies & Investments

These indicators speak to various sources of funding, infrastructure and policies that impact children's movement behaviours



#Government



B-

This year's grade is a B- and represents a slight improvement from the C+ assigned in 2018. The grade change reflects several observable, direct efforts to increase children's and youths' physical activity in Canada.

Year	2010	2011	2012	2013	2014	2015	2016	2018	2020
Grade	Federal Government Strategies & Investments				C	B-	B-	C+	B-
	C+/F*	C/F*	D/F*	C-					
Grade	Provincial/Territorial Government Strategies & Investments				C	B-	B-	C+	B-
	B+/C-**	B+/C-**	B+/C-**	C					
Benchmark	<ul style="list-style-type: none"> ▶ Evidence of leadership and commitment in providing physical activity opportunities for all children and youth. ▶ Allocated funds and resources for the implementation of physical activity promotion strategies and initiatives for all children and youth. ▶ Demonstrated progress through the key stages of public policy making (i.e., policy agenda, policy formation, policy implementation, policy evaluation and decisions about the future). 								
	<p>* From 2010 to 2012, there were two separate indicators: Strategies and Investments. In 2013, these indicators were collapsed into a single indicator.</p> <p>** From 2010 to 2012, there were two separate indicators: Strategies and Investments. In 2013, these indicators were collapsed into a single indicator.</p>								

Key Findings

- ▶ The 2018 federal budget highlighted the government's commitment to improving the country's physical activity levels by pledging to invest \$5 million per year for five consecutive years (totalling \$25 million) in ParticipACTION.²⁸⁵
- ▶ Approximately \$2 million per year has been committed by Sport Canada to support ParticipACTION's efforts to increase sport participation (up until March 2021).²⁸⁵
- ▶ The 2018 federal budget announced \$30 million over three years to support data, research and innovative practices to promote women's and girls' participation in sport, and \$47.5 million over five years as well as \$9.5 million per year ongoing to expand the use of sport for social development in more than 300 Indigenous communities.²⁸⁵
- ▶ In May 2018, federal, provincial and territorial ministers responsible for sport, physical activity and recreation released *A Common Vision for Increasing Physical Activity and Reducing Sedentary Living in Canada: Let's Get Moving!* – a pan-Canadian physical activity policy framework to guide and stimulate coordinated and collaborative policies and actions to increase physical activity and reduce sedentary behaviour among all Canadians across the life course.¹ In 2020, PHAC pledged \$1.2 million to support the implementation of the *Common Vision* in partnership with provinces, territories and the non-governmental sector. An additional \$120,000 was provided by the provinces and territories to assist with implementation efforts.
- ▶ *Budget 2017* committed \$21.9 billion to support social infrastructure – including sport and recreational infrastructure – in Canadian communities.²⁸⁶ This budget proposed to invest \$18.9 million over five years – and ongoing funding of \$5.5 million on a four-year cycle thereafter – to support Indigenous youth and sport initiatives.
- ▶ To complete, enhance and maintain the Trans Canada Trail, in partnership with the provinces and individual Canadians, *Budget 2017* proposed to invest \$30 million over five years, starting in 2017-18, to be delivered through the Parks Canada Agency.²⁸⁷
 - ★ More than \$3 million of this funding is earmarked for active transportation, including walking school buses and biking-to-school programs that create more physical activity opportunities for students.^{288,289}
- ▶ According to representatives from federal, provincial and territorial governments, 92% note having policies and programs that support increasing physical activity and reducing sedentary behaviour among Canadians, including policies and programs for children and youth (2019 ParticipACTION).^{Custom analysis}
- ▶ Almost 70% of federal, provincial and territorial governments report that funds invested in physical activity programming for children and youth has remained the same over the past fiscal years, while close to 10% of provinces/territories noted a decrease and 25% an increase (2019 ParticipACTION).^{Custom analysis}
- ▶ Over 90% of federal, provincial and territorial governments reported modifying or adapting their respective physical activity policies and programs to better align with the *Common Vision* (2019 ParticipACTION).^{Custom analysis}



Research Gaps

- ▶ Research is needed to gain a better understanding of what is required in financial, human and program resources to reverse negative trends in physical activity and sedentary behaviour in Canadian children and youth.
- ▶ There is an ongoing need to implement common tools and metrics for measuring all movement behaviours (physical activity, sedentary behaviour and sleep) at the national level, as well as within each province and territory. Measurement efforts should include assessment of the impact of the social determinants of health on physical activity for children and youth, such as socio-economic status, education, neighbourhood and physical environment, social support networks and access to health promotion services, all of which are important for improving health and reducing health disparities.
- ▶ Natural experiments such as the introduction of new physical activity, sport or recreation policies and programs, including those outside of leisure-time recreation and sport, should be evaluated, with the outcomes and results documented and impact shared.
- ▶ More insight is required on the extent to which governments are subsidizing the cost of children and youth participation in organized sport and recreation programs.

Recommendations

- ▶ Enhance collaboration and alignment across federal, provincial, territorial and local governments; academia; health charities; the non-governmental sector, including child- and youth-serving organizations; the private sector, including social purpose organizations that support innovation and experimentation; and with international players, to develop, support and sustain physical activity policy and program development, research and surveillance, and evaluation.
- ▶ Give voice to children and youth by engaging them directly in national, regional and local efforts to conceive, design, develop, implement and evaluate physical activity policies, programs and services, including unstructured physical activity and utilitarian physical activity whose primary purpose is to accomplish work, chores, errands or travel in accordance with one's cultural values and practices.
- ▶ Provide leadership development, training and community capacity building for those living in rural or remote communities, including Indigenous Canadians, as well as for new Canadians and marginalized populations.
- ▶ Work with other domestic and international organizations to add to current understanding of the investment required to increase population physical activity in Canada.

#Active Transportation

- ▶ Enhance capacity and consistency in childcare settings and schools to provide opportunities to develop physical literacy, such as through curriculum-based physical activity delivered by qualified instructors.
- ▶ Invest in training around understanding the importance of the natural and outdoor environment as it relates to play education.
- ▶ Governments at all levels should intentionally address people who are at the greatest risk for inactivity, by supporting policies that eliminate disparities that impact physical activity levels.
- ▶ Three distinct but integrated national policy frameworks exist to advance physical activity opportunities for Canadians across sport (*Canadian Sport Policy*), recreation (*A Framework for Recreation in Canada: Pathways to Well-Being*) and physical activity (*A Common Vision for Increasing Physical Activity and Reducing Sedentary Living in Canada: Let's Get Moving!*). The *Common Vision* identifies opportunities for alignment and convergence of policy and program opportunities to increase population physical activity across all three frameworks, including among children and youth.
 - * In implementing these policy frameworks, governments should provide tools and other forms of support to practitioners on how to use these frameworks interdependently to align sport, recreation and physical activity programs as well as other opportunities for children and youth, where appropriate.

Key National and Provincial/Territorial Physical Activity Policies and Programs

National

- ▶ The Public Health Agency of Canada invests approximately \$20 million annually in projects through its *Multisectoral Partnerships to Promote Healthy Living and Prevent Chronic Disease Initiative*, which tests or scales innovative ideas to encourage behaviour changes that will positively impact the health of Canadians. Current funding is provided to nine projects targeting children and youth, and seven projects that target children and youth together with other population groups. Project examples include:²⁹⁰
 - * The *Alliance Wellness and Rehabilitation – Healthy Kids Initiative* supports youth who are overweight through a 12-week program that provides daily physical activity and access to weekly healthy eating and mental well-being sessions. Parents of the youths are included and encouraged to attend the weekly sessions. Some parents, or family members, also serve as the daily ‘workout buddy’ for the youths, a mandatory requirement for this initiative.
 - * The *Nose Creek Sports & Recreation Association (Vivo) initiative* offers facilitated, unstructured outdoor play for children and families in north-central Calgary, Alberta. Through volunteers and professionals trained to be successful Play Ambassadors, the project aims to increase access to enhanced outdoor play environments and to encourage children and their families to participate in a range of physical activities.

- ▶ The Government of Canada encourages sport participation and physical activity through strategic investments in Canada’s sport system. These investments include funding to help children and youth and under-represented groups (e.g., women and girls, persons with a disability, Indigenous peoples) participate in sport and physical activity through a number of activities managed by Sport Canada.²⁹¹ Concussions in sport and sport development pathways are also key areas of focus.
- ▶ From 2019-2022, Sport Canada has released the *Innovation Initiative of the Sport Support Program*, which enables the testing of innovative quality sport approaches and the trial of new programs, strategies and technologies in order to develop evidence-based solutions that can be shared nationwide.²⁹²
- ▶ In response to the Truth and Reconciliation Commission of Canada, the *Sport for Social Development in Indigenous Communities* (SSDIC) funds eligible organizations to deliver sport for social development projects in Indigenous communities in Canada.²⁹³
- ▶ Sport Canada provides funding to *Canadian Tire Jumpstart and KidSport*. Both programs seek to provide sport equipment or cover registration fees for children and youth in families that would normally be excluded due to financial barriers.
- ▶ *go!PEI* is a province-wide physical activity initiative designed to remove barriers to participating in physical activity by offering programs and opportunities for physical activity at the local level at low/no cost to participants. Within this program, there is an afterschool play-based component and community come-try events to expose Islanders to physical activity opportunities.²⁹⁵
- ▶ The *New Brunswick Wellness Strategy* (2016-2021) includes a goal to increase physical activity among all New Brunswickers, including children and youth. Consistent with Canadian physical activity guidelines, it recommends that children and youth accumulate 60 minutes of moderate to vigorous physical activity daily, as well as limit screen time and sedentary behaviour. The New Brunswick School Wellness Grant provides financial resources to schools to support the implementation of Comprehensive School Health, including increasing physical activity opportunities for students.
- ▶ *Let’s Get Moving Nova Scotia* is an action plan to create a more active, inclusive and healthier population.²⁹⁶ The plan calls for education, improved access to funding, and partnerships with the private and public sectors to increase physical activity across the province. It builds on existing physical activity networks, programs and resources, and addresses gaps to make it easier for all Nova Scotians to move more and sit less. It builds on the Canada’s pan-Canadian physical activity policy framework.¹

Provincial and Territorial

- ▶ The Newfoundland and Labrador *Participation Nation Play 4 Fun Program* is an adult/guardian and child initiative that promotes physical activity and nutrition among students from kindergarten to Grade 3 in the early evening once a week. Play 4 Fun includes activities involving fundamental movement skills and modified games that are run by a facilitator where a child and their guardian participate together.²⁹⁴
- ▶ The Quebec Policy on Physical Activity, Sport and Recreation, *Quebecers on the Move!*, aims to get all Quebecers, including children and youth, to participate more regularly in physical, sport and recreational activities as a valued part of everyday life. *Quebecers on the Move!* applies to both structured and unstructured participation in all kinds of activities: play, sport



(discovery, introduction to basics, recreational participation, competition, high performance), fitness, recreation, outdoor activities, dance and active transportation.²⁹⁷

- ▶ Ontario's *After School Program* provides funding to help not-for-profit organizations, municipalities and Indigenous groups deliver quality programs for children and youth in priority neighbourhoods across the province. The program aims to help children and youth get active, develop healthy eating habits, gain confidence and do better in school.²⁹⁸
- ▶ The Manitoba *Healthy Together Now Program* is a community-led, regionally coordinated and government-supported grassroots program to help prevent chronic disease in Manitoba. It aims to increase physical activity and reduce sedentary behaviours among children and youth in a family context. Projects are planned and led by individual communities while the Manitoba government and regional health authorities provide funding, support and training. The program operates in five regional health authorities, and targets Manitobans who are most at risk for chronic disease in rural, urban, First Nations and Métis communities.²⁹⁹
- ▶ *Active Saskatchewan* is a network of individuals and organizations focused on working together to create a province where physical activity is the cultural norm.³⁰⁰ It aims to lead, mobilize and build partnerships and networks to take action that inspires and supports people to move more and sit less. Its strategic plan (2019-22) is uniquely positioned to lead a Saskatchewan implementation strategy that aligns with and builds on Canada's pan-Canadian physical activity policy framework.¹
- ▶ Alberta Education supports the *Alberta Daily Physical Activity (DPA) Initiative*. Alberta DPA aims to increase students' physical activity levels. It is based on the belief that healthy students are better able to learn and that school communities provide supportive environments for students to develop positive habits needed for a healthy, active lifestyle. The DPA Policy calls on school authorities to ensure that all students in grades 1 to 9 are physically active for a minimum of 30 minutes daily through activities that are organized by the school.



- ▶ British Columbia's *Generation Health* is an early intervention program for families of children who are overweight and focuses on supporting family changes to health behaviours such as healthy eating, physical activity, screen time and sleep. The program is focused on practical, fun activities that build both the parent/caregiver's and the child's skills to make lasting changes.³⁰¹
- ▶ The Nunavut Department of Community and Government Services, Sport and Recreation Division provides annual community grants that support the planning and delivery of sport, physical activity and recreation initiatives in schools and by not-for-profit organizations.³⁰²
- ▶ The Northwest Territories *After School Physical Activity Program (ASPAP)* provides funding to schools and community-based organizations to build on existing programs or create new physical activities for all school-aged children and youth during the afterschool time period, with a strong focus on engaging currently inactive or underactive youth. Funding projects and programs from kindergarten to Grade 12, ASPAP allows all children to participate, regardless of age, experience or physical activity level.³⁰³
- ▶ The Yukon *Active Playground Experience* program instills values and behaviours for an active healthy lifestyle through peer leadership. This program is run in partnership with classroom teachers and targets grades 6 to 8.³⁰⁴
- * With the exception of Alberta and New Brunswick, descriptions of these example initiatives were provided by provincial and territorial representatives (ParticipACTION, 2019).^{Custom analysis} Members of the RCRC selected example initiatives for the provinces of Alberta and New Brunswick.

Spotlight

Global Action Plan on Physical Activity 2018-2030

In 2013, the World Health Assembly endorsed a *Global Action Plan on the Prevention and Control of Non-Communicable Diseases* and agreed on a set of nine global voluntary targets, which include a 25% reduction in premature mortality from non-communicable diseases and a 10% relative reduction in the prevalence of insufficient physical activity by 2025. In May 2018, member states endorsed the *Global Action Plan on Physical Activity, 2018-2030*. This new global action plan to promote physical activity responds to the requests by countries for updated guidance and a framework of effective and feasible policy actions to increase physical activity at all levels. The plan sets out four objectives and recommends 20 policy actions that are universally applicable to all countries and address the multiple cultural, environmental and individual determinants of physical inactivity. ParticipACTION contributed feedback to initial drafts of this plan as part of the global review process, demonstrating Canada's commitment to and role in promoting physical activity and addressing sedentary behaviours in populations everywhere.

A Notable Highlight: The Early Years

Numerous health benefits of physical activity are seen in young children (0- to 4-year-olds). A recent systematic review of nearly 100 research studies from 36 countries found that physical activity – MVPA and total daily physical activity – is associated with improved motor development (e.g., running, jumping, hopping), cognitive development (e.g., language development, executive functioning, attention), psychosocial health (e.g., self-esteem, pro-social behaviour, aggression) and cardiometabolic health (e.g., blood pressure, insulin resistance).³⁰⁵ Additionally, in observational studies, physical activity has been found to be positively associated with favourable motor development, physical fitness (e.g., cardiorespiratory fitness) and bone/skeletal health (e.g., bone mineral density).³⁰⁵ A link also exists between physical activity and more positive body composition indicators (e.g., overweight, obesity, body mass index); however, the relationship is not as consistent in the early years as it is in older age groups.³⁰⁵

Family Influence

Physical Activity

- ▶ 62% of 3- to 4-year-olds in Canada meet the physical activity recommendation of the Canadian 24-Hour Movement Guidelines for the Early Years,⁴ which encourages 180 minutes of daily activity, of which 60 minutes should be spent in MVPA (2009-11, 2012-13 and 2014-15 CHMS, Statistics Canada).³⁰⁶
- ▶ In a regional sample of toddlers in Edmonton (n = 151), 99% met the physical activity recommendation within the Canadian 24-Hour Movement Guidelines for the Early Years (2014-15 Parents' Role in Establishing Healthy Physical Activity and Sedentary Behaviour Habits [PREPS]).³⁰⁷
- ▶ A recent systematic review and meta-analysis from 16 countries (n = 24), representing over 3,000 children, reported that toddlers engaged in approximately 247 minutes per day of total physical activity and 60 minutes per day of MVPA.³⁰⁸
- ▶ According to national estimates, 3- to 5-year-olds accumulate 195 minutes of daily, light-intensity physical activity on average and 72 minutes of daily MVPA on average.³⁰⁹ Several studies in Canada^{310,311} and abroad³¹² report generally comparable estimates of light-intensity physical activity (> 3 hours per day on average) and MVPA (> 1 hour per day on average) in preschoolers, and also provide informative physical activity profiles (e.g., time of day, weekday vs. weekend day, bout/session frequency and duration).
- ▶ **A shift in analysis.** A noticeable difference in the proportion of Canadian preschoolers now meeting the physical activity recommendation within the new Canadian 24-Hour Movement Guidelines for the Early Years⁴ (62%) appears to be a decline from previous iterations of this Report Card, where the reported proportion ranged from 70% to 84%.^{313,314} The current proportion (62%) is based on the new Guidelines (and additional data); the deviation from

previous analyses is explained, in part, by a change in the physical activity recommendation for preschoolers itself as well as the approach to analysis (as with children and youth, the operational definition for guideline adherence assessment in preschoolers now focuses on minutes of daily physical activity on average (over seven days) without regard for how many days in the past seven days this threshold is met).³⁰⁶

Organized Sport

- ▶ 46% of 3- to 4-year-olds spend time in physical activity through participation in organized lessons, or league or team sports, according to their parents (2012-13 and 2014-15 CHMS, Statistics Canada).^{Custom analysis}
- ★ Preschoolers accumulate approximately 7 minutes per day in physical activity through participation in these activities.
- ★ 13% of preschoolers accumulate at least 2 hours per week in physical activity through participation in these activities.
- ★ 33% of preschoolers accumulate less than 2 hours per week in physical activity through participation in these activities.

Sedentary Behaviours

- ▶ 24% of 3- to 4-year-olds in Canada meet the screen time recommendation (< 1 hour screens/day) within the Canadian 24-Hour Movement Guidelines for the Early Years (2009-11, 2012-13 and 2014-15 CHMS, Statistics Canada).³⁰⁶
- ▶ 3- to 4-year-olds in Canada spend 1.9 hours per day in screen time, according to their parents (2012-13, 2014-15 CHMS, Statistics Canada).^{Custom analysis}

- ▶ In a regional sample of toddlers from Edmonton, Alberta, 15% met the screen time recommendation within the Canadian 24-Hour Movement Guidelines for the Early Years (2014-15 PREPS).
- ▶ A recent systematic review and meta-analysis (n = 24) from 16 countries, representing over 3,000 children, reported that toddlers engaged in approximately 337 min/day of sedentary behaviours.³⁰⁸
- ▶ A recent systematic review of research in the early years (0- to 4-year-olds) found that screen time is sometimes negatively associated with body composition, motor development, cognitive development and indicators of psychosocial health (e.g., self-regulation, pro-social behaviour, aggression), while non-screen-based sedentary time (e.g., reading, storytelling) is sometimes positively associated with cognitive development.³¹⁵

Sleep

- ▶ 84% of 3- to 4-year-olds in Canada meet the sleep recommendation of 10-13 hours of sleep per night on average (2009-11, 2012-13, 2014-15 CHMS, Statistics Canada).³⁰⁶
 - * Preschoolers are asleep for 10.6 hours per night, according to their parents (2012-13, 2014-15 CHMS, Statistics Canada).^{Custom analysis}
- ▶ The systematic reviews that helped inform the Canadian 24-Hour Movement Guidelines for the Early Years⁴ reveal that short sleep duration is associated with excess body weight, poorer emotional regulation, impaired growth, poorer academic achievement, more screen time, higher risk of injuries and lower quality of life/well-being.³¹⁶

24-Hour Movement Behaviours

- ▶ Released in November 2017, the Canadian 24-Hour Movement Guidelines for the Early Years⁴ combine recommendations for physical activity, sedentary behaviour and sleep, highlighting the interrelationship between all three behaviours. These guidelines were developed by the Canadian Society for Exercise Physiology; HALO-CHEO; the Faculty of Kinesiology, Sport and Recreation at the University of Alberta; PHAC; ParticipACTION; and a group of leading researchers from Canada and around the world, with input from more than 600 national and international stakeholders.
- ▶ 13% of 3- to 4-year-olds in Canada meet all three components of the Canadian 24-Hour Movement Guidelines for the Early Years (2009-15 CHMS, Statistics Canada).³¹⁶
 - * A high proportion of 3- to 4-year-olds in Canada meet the physical activity (62%) and sleep (84%) recommendations, but only a quarter (24%) meet the screen time recommendation.³¹⁶
- ▶ More research on napping as it relates to sleep and health outcomes is needed for young children. Napping is generally not included in national surveys but is part of the Canadian 24-Hour Movement Guidelines for the Early Years.
- ▶ Research is needed to better inform the sleep consistency piece of the Canadian 24-Hour Movement Guidelines for the Early Years. The specific surveillance recommendation is that bedtime and wake-up times should not vary by more than ± 30 minutes each, including on weekends. However, this is not supported by robust evidence and work needs to be done to better support this specific surveillance recommendation.

The Influence of the Childcare Environment

- ▶ As with the school setting, the childcare setting offers potential for physical activity promotion in the early years, which is an important avenue for increased efforts, given that many young children spend substantial portions of their day in these venues.³¹⁷
- ▶ Current evidence suggests that in Canadian centre-based childcare settings, children are more physically active outdoors (approximately 40% of the time) compared to indoors (approximately 20% of the time).³¹⁸ However, almost 60% of time spent outdoors is sedentary.³¹⁸
- ▶ The first systematic review of research on physical activity levels among preschoolers in home-based childcare settings found that physical activity appears to be well below the recommended 180 minutes per day, but also varies substantially by study; therefore, further research is warranted.³¹⁹
- ▶ A recent systematic review (n = 55) that focused on centre-based childcare highlighted wide ranges of physical activity participation among preschoolers, but consistently noted high sedentary time in this group.³²⁰
- ▶ No significant differences in habitual daily or hourly rates of physical activity or sedentary time were noted among a nationally representative sample of preschoolers from four childcare environments (centre-based, home-based, stayed at home with parent, school).³²¹
- ▶ When three different early learning environments were compared in Ontario (centre-based childcare, home-based childcare and full-day kindergarten), children in full-day kindergarten accumulated more MVPA than children in the other two environments and also accumulated more daily physical activity at any intensity compared to those in a centre-based childcare environment.³¹⁷



- ▶ Interventions targeting physical activity behaviours in childcare centres are showing evidence of success for improving activity levels.
 - ★ The Supporting Physical Activity in the Childcare Environment (SPACE)³²² study – a three-component intervention trial targeting modified outdoor playtime schedule (shorter, more frequent bouts), the addition of portable play equipment, and staff training for early childhood educators – was found to increase preschoolers' total physical activity and MVPA in London, Ontario.

Parental Influence

- ▶ A recent study that examined parent and child physical activity and sedentary behaviour in early childhood found that higher parental screen time, sedentary time, light physical activity and MVPA was significantly associated with higher child screen time, sedentary time, light physical activity and MVPA, respectively, in a large representative sample of Canadian 3- to 5-year-olds.³²³
 - ★ The strength of relationships did not differ between weekdays and weekend days, sons and daughters, or mothers and fathers.

Abbreviations

ABCD

Adolescent Brain Cognitive Development

ADHD

Attention deficit hyperactivity disorder

AHKGA

The Active Healthy Kids Global Alliance

ASPAP

After School Physical Education Program

Can-ALE

Canadian Active Living Environment Database

CANPLAY

Canadian Physical Activity Levels Among Youth study

CAPL

Canadian Assessment of Physical Literacy

CAPL-2

Canadian Assessment of Physical Literacy, 2nd edition

CFLRI

Canadian Fitness and Lifestyle Research Institute

CHEO

Children's Hospital of Eastern Ontario

CHMS

Canadian Health Measures Survey

COMPASS

Cohort Study for Obesity, Marijuana Use, Physical Activity, Alcohol Use, Smoking and Sedentary Behaviour

CS4L

Canadian Sport 4 Life

DPA

Daily Physical Activity

GIS

Global Information System

GPS

Global Positioning System

HALO

Healthy Active Living and Obesity Research Group

HBSC

Health Behaviour in School-Aged Children study

MVPA

Moderate- to vigorous-intensity physical activity

OPASS

Opportunities for Physical Activity at School Study

PAM

Physical Activity Monitor

PE

Physical Education

PHAC

Public Health Agency of Canada

PHE

Physical Health and Education

PLAY

Physical Literacy Assessment for Youth

PREPS

Parents' Role in Establishing Healthy Physical Activity and Sedentary Behaviour Habits

RBC

Royal Bank of Canada

RCRC

Report Card Research Committee

SHAPES-PEI

School Health Action Planning and Evaluation System – Prince Edward Island

SPACE

Supporting Physical Activity in the Childcare Environment

SPA OCC

Survey of Physical Activity Opportunities in Canadian Communities

SSDIC

Sport for Social Development in Indigenous Communities

UCRS

Uniform Crime Reporting Survey

WHO

World Health Organization

Summary of Indicators

Indicator Name	Benchmark(s)	2020 Report Card Grades				
		0-19%	20-39%	40-59%	60-79%	80-100%
		F	D	C	B	A
Daily Behaviours						
Overall Physical Activity	Percentage of children and youth who meet the physical activity recommendation within the Canadian 24-Hour Movement Guidelines for Children and Youth (at least 60 minutes of daily MVPA, on average)		D+			
Active Play	Percentage of children and youth who engage in active play and non-organized/unstructured leisure activities for several hours (> 2) a day.	F				
Active Transportation	Percentage of children and youth who typically use active transportation to get to and from places (e.g., school, park, mall, friend's house).		D-			
Organized Sport	Percentage of children and youth who participate in organized sport programs.				B	
Physical Education	Percentage of students in grades K-8 receiving at least 150 minutes of PE per week. Percentage of high school students taking PE. Percentage of students in grades K-8 receiving DPA in provinces that have DPA policies.		D+			
Sedentary Behaviours	Percentage of children and youth who meet the screen time recommendation within the Canadian 24-Hour Movement Guidelines for Children and Youth (no more than two hours of recreational screen time per day on average).		D+			
Sleep	Percentage of children and youth who meet the sleep recommendation within the Canadian 24-Hour Movement Guidelines for Children and Youth (5- to 13-year-olds: 9-11 hours per night, on average; 14- to 17-year-olds: 8-10 hours per night, on average).				B	
24-Hour Movement Behaviours	Percentage of children and youth who meet the physical activity, screen time and sleep recommendations within the Canadian 24-Hour Movement Behaviour Guidelines for Children and Youth.	F				
Individual Characteristics						
Physical Literacy	Percentage of children and youth who meet the recommended levels of physical competence, knowledge and understanding, motivation and confidence and daily behaviours needed for a physically active lifestyle.		D+			
Physical Fitness	Average percentile of cardiorespiratory fitness achieved based on age- and sex-specific international normative data. Percentage of children and youth who meet criterion-referenced standards for muscular strength. Percentage of children and youth who meet criterion-referenced standards for muscular endurance. Percentage of children and youth who meet criterion-referenced standards for flexibility.		D			

2020 Report Card Grades

0-19%	20-39%	40-59%	60-79%	80-100%
F	D	C	B	A

Indicator Name

Benchmark(s)

Strategies & Investments

Household

Percentage of parents who facilitate physical activity and sport opportunities for their children (e.g. volunteering, coaching, driving, paying for membership fees and equipment).

Percentage of parents who meet the Canadian Physical Activity Guidelines for Adults.

Percentage of parents who are physically active with their kids.

Percentage of children and youth with friends and peers who encourage and support them to be physically active.

Percentage of children and youth who encourage and support their friends to be physically active

C

School

Percentage of schools with active school policies (e.g., daily PE, DPA, recess, "everyone plays" approach, bike racks at school, traffic calming on school property, outdoor time).

Percentage of schools where the majority (≥ 80%) of students are taught by a PE specialist.

Percentage of schools where the majority (≥ 80%) of students are offered at least 150 minutes of PE per week.

Percentage of schools that offer physical activity opportunities (excluding PE) to the majority (≥ 80%) of their students.

Percentage of parents who report their children and youth have access to physical activity opportunities at school in addition to PE classes.

Percentage of schools with students who have regular access to facilities and equipment that support physical activity (e.g., gymnasium, outdoor playgrounds, sporting fields, multipurpose space for physical activity, equipment in good condition).

Percentage of schools reporting that competing priorities (e.g., for resources, equipment, facilities) and/or attitudes (e.g., teachers, parents, children) are not major barriers to PE delivery and physical activity promotion at school.

B-

Community & Environment

Percentage of children or parents who perceive their community/municipality is doing a good job at promoting physical activity (e.g., variety, location, cost, quality).

Percentage of communities/municipalities that report they have policies promoting physical activity.

Percentage of communities/municipalities that report they have infrastructure (e.g., sidewalks, trails, paths, bike lanes) specifically geared toward promoting physical activity.

Percentage of children or parents who report having facilities, programs, parks and playgrounds available to them in their community.

Percentage of children or parents who report living in a safe neighbourhood where they can be physically active.

Percentage of children or parents who report having well-maintained facilities, parks and playgrounds in their community that are safe to use.

B+

Strategies & Investments

Government

Evidence of leadership and commitment in providing physical activity opportunities for all children and youth.

Allocated funds and resources for the implementation of physical activity promotion strategies and initiatives for all children and youth.

Demonstrated progress through the key stages of public policy making (i.e., policy agenda, policy formation, policy implementation, policy evaluation and decisions about the future).

B-

Methodology & Data Sources

Unlike other report card publications, which often rely on a single data source, the ParticipACTION Report Card synthesizes data from multiple data sources and the research literature. The development of indicators and the assignment of grades involve an interdisciplinary Report Card Research Committee, including researchers from across Canada. A biennial summary of research data and literature is prepared by staff within HALO-CHEO (www.haloresearch.ca) to facilitate the review of the information. Grade assignments are determined based on examination of the current data and literature for each indicator against a benchmark or optimal scenario, assessing the indicator to be incomplete, poor, adequate, good or excellent:



A+	94%–100%
A	We are succeeding with a large majority of children and youth (87%–93%)
A-	80%–86%
B+	74%–79%
B	We are succeeding with well over half of children and youth (67%–73%)
B-	60%–66%
C+	54%–59%
C	We are succeeding with about half of children and youth (47%–53%)
C-	40%–46%
D+	34%–39%
D	We are succeeding with less than half but some children and youth (27%–33%)
D-	20%–26%
F	We are succeeding with very few children and youth (< 20%)
INC	Incomplete – insufficient or inadequate information to assign a grade

National data take precedence over sub-national and regional data, and objectively measured data take precedence over subjectively measured data. Although no longer factoring into grade assignments, trends over time and the presence of disparities are highlighted where applicable. Disparities are primarily based on disabilities, race/ethnicity, immigration status, geography (provincial/territorial comparisons), socio-economic status, urban/rural setting, gender and age (e.g., adolescence).

A given indicator grade is assigned after applying weightings to the key findings in order to provide a more fair and valid representation of the overall proportion of children and youth meeting a given benchmark. This is important because how the key findings are weighted can have considerable impact on the eventual letter grade for an indicator.

Some indicators are stand-alone, while others are comprised of several components. During the grade assignment meeting, each component of an indicator is assessed. Over the evolution of the Report Card, there has been an attempt to move toward indicators that are broad enough to contain various components in their assessment so that indicators can become more consistent from year to year.

The following are major data sources used in the 2020 Report Card:

Canadian Health Measures Survey (CHMS; goo.gl/dnZ41C): The Canadian Health Measures Survey, launched in 2007, is collecting key information relevant to the health of Canadians by means of direct physical measurements such as blood pressure, height, weight, physical fitness and physical activity (via accelerometers). In addition, the survey is collecting blood and urine samples to test for chronic and infectious diseases, as well as nutrition and environment markers. Through household interviews, the CHMS is gathering information related to nutrition, smoking habits, alcohol use, medical history, current health status, sexual behaviour, lifestyle and physical activity, the environment and housing characteristics, as well as demographic and socio-economic variables.

Canadian Physical Activity Levels Among Youth study (CANPLAY; www.cflri.ca): The Canadian Fitness and Lifestyle Research Institute conducted an annual major national survey to examine physical activity levels of children and youth. CANPLAY studied the current fitness and physical activity patterns of young people in Canada. Approximately 10,000 children and youth (approximately 6,000 families) were randomly selected across Canada. The study was conducted from 2005 to 2016. Pedometers were used to measure the number of steps taken daily by each participant. CANPLAY was a joint venture of the Canadian Fitness and Lifestyle Research Institute and the Interprovincial Sport and Recreation Council.

Cohort Study for Obesity, Marijuana Use, Physical Activity, Alcohol Use, Smoking and Sedentary Behaviour (COMPASS; www.uwaterloo.ca/compass-system): The COMPASS study, which started in 2012-13, focuses on youth health behaviours and continues to be funded by the Canadian Institutes of Health Research and Health Canada. It is being conducted and led by researchers at the University of Waterloo in collaboration with researchers at the University of Alberta, the University of British Columbia and the University of Toronto:

- ▶ Participating students in grades 9 to 12 are surveyed once annually.
- ▶ COMPASS tracks any changes made to the school's health policies and programs over time.
- ▶ Each year, participating schools receive a detailed feedback report, which will include evidence-based recommendations for health policy and program improvement.
- ▶ COMPASS has support staff and resources available to schools to help them translate these recommendations into action.

This is the first time in Canada and the world that a survey will allow us to see changes in youth health behaviours over time; determine whether changes to school health policies and programs are effective; and work directly with schools to implement change.

Opportunities for Physical Activity at School Study (OPASS; www.cflri.ca):

The content of the 2015 OPASS was designed to explore the availability and composition of PE programming at school, determine the availability and adequacy of facilities and opportunities for physical activity, explore the provision of extracurricular physical activities, examine policies related to physical activity at school, and describe the broader physical and social environments at school. The survey consisted of a self-completed questionnaire that was mailed to a total of 8,000 Canadian schools. The survey was conducted by the CFLRI with funding support from the Interprovincial Sport and Recreation Council, and in partnership with PHE Canada.

Physical Activity Monitor (PAM; www.cflri.ca):

The PAM is a telephone survey conducted by the CFLRI that tracks changes in physical activity patterns, factors influencing participation, and life circumstances in Canada. As such, it tracks outcome indicators of the efforts to increase physical activity among Canadians. To date, 19 waves of PAM have been completed, with theme content cycled in and out across planned periods.

Health Behaviour in School-Aged Children Survey (HBSC; www.hbsc.org):

Results are based on the Canadian data from the World Health Organization's 2018 HBSC. The HBSC is a repeated cross-sectional survey conducted every four years. The survey consists of a classroom-based questionnaire. The sample was designed according to the international HBSC protocol in that a cluster design was used, with the school class being the basic cluster and the distribution of the students reflected in the distribution of Canadians in grades 6 to 10 (ages 10 to 16). Canadian schools were selected for this study using a weighted probability technique to ensure that the sample is representative of regional

geography and key demographic features such as religion, community size, school size and language of instruction. Schools from each province and territory, as well as urban and rural locations, are represented. The Canadian HBSC was approved by the Queen's University General Research Ethics Board. Consent was obtained from the participating school boards, individual schools, parents and students. Student participation is voluntary. The HBSC includes three main components: 1) a questionnaire completed by students that asks about their health behaviours (such as physical activity and active transportation), lifestyle factors and demographics; 2) an administrator questionnaire distributed to each school principal that inquires about school demographics, policy, infrastructure and the school neighbourhood setting; and 3) geographic information systems (GIS) measures of built and social features in the school neighbourhoods.

Survey of Physical Opportunities in Canadian Communities (www.cflri.ca)

The content of the 2015 Survey of Physical Opportunities in Canadian Communities is designed to explore the availability of policies and programming, the availability and adequacy of facilities and infrastructure, and the broader physical and social environments for physical activity within Canadian communities. The survey consists of a self-completed questionnaire that was mailed to a total of 4,000 communities across Canada. The survey was conducted by the CFLRI and funded by the Interprovincial Sport and Recreation Council.



References for Full Report

1. Public Health Agency of Canada. A common vision for increasing physical activity and reducing sedentary living in Canada: Let's get moving. Ottawa; 2018. URL: www.canada.ca/en/public-health/services/publications/healthy-living/lets-get-moving.html.
2. Tremblay MS, Carson V, Chaput JP, Connor Gorber S, Dinh T, Duggan M, Faulkner G, Gray CE, Gruber R, Janson K, Janssen I, Katzmarzyk PT, Kho ME, Latimer-Cheung AE, LeBlanc C, Okely AD, Olds T, Pate RR, Phillips A, Poitras VJ, Rodenburg S, Sampson M, Saunders TJ, Stone JA, Stratton G, Weiss SK, Zehr L. Canadian 24-hour movement guidelines for children and youth: An integration of physical activity, sedentary behaviour, and sleep. *Appl Physiol Nutr Metab*. 2016;41:S311-S327.
3. Canadian Society for Exercise Physiology. Canadian 24-hour movement guidelines for children and youth (5-17 years): An integration of physical activity, sedentary behaviour, and sleep. Ottawa: Canadian Society for Exercise Physiology; 2017. URL: csepguidelines.ca/children-and-youth-5-17.
4. Canadian Society for Exercise Physiology. Canadian 24-Hour Movement Guidelines for the Early Years (0-4 years): an integration of physical activity, sedentary behaviour, and sleep. Ottawa: Canadian Society for Exercise Physiology; 2017. URL: csepguidelines.ca/early-years-0-4.
5. ParticipACTION. The Brain + Body Equation: Canadian kids need active bodies to build their best brains. The 2018 ParticipACTION Report Card on Physical Activity for Children and Youth. Toronto: ParticipACTION; 2018.
6. Thivel D, Masurier J, Baquet G, Timmons BW, Pereira B, Berthoin S, Duclos M, Aucouturier J. High-intensity interval training in overweight and obese children and adolescents: Systematic review and meta-analysis. *J Sports Med Phys Fitness*. 2019;59:310-324.
7. Eddolls WTB, McNarry MA, Lester L, Winn CON, Stratton G, Mackintosh KA. The association between physical activity, fitness and body mass index on mental well-being and quality of life in adolescents. *Qual Life Res*. 2018;27:2313-2320.
8. Proudfoot NA, King-Dowling S, Cairney J, Bray SR, MacDonald MJ, Timmons BW. Physical activity and trajectories of cardiovascular health indicators during early childhood. *Pediatr*. 2019;144:e20182242.
9. Tan VP, Macdonald HM, Gabel L, McKay HA. Physical activity, but not sedentary time, influences bone strength in late adolescence. *Arch Osteoporos*. 2018;13:31.
10. Kehrig AM, Bjorkman K, Muhajarine N, Johnston JD, Kontulainen SA. Moderate to vigorous physical activity and impact loading independently predict variance in bone strength at the tibia but not at the radius in children. *Appl Physiol Nutr Metab*. 2019;44:326-331.
11. Exupério IN, Agostinete RR, Werneck AO, Maillane-Vanegas S, Luiz-de-Marco R, Mesquita EDL, Kemper HCG, Fernandes RA. Impact of artistic gymnastics on bone formation marker, density and geometry in female adolescents: ABCD growth study. *J Bone Metab*. 2019;26:75-82.
12. Tarp J, Child A, White T, Westgate K, Bugge A, Grøntved A, Wedderkopp N, Andersen LB, Cardon G, Davey R, Janz KF, Kriemler S, Northstone K, Page AS, Puder JJ, Reilly JJ, Sardinha LB, van Sluijs EMF, Ekelund U, Wijndaele K, Brage S; International Children's Accelerometry Database (ICAD) Collaborators. Physical activity intensity, bout-duration, and cardiometabolic risk markers in children and adolescents. *Int J Obes*. 2018;42:1639-1650.
13. Quante M, Cespedes Feliciano EM, Rifas-Shiman SL, Mariani S, Kaplan ER, Rueschman M, Oken E, Taveras EM, Redline S. Association of daily rest-activity patterns with adiposity and cardiometabolic risk measures in teens. *J Adolesc Health*. 2019;65:224-231.
14. Carson V, Tremblay MS, Chaput JP, McGregor D, Chastin S. Compositional analyses of the associations between sedentary time, different intensities of physical activity, and cardiometabolic biomarkers among children and youth from the United States. *PLoS One*. 2019;14:e0220009.
15. Kelley GA, Kelley KS, Pate RR. Exercise and adiposity in overweight and obese children and adolescents: a systematic review with network meta-analysis of randomised trials. *BMJ Open*. 2019;9:e031220.
16. Zeng N, Ayyub M, Sun H, Wen X, Xiang P, Gao Z. Effects of physical activity on motor skills and cognitive development in early childhood: A systematic review. *Biomed Res Int*. 2017;2017:2760716.
17. Martin A, Booth JN, Laird Y, Sproule J, Reilly JJ, Saunders DH. Physical activity, diet and other behavioural interventions for improving cognition and school achievement in children and adolescents with obesity or overweight. *Cochrane Database Syst Rev*. 2019. In press.
18. Bidzan-Bluma I, Lipowska M. Physical activity and cognitive functioning of children: A systematic review. *Int J Environ Res Public Health*. 2018;15:e800.
19. Benzing V, Chang YK, Schmidt M. Acute physical activity enhances executive functions in children with ADHD. *Sci Rep*. 2018;8:12382.
20. Chaddock-Heyman L, Erickson KI, Kienzler C, Drollette ES, Raine LB, Kao SC, Bensken J, Weissshappel R, Castelli DM, Hillman CH, Kramer AF. Physical activity increases white matter microstructure in children. *Front Neurosci*. 2018;12:950.
21. Christiansen L, Beck MM, Bilberg N, Wienecke J, Astrup A, Lundbye-Jensen J. Effects of exercise on cognitive performance in children and adolescents with ADHD: Potential mechanisms and evidence-based recommendations. *J Clin Med*. 2019;8:e841.
22. Valkenborghs SR, Noetel M, Hillman C, Nilsson M, Smith J, Ortega F, Lubans DR. The impact of physical activity on brain structure and function in youth: A systematic review. *Pediatrics*. 2019 Oct;144:e20184032.
23. Rodriguez-Ayllon M, Derks IPM, van den Dries M, Esteban-Cornejo I, Labrecque JA, Yang-Huang J, Raat H, Vernooij MW, White T, Ortega FB, Tiemeier H, Muetzel RL. Associations of physical activity and screen time with white matter microstructure in children from the general population. *Neuroimage*. 2019;205:116258.

24. Syväoja HJ, Kankaanpää A, Kallio J, Hakonen H, Kulmala J, Hillman CH, Pesonen AK, Tammelin TH. The relation of physical activity, sedentary behaviors, and academic achievement is mediated by fitness and bedtime. *J Phys Act Health*. 2018;15:135-143.
25. Singh AS, Saliassi E, van den Berg V, Uijtdewilligen L, de Groot RHM, Jolles J, Andersen LB, Bailey R, Chang YK, Diamond A, Ericsson I, Etnier JL, Fedewa AL, Hillman CH, McMorris T, Pesce C, Pühse U, Tomporowski PD, Chinapaw MJM. Effects of physical activity interventions on cognitive and academic performance in children and adolescents: a novel combination of a systematic review and recommendations from an expert panel. *Br J Sports Med*. 2019;53:640-647.
26. Burns RD, Fu Y, Brusseau TA, Clements-Nolle K, Yang W. Relationships among physical activity, sleep duration, diet, and academic achievement in a sample of adolescents. *Prev Med Rep*. 2018;12:71-74.
27. Alghadir AH, Gabr SA, Iqbal ZA, Al-Eisa E. Association of physical activity, vitamin E levels, and total antioxidant capacity with academic performance and executive functions of adolescents. *BMC Pediatr*. 2019;19:156.
28. Dumuid D, Maher C, Lewis LK, Stanford TE, Martín Fernández JA, Ratcliffe J, Katzmarzyk PT, Barreira TV, Chaput JP, Fogelholm M, Hu G, Maia J, Sarmiento OL, Standage M, Tremblay MS, Tudor-Locke C, Olds T. Human development index, children's health-related quality of life and movement behaviors: a compositional data analysis. *Qual Life Res*. 2018;27:1473-1482.
29. Doja A, Bookwala A, Pohl D, Rossi-Ricci A, Barrowman N, Chan J, Longmuir PE. Relationship between physical activity, tic severity and quality of life in children with tourette syndrome. *J Can Acad Child Adolesc Psychiatry*. 2018;27:222-227.
30. Wilkie HJ, Standage M, Gillison FB, Cumming SP, Katzmarzyk PT. Correlates of intensity-specific physical activity in children aged 9-11 years: a multilevel analysis of UK data from the International Study of Childhood Obesity, Lifestyle and the Environment. *BMJ Open*. 2018;8:e018373.
31. Moeijes J, van Busschbach JT, Bosscher RJ, Twisk JWR. Sports participation and psychosocial health: A longitudinal observational study in children. *BMC Public Health*. 2018;18:702.
32. Guddal MH, Stensland SØ, Småstuen MC, Johnsen MB, Zwart JA, Storheim K. Physical activity and sport participation among adolescents: associations with mental health in different age groups. Results from the Young-HUNT study: A cross-sectional survey. *BMJ Open*. 2019;9:e028555.
33. Bélanger M, Gallant F, Doré I, O'Loughlin JL, Sylvestre MP, Abi Nader P, Larouche R, Gunnell K, Sabiston CM. Physical activity mediates the relationship between outdoor time and mental health. *Prev Med Rep*. 2019;16:101006.
34. Loewen OK, Maximova K, Ekwaru JP, Faught EL, Asbridge M, Ohinmaa A, Veugelaers PJ. Lifestyle behavior and mental health in early adolescence. *Pediatr*. 2019;143:e201883307.
35. Jarraya S, Wagner M, Jarraya M, Engel FA. 12 weeks of kindergarten-based yoga practice increases visual attention, visual-motor precision and decreases behavior of inattention and hyperactivity in 5-year-old children. *Front Psychol*. 2019;10:796.
36. Liu S, Xiao T, Yang L, Loprinzi PD. Exercise as an alternative approach for treating smartphone addiction: A systematic review and meta-analysis of random controlled trials. *Int J Environ Res Public Health*. 2019;16:e3912.
37. Kleppang AL, Hartz I, Thurston M, Hagquist C. The association between physical activity and symptoms of depression in different contexts - a cross-sectional study of Norwegian adolescents. *BMC Public Health*. 2018;18:1368.
38. He JP, Paksarian D, Merikangas KR. Physical activity and mental disorder among adolescents in the United States. *J Adolesc Health*. 2018;63:628-635.
39. Li N, Zhao P, Diao C, Qiao Y, Katzmarzyk PT, Chaput JP, Fogelholm M, Kuriyan R, Kurpad A, Lambert EV, Maher C, Maia J, Matsudo V, Olds T, Onywera V, Sarmiento OL, Standage M, Tremblay MS, Tudor-Locke C, Hu G; ISCOLE Research Group. Joint associations between weekday and weekend physical activity or sedentary time and childhood obesity. *Int J Obes*. 2019;43:691-700.
40. Menon S, Philipperi A, Ratnasingham S, Manson H. The integrated role of multiple healthy weight behaviours on overweight and obesity among adolescents: a cross-sectional study. *BMC Public Health*. 2019;19:1157.
41. Bélair MA, Kohen DE, Kingsbury M, Colman I. Relationship between leisure time physical activity, sedentary behaviour and symptoms of depression and anxiety: evidence from a population-based sample of Canadian adolescents. *BMJ Open*. 2018;8:e021119.
42. Uddin R, Burton NW, Maple M, Khan SR, Tremblay MS, Khan A. Low physical activity and high sedentary behaviour are associated with adolescents' suicidal vulnerability: evidence from 52 low- and middle-income countries. *Acta Paediatr*. 2019. In press.
43. Marques A, Peralta M, Santos T, Martins J, Gaspar de Matos M. Self-rated health and health-related quality of life are related with adolescents' healthy lifestyle. *Public Health*. 2019;170:89-94.
44. Marques A, Demetriou Y, Tesler R, Gouveia ÉR, Peralta M, Matos MG. Healthy lifestyle in children and adolescents and its association with subjective health complaints: Findings from 37 countries and regions from the HBSC study. *Int J Environ Res Public Health*. 2019;16:e3292.
45. Bawaked RA, Fernández-Barrés S, Navarrete-Muñoz EM, González-Palacios S, Guxens M, Irizar A, Lertxundi A, Sunyer J, Vioque J, Schröder H, Vrijheid M, Romaguera D. Impact of lifestyle behaviors in early childhood on obesity and cardiometabolic risk in children: Results from the Spanish INMA birth cohort study. *Pediatr Obes*. 2019. In press.
46. Canadian Fitness and Lifestyle Research Institute. Bulletin 8: Achieving sufficient steps per day among Canadian children and youth. Ottawa, ON: Canadian Fitness and Lifestyle Research Institute; 2018.
47. Canadian Fitness and Lifestyle Research Institute. Bulletin 1: Physical activity levels of Canadian children and youth. Ottawa, ON: Canadian Fitness and Lifestyle Research Institute; 2017.
48. Harvard T.H. Chan School of Public Health. Measuring physical activity. Harvard T.H. Boston, MA: Harvard T.H. Chan School of Public Health. URL: www.hsph.harvard.edu/nutritionsource/mets-activity-table.

49. Colley RC, Carson V, Garriguet D, Janssen I, Roberts KC, Tremblay MS. Physical activity of Canadian children and youth, 2007 to 2015. *Health Rep.* 2017;28(10):8-16.
50. Guthold R, Stevens GA, Riley LM, Bull FC. Global trends in insufficient physical activity among adolescents: A pooled analysis of 298 population-based surveys with 1·6 million participants. *Lancet Child Adolesc Health.* 2019;4:23-35.
51. Tremblay MS. Challenges in global surveillance of physical activity. *Lancet Child Adolesc Health.* 2019;4:2-3.
52. Aubert S, Barnes JD, Abdeta C, Abi Nader P, Adeniyi AF, Aguilar-Farias N, Andrade Tenesaca DS, Bhawra J, Brazo-Sayavera J, Cardon G, Chang CK, Delisle Nyström C, Demetriou Y, Draper CE, Edwards L, Emeljanovas A, Gába A, Galaviz KI, González SA, Herrera-Cuenca M, Huang WY, Ibrahim IAE, Jürimäe J, Kämppi K, Katapally TR, Katewongsa P, Katzmarzyk PT, Khan A, Korcz A, Kim YS, Lambert E, Lee EY, Löf M, Loney T, López-Taylor J, Liu Y, Makaza D, Manyanga T, Mileva B, Morrison SA, Mota J, Nyawornota VK, Ocansey R, Reilly JJ, Roman-Viñas B, Silva DAS, Saonuam P, Scriven J, Seghers J, Schranz N, Skovgaard T, Smith M, Standage M, Starc G, Stratton G, Subedi N, Takken T, Tammelin T, Tanaka C, Thivel D, Tladi D, Tyler R, Uddin R, Williams A, Wong SHS, Wu CL, Zembura P, Tremblay MS. Global matrix 3.0 physical activity report card grades for children and youth: Results and analysis from 49 countries. *J Phys Act Health.* 2018;15:S251-S273.
53. Aubert S, Barnes JD, Aguilar-Farias N, Cardon G, Chang CK, Delisle Nyström C, Demetriou Y, Edwards L, Emeljanovas A, Gába A, Huang WY, Ibrahim IAE, Jürimäe J, Katzmarzyk PT, Korcz A, Kim YS, Lee EY, Löf M, Loney T, Morrison SA, Mota J, Reilly JJ, Roman-Viñas B, Schranz N, Scriven J, Seghers J, Skovgaard T, Smith M, Standage M, Starc G, Stratton G, Takken T, Tammelin T, Tanaka C, Thivel D, Tyler R, Williams A, Wong SHS, Zembura P, Tremblay MS. Report card grades on the physical activity of children and youth comparing 30 very high human development index countries. *J Phys Act Health.* 2018;15:S298-S314.
54. González SA, Barnes JD, Nader PA, Andrade DST, Brazo-Sayavera J, Galaviz KI, Herrera-Cuenca M, Katewongsa P, López-Taylor J, Liu Y, Mileva B, Avilés AMO, Silva DAS, Saonuam P, Tremblay MS. Report Card grades on the physical activity of children and youth from 10 countries with high human development index: Global Matrix 3.0. *J Phys Act Health.* 2018;15:S284-S297.
55. Manyanga T, Barnes JD, Adeniyi AF, Bhawra J, Draper CE, Katapally TR, Khan A, Lambert E, Makaza D, Nyawornota VK, Ocansey R, Subedi N, Uddin R, Tladi D, Tremblay MS. Indicators of physical activity among children and youth in nine countries with low-to-medium human development indices: A Global Matrix 3.0 paper. *J Phys Act Health.* 2018;15:S274-S283.
56. Active Healthy Kids Global Alliance. Global Matrix 3.0. Ottawa: Active Healthy Kids Global Alliance; 2018. URL: www.activehealthykids.org/global-matrix/3-0.
57. Barnes JD, Aubert S, Vanderloo L, Tremblay MS. Canada's 2018 report card on physical activity of children and youth: Leading or lagging in comparison to the Global Matrix 3.0 findings? Poster presentation at The International Society of Behavioral Nutrition and Physical Activity Annual Meeting, Prague, 2019.
58. Love R, Adams J, Atkin A, van Sluijs E. Socioeconomic and ethnic differences in children's vigorous intensity physical activity: A cross-sectional analysis of the UK Millennium Cohort Study. *BMJ Open.* 2019;9:e027627.
59. Sigmundová D, Sigmund E, Tesler R, Ng KW, Hamrik Z, Mathisen FKS, Inchley J, Bucksch J. Vigorous physical activity in relation to family affluence: time trends in Europe and North America. *Int J Public Health.* 2019;64:1049-1058.
60. LeBlanc AG, Broyles ST, Chaput JP, Leduc G, Boyer C, Borghese MM, Tremblay MS. Correlates of objectively measured sedentary time and self-reported screen time in Canadian children. *Int J Behav Nutr Phys Act.* 2015;12:38.
61. LeBlanc AG, Katzmarzyk PT, Barreira TV, Broyles ST, Chaput JP, Church TS, Fogelholm M, Harrington DM, Hu G, Kuriyan R, Kurpad A. Correlates of total sedentary time and screen time in 9–11 year-old children around the world: the international study of childhood obesity, lifestyle and the environment. *PLoS one.* 2015;10:e0129622.
62. Healy S, Aigner CJ, Haeghele JA, Patterson F. Meeting the 24-hr movement guidelines: An update on US youth with autism spectrum disorder from the 2016 National Survey of Children's Health. *Autism Res.* 2019;12:941-951.
63. Tandon PS, Sasser T, Gonzalez ES, Whitlock KB, Christakis DA, Stein MA. Physical activity, screen time, and sleep in children with ADHD. *J Phys Act Health.* 2019;16:416-422.
64. Lin J, Magiati I, Chiong SHR, Singhal S, Riard N, Ng IH, Muller-Riemenschneider F, Wong CM. The relationship among screen use, sleep, and emotional/behavioral difficulties in preschool children with neurodevelopmental disorders. *J Dev Behav Pediatr.* 2019;40:519-529.
65. Pohl D, Alpous A, Hamer S, Longmuir PE. Higher screen time, lower muscular endurance, and decreased agility limit the physical literacy of children with epilepsy. *Epilepsy Behav.* 2019;90:260-265.
66. McMullen J, McCrindle B, Dell S, Feldman B, Longmuir PE. Understanding parent perceptions of healthy physical activity for their child with a chronic medical condition: A cross-sectional study. *Pediatrics and Child Health.* 2019;24:e135-e141.
67. Patterson C, So S, DeAngelis M, Ghent E, Southmayd D, Carpenter C. Physical activity experiences in children post-liver transplant: Developing a foundation for rehabilitation interventions. *Pediatr Transplant.* 2018;22:e13179.
68. Wurz A, Daeggelmann J, Albinati N, Kronlund L, Chamorro-Viña C, Culos-Reed SN. Physical activity programs for children diagnosed with cancer: an international environmental scan. *Support Care Cancer.* 2019;27:1153-1162.
69. Coleman N, Nemeth BA, LeBlanc CMA. Increasing wellness through physical activity in children with chronic disease and disability. *Curr Sports Med Rep.* 2018;17:425-432.
70. West SL, Banks L, Schneiderman JE, Caterini JE, Stephens S, White G, Dogra S, Wells GD. Physical activity for children with chronic disease; a narrative review and practical applications. *BMC Pediatr.* 2019;19:12.
71. Boyes NG, Stickland MK, Fusnik S, Hogeweide E, Fries JTJ, Haykowsky MJ, Baril CL, Runalls S, Kakadekar A, Pharis S, Pockett C, Bradley TJ, Wright KD, Erlandson M, Tomczak CR. Physical activity modulates arterial stiffness in children with congenital heart disease: A CHAMPS cohort study. *Congenit Heart Dis.* 2018;13:578-583.

72. Lankhorst K, Takken T, Zwinkels M, van Gaalen L, Velde ST, Backx F, Verschuren O, Wittink H, de Groot J. Sports participation, physical activity, and health-related fitness in youth with chronic diseases or physical disabilities: The health in adapted youth sports study. *J Strength Cond Res*. 2019. In press.
73. Reinders NJ, Branco A, Wright K, Fletcher PC, Bryden PJ. Scoping review: Physical activity and social functioning in young people with autism spectrum disorder. *Front Psychol*. 2019;10:120.
74. Lin Y, Borghese M, Janssen I. Bi-directional association between sleep and outdoor active play among 10-13 year olds. *BMC Public Health*. 2018;18:224.
75. Truelove S, Vanderloo LM, Tucker P. Defining and measuring active play among young children: a systematic review. *J Phys Act Health*. 2017;14:155-166.
76. IKEA. Play report 2017: a spark of play every day. Delft: IKEA; 2017. URL: www.ikea.com/ms/en_JP/pdf/reports-downloads/ikea_play_report_2017.pdf
77. Larouche R, Mire EF, Belanger K, Barreira TV, Chaput JP, Fogelholm M, Hu G, Lambert EV, Maher C, Maia J, Olds T, Onywera V, Sarmiento OL, Standage M, Tudor-Locke C, Katzmarzyk PT, Tremblay MS, ISCOLE Research Group. Relationships between outdoor time, physical activity, sedentary time, and body mass index in children: A 12-country study. *Pediatr Exerc Sci*. 2019;31:118-129.
78. Fitzpatrick C, Alexander S, Henderson M, Barnett TA. Prospective associations between play environments and pediatric obesity. *Am J Health Promot*. 2019;33:541-548.
79. Porter RM, Tindall A, Gaffka BJ, Kirk S, Santos M, Abraham-Pratt I, Gray J, Heckler D, Ward WL, Tucker JM, Sweeney B. A review of modifiable risk factors for severe obesity in children ages 5 and under. *Child Obes*. 2018;14:468-476.
80. Rodriguez-Ayllon M, Derks IPM, van den Dries M, Esteban-Cornejo I, Labrecque JA, Yang-Huang J, Raat H, Vernooij MW, White T, Ortega FB, Tiemeier H, Muetzel RL. Associations of physical activity and screen time with white matter microstructure in children from the general population. *Neuroimage*. 2019;205:116258.
81. Hinkley T, Brown H, Carson V, Teychenne M. Cross sectional associations of screen time and outdoor play with social skills in preschool children. *PLoS One*. 2018;13:e0193700.
82. Chaput JP, Tremblay MS, Katzmarzyk PT, Fogelholm M, Mikkilä V, Hu G, Lambert EV, Maher C, Maia J, Olds T, Onywera V, Sarmiento OL, Standage M, Tudor-Locke C, LeBlanc AG; ISCOLE research group. Outdoor time and dietary patterns in children around the world. *J Public Health*. 2018;40:e493-e501.
83. Vlaar J, Brussoni M, Janssen I, Mâsse LC. Roaming the neighbourhood: Influences of independent mobility parenting practices and parental perceived environment on children's territorial range. *Int J Environ Res Public Health*. 2019;16:e3129.
84. Boxberger K, Reimers AK. Parental correlates of outdoor play in boys and girls aged 0 to 12: A systematic review. *Int J Environ Res Public Health*. 2019;16:e190.
85. Borghese MM, Janssen I. Development of a measurement approach to assess time children participate in organized sport, active travel, outdoor active play, and curriculum-based physical activity. *BMC Public Health*. 2018;18:396.
86. Priebe CS, Latimer-Cheung AE, Berry T, O'Reilly N, Rhodes RE, Spence JC, Tremblay MS, Faulkner G. Make room for play: An evaluation of a campaign promoting active play. *J Health Commun*. 2019;24:38-46.
87. Wilkie HJ, Standage M, Gillison FB, Cumming SP, Katzmarzyk PT. The home electronic media environment and parental safety concerns: relationships with outdoor time after school and over the weekend among 9-11 year old children. *BMC Public Health*. 2018;18:456.
88. Colley RC, Christidis T, Michaud I, Tjepkema M, Ross NA. The association between walkable neighbourhoods and physical activity across the lifespan. *Health Rep*. 2019;30(9):3-13.
89. Delisle Nyström C, Barnes JD, Blanchette S, Faulkner G, Leduc G, Riazi NA, Tremblay MS, Trudeau F, Larouche R. Relationships between area-level socioeconomic status and urbanization with active transportation, independent mobility, outdoor time, and physical activity among Canadian children. *BMC Public Health*. 2019;19:1082.
90. Larouche R, Mammen G, Rowe DA, Faulkner G. Effectiveness of active transport interventions: A systematic review and update. *BMC Pub Health*. 2018;18:206.
91. Mitra R, Faulkner GEJ, Buliung RN, Stone MR. Do parental perceptions of the neighbourhood environment influence children's independent mobility. *Urban Studies*. 2014;51:3401-19.
92. Schoeppe S, Duncan m, Badland H, Oliver M, Curtis C. Associations of children's independent mobility and active travel with physical activity, sedentary behaviour and weight status: a systematic review. *J Sci Med Sport*. 2013;16:312-19.
93. Tremblay MS, Barnes JD, González SA, Katzmarzyk PT, Onywera VO, Reilly JJ, Tomkinson GR; Global Matrix 2.0 Research Team. Global Matrix 2.0: Report card grades on the physical activity of children and youth comparing 38 countries. *J Phys Act Health*. 2016;13:S343-S366.
94. Healthy Active Living and Obesity Research Group. Position statement on active outdoor play. Ottawa: Healthy Active Living and Obesity Research Group; 2015. URL: www.outdoorplaycanada.ca/position-statement-on-active-outdoor-play/.
95. Prince SA, Butler GP, Rao DP, Thompson W. Evidence synthesis: Where are children and adults physically active and sedentary? A rapid review of location-based studies. *Health Promot Chronic Dis Prev Can*. 2019;39:67-103.
96. Borghese MM, Janssen I. Duration and intensity of different types of physical activity among children aged 10-13 years. *Can J Public Health*. 2019;110:178-186.
97. Williams GC, Borghese MM, Janssen I. Objectively measured active transportation to school and other destinations among 10-13 year olds. *Int J Behav Nutr Phys Act*. 2018;15:11.
98. Kek CC, García Bengoechea E, Spence JC, Mandic S. The relationship between transport-to-school habits and physical activity in a sample of New Zealand adolescents. *J Sport Health Sci*. 2019;8:463-70.
99. Ikeda E, Hinckson E, Witten K, Smith M. Assessment of direct and indirect associations between children active school travel and environmental, household and child factors using structural equation modelling. *Int J Behav Nutr Phys Act*. 2019;16:32.

100. Barranco-Ruiz Y, Paz A, Ramírez-Vélez R, Chillón P, Villa-González E. Mode of commuting to school and its association with physical activity and sedentary habits in young Ecuadorian students. *Int J Environ Res Public Health*. 2018;15:2704.
101. Salway R, Emm-Collison L, Sebire SJ, Thompson JL, Lawlor DA, Jago R. The association of school-related active travel and active after-school clubs with children's physical activity: a cross-sectional study in 11-year-old UK children. *Int J Behav Nutr Phys Act*. 2019;16:72.
102. Wilson K, Clark AF, Gilliland JA. Understanding child and parent perceptions of barriers influencing children's active school travel. *BMC Public Health*. 2018;18:1053.
103. Mandic S, Keller R, García Bengoechea E, Moore A, Coppell KJ. School bag weight as a barrier to active transport to school among New Zealand adolescents. *Children*. 2018;5:e129.
104. Fridman L, Pitt T, Rothman L, Howard A, Hagel B. Driver and road characteristics associated with child pedestrian injuries. *Accid Anal Prev*. 2019;131:248-253.
105. Rothman L, Cloutier MS, Manaugh K, Howard AW, Macpherson AK, Macarthur C. Spatial distribution of roadway environment features related to child pedestrian safety by census tract income in Toronto, Canada. *Inj Prev*. 2020.
106. Pitt TM, Nettel-Aguirre A, McCormack GR, Howard AW, Piatkowski C, Rowe BH, Hagel BE. Child and adolescent bicycling injuries involving motor vehicle collisions. *Inj Epidemiol*. 2019;6:7.
107. Elford S, Adams MD. Exposure to ultrafine particulate air pollution in the school commute: Examining low-dose route optimization with terrain-enforced dosage modelling. *Environ Res*. 2019;178:108674.
108. Gilliland J, Maltby M, Xu X, Luginaah I, Loebach J, Shah T. Is active travel a breath of fresh air? Examining children's exposure to air pollution during the school commute. *Spat Spatiotemporal Epidemiol*. 2019;29:51-57.
109. Canadian Fitness and Lifestyle Research Institute. Participation in organized physical activity and sport. Bulletin 2: Kids CAN PLAY! Bulletin Series. Ottawa, ON: Canadian Fitness and Lifestyle Research Institute.
110. Cairney J, Bulten R, King-Dowling S, Arbour-Nicitopoulos K. A longitudinal study of the effect of organized physical activity on free active play. *Med Sci Sports Exerc*. 2018;50:1772-1779.
111. Torstveit MK, Johansen BT, Haugland SH, Stea TH. Participation in organized sports is associated with decreased likelihood of unhealthy lifestyle habits in adolescents. *Scand J Med Sci Sports*. 2018;28:2384-2396.
112. Moeijes J, van Busschbach JT, Bosscher RJ, Twisk JWR. Sports participation and psychosocial health: A longitudinal observational study in children. *BMC Public Health*. 2018;18:702.
113. Agata K, Monyeki MA. Association between sport participation, body composition, physical fitness, and social correlates among adolescents: The PAHL study. *Int J Environ Res Public Health*. 2018;15:e2793.
114. Moeijes J, van Busschbach JT, Wieringa TH, Kone J, Bosscher RJ, Twisk JWR. Sports participation and health-related quality of life in children: Results of a cross-sectional study. *Health Qual Life Outcomes*. 2019;17:64.
115. Moeijes J, van Busschbach JT, Wieringa TH, Kone J, Bosscher RJ, Twisk JWR. Sports participation and health-related quality of life in children: results of a cross-sectional study. *Health Qual Life Outcomes*. 2019;17:64.
116. Brière FN, Imbeault A, Goldfield GS, Pagani LS. Consistent participation in organized physical activity predicts emotional adjustment in children. *Pediatr Res*. 2019. In press
117. Somerset S, Hoare DJ. Barriers to voluntary participation in sport for children: a systematic review. *BMC Pediatr*. 2018;18:47.
118. Russell K, Selci E, Black B, Cochrane K, Ellis M. Academic outcomes following adolescent sport-related concussion or fracture injury: A prospective cohort study. *PLoS One*. 2019;14:e0215900.
119. Brooks BL, Low TA, Plourde V, Virani S, Jadavji Z, MacMaster FP, Barlow KM, Lebel RM, Yeates KO. Cerebral blood flow in children and adolescents several years after concussion. *Brain Inj*. 2018;33:233-241.
120. Chung JS, Zynda AJ, Didehbani N, Hicks C, Hynan LS, Miller SM, Bell KR, Cullum CM. Association between sleep quality and recovery following sport-related concussion in pediatrics. *J Child Neurol*. 2019;34:639-645.
121. Emery C, Palacios-Derflingher L, Black AM, Eliason P, Krolikowski M, Spencer N, Kozak S, Schneider KJ, Babul S, Mrazik M, Lebrun CM, Goulet C, Macpherson A, Hagel BE. Does disallowing body checking in non-elite 13- to 14-year-old ice hockey leagues reduce rates of injury and concussion? A cohort study in two Canadian provinces. *Br J Sports Med*. 2019. In press.
122. Blake TA, Doyle-Baker PK, Brooks BL, Palacios-Derflingher L, Emery CA. Physical activity and concussion risk in youth ice hockey players: Pooled prospective injury surveillance cohorts from Canada. *BMJ Open*. 2018;8:e022735.
123. Gauvin-Lepage J, Friedman D, Grilli L, Sufrategui M, De Matteo C, Iverson GL, Gagnon I. Effectiveness of an exercise-based active rehabilitation intervention for youth who are slow to recover after concussion. *Clin J Sport Med*. 2018. In press.
124. Panizza M, Knafo R, Thomas S, Taha T, Ladha A, Thompson L, Reed N. Mindfulness-based yoga for youth with persistent concussion: A pilot study. *Am J Occup Ther*. 2019;73:11.
125. Lawrence DW, Richards D, Comper P, Hutchison MG. Earlier time to aerobic exercise is associated with faster recovery following acute sport concussion. *PLoS One*. 2018;13:e0196062.
126. Lishchynsky JT, Rutschmann TD, Toomey CM, Palacios-Derflingher L, Yeates KO, Emery CA, Schneider KJ. The association between moderate and vigorous physical activity and time to medical clearance to return to play following sport-related concussion in youth ice hockey players. *Front Neurol*. 2019;10:588.
127. Parachute. Canadian guideline on concussion in sport. Toronto; Parachute: 2017. URL: www.parachute.ca/en/professional-resource/concussion-collection/canadian-guideline-on-concussion-in-sport/.
128. McCrory P, Meeuwisse W, Dvork J, Aubry M, Bailes J, Broglio S, Cantu RC, Cassidy D, Echemendia RJ, Castellani RJ, Davis GA, Ellenbogen R, Emery C, Engebretsen L, Feddermann-Demont N, Giza CC, Guskiewicz KM, Herring S, Iverson GL, Johnston KM, Kissick J, Kutcher J, Leddy JJ, Maddocks D, Makdissi M, Manley GT, McCrea M, Meehan WP, Nagahiro S, Patricios J, Putukian M, Schneider KJ, Sills A, Tator CH, Turner M, Vos PE. Consensus statement on concussion in sport – the 5th international conference on concussion in sport held in Berlin, October 2016. *Br J Sports Med*. 2017;51:838-847.

129. Harmon KG, Clugston JR, Dec K, Hainline B, Herring SA, Kane S, Kontos AP, Leddy JJ, McCrema MA, Poddar SK, Putukian M, Wilson JC, Roberts WO. American medical society for sports medicine position statement on concussion in sport. *Clin J Sport Med.* 2019;29:87-100.
130. Sprengeler O, Buck C, Hebestreit A, Ahrens W, Wirsik N. Sports contribute to total moderate to vigorous physical activity in school children. *Med Sci Sports Exerc.* 2019;51:1653-1661.
131. Tanaka C, Tanaka M, Tanaka S. Objectively evaluated physical activity and sedentary time in primary school children by gender, grade and types of physical education lessons. *BMC Public Health.* 2018;18:948.
132. Zhou Y, Wang L. Correlates of physical activity of students in secondary school physical education: A systematic review of literature. *Biomed Res Int.* 2019;19:4563484.
133. Leisterer S, Jekauc D. Students' emotional experience in physical education: A qualitative study for new theoretical insights. *Sports.* 2019;7:e10.
134. Belton S, McCarren A, McGrane B, Powell D, Issartel J. The Youth-Physical Activity Towards Health (Y-PATH) intervention: Results of a 24 month cluster randomised controlled trial. *PLoS One.* 2019;14:e0221684.
135. Arbour-Nicitopoulos KP, Bassett-Gunter RL, Latimer-Cheung AE, Leo J, Voss C, Best K, Moore SA, Routhier F, Martin Ginis K. Parent-reported movement behaviours of Canadian school-aged children and youth with disabilities: Preliminary evidence from the national physical activity measurement (NPAM) study. Unpublished analysis.
136. Tremblay MS, Aubert S, Barnes JD, Saunders TJ, Carson V, Latimer-Cheung AE, Chastin SF, Altenburg TM, Chinapaw MJ. Sedentary Behavior Research Network (SBRN)—terminology consensus project process and outcome. *Int J Behav Nutr Phys.* 2017;14:75.
137. Colley RC, Garriguet D, Janssen I, Craig CL, Clarke J, Tremblay MS. Physical activity of Canadian children and youth: Accelerometer results from the 2007 to 2009 Canadian Health Measures Survey. *Health Rep.* 2011;22:15-23.
138. Rideout V RM. *The Common Sense Census: Media Use in Tweens and Teens.* San Francisco; 2019.
139. Carson V, Hunter S, Kuzik N, Gray CE, Poitras VJ, Chaput JP, Saunders TJ, Katzmarzyk PT, Okely AD, Connor Gorber S, Kho ME. Systematic review of sedentary behaviour and health indicators in school-aged children and youth: An update. *Appl Physiol Nutr Metab.* 2016;41:S240-65.
140. Madigan S, Browne D, Racine N, Mori C, Tough S. Association between screen time and children's performance on a developmental screening test. *JAMA Pediatr.* 2019;173:244-250.
141. Arundell L, Salmon J, Veitch J, Timperio A. The relationship between objectively measured and self-reported sedentary behaviours and social connectedness among adolescents. *Int J Environ Res Public Health.* 2019;16:e277.
142. Hinkley T, Brown H, Carson V, Teychenne M. Cross sectional associations of screen time and outdoor play with social skills in preschool children. *PLoS One.* 2018;13:e0193700.
143. Hunter S, Leatherdale ST, Carson V. The 3-Year longitudinal impact of sedentary behavior on the academic achievement of secondary school students. *J Sch Health.* 2018;88:660-668.
144. Collings PJ, Kelly B, West J, Wright J. Associations of TV viewing duration, meals and snacks eaten when watching TV, and a TV in the bedroom with child adiposity. *Obesity.* 2018;26:1619-1628.
145. Fitzpatrick C, Burkhalter R, Asbridge M. Adolescent media use and its association to wellbeing in a Canadian national sample. *Prev Med Rep.* 2019;14:100867.
146. Baiden P, Tadeo SK, Peters KE. The association between excessive screen-time behaviors and insufficient sleep among adolescents: Findings from the 2017 youth risk behavior surveillance system. *Psychiatry Res.* 2019;281:112586.
147. Bélair MA, Kohen DE, Kingsbury M, Colman I. Relationship between leisure time physical activity, sedentary behaviour and symptoms of depression and anxiety: evidence from a population-based sample of Canadian adolescents. *BMJ Open.* 2018;8:e021119.
148. Boers E, Afzali MH, Newton N, Conrod P. Association of screen time and depression in adolescence. *JAMA Pediatr.* 2019;173:853-859.
149. Chang VC, Chaput JP, Roberts KC, Jayaraman G, Do MT. Factors associated with sleep duration across life stages: results from the Canadian Health Measures Survey. *Health Promot Chronic Dis Prev Can.* 2018;38:404-418.
150. Sampasa-Kanyinga H, Chaput JP, Hamilton HA. Social media use, school connectedness, and academic performance among adolescents. *J Prim Prev.* 2019;40:189-211.
151. Katapally TR, Chu LM. Methodology to derive objective screen-state from smartphones: A SMART platform study. *Int J Environ Res Public Health.* 2019;16:e2275.
152. Downing KL, Janssen X, Reilly JJ. Feasibility of wearable cameras to assess screen time and time spent restrained in children aged 3 to 5 years: a study protocol. *BMJ Open.* 2019;9:e028265.
153. Goncalves WSF, Byrne R, Viana MT, Trost SG. Parental influences on screen time and weight status among preschool children from Brazil: a cross-sectional study. *Int J Behav Nutr Phys Act.* 2019;16:27.
154. Lee EY, Hesketh KD, Rhodes RE, Rinaldi CM, Spence JC, Carson V. Role of parental and environmental characteristics in toddlers' physical activity and screen time: Bayesian analysis of structural equation models. *Int J Behav Nutr Phys Act.* 2018;15:17.
155. Tang L, Darlington G, Ma DWL, Haines J; Guelph Family Health Study. Mothers' and fathers' media parenting practices associated with young children's screen-time: a cross-sectional study. *BMC Obes.* 2018;5:37.
156. Doggett A, Qian W, Godin K, De Groh M, Leatherdale ST. Examining the association between exposure to various screen time sedentary behaviours and cannabis use among youth in the COMPASS study. *SSM Popul Health.* 2019;9:100487.
157. Buysse DJ. Sleep health: Can we define it? Does it matter? *Sleep.* 2014;37:9-17.
158. Chaput JP, Janssen I. Sleep duration estimates of Canadian children and adolescents. *J Sleep Res.* 2016;25:541-548.

159. Michaud I, Chaput JP. Are Canadian children and adolescents sleep deprived? *Public Health*. 2016;141:126-129.
160. Chaput JP, Yau J, Rao DP, Morin CM. Prevalence of insomnia for Canadians aged 6 to 79. *Health Rep*. 2018;29(12):16-20.
161. Dutil C, Walsh JJ, Featherstone RB, Gunnell KE, Tremblay MS, Gruber R, Weiss SK, Cote KA, Sampson M, Chaput JP. Influence of sleep on developing brain functions and structures in children and adolescents: A systematic review. *Sleep Medicine Reviews*. 2018;42:184-201.
162. Gruber R, Carrey N, Weiss SK, Frappier JY, Rourke L, Brouillette RT, Wise MS. Position statement on pediatric sleep for psychiatrists. *J Can Acad Child Adolesc Psychiatry*. 2014;23:174-195.
163. Owens J, Adolescent Sleep Working Group, Committee on Adolescence. Insufficient sleep in adolescents and young adults: an update on causes and consequences. *Pediatrics*. 2014;134:e921-e932.
164. Sampasa-Kanyinga H, Hamilton HA, Chaput JP. Use of social media is associated with short sleep duration in a dose-response manner in students aged 11 to 20 years. *Acta Paediatr*. 2018;107:694-700.
165. Chaput JP, Dutil C, Sampasa-Kanyinga H. Sleeping hours: What is the ideal number and how does age impact this? *Nat Sci Sleep*. 2018;10:421-430.
166. Chaput JP. The integration of pediatric sleep into public health in Canada. *Sleep Med*. 2019;56:4-8.
167. Meltzer LJ, Montgomery-Downs HE. Sleep in the family. *Pediatr Clin North Am*. 2011;58:765-774.
168. McDowall PS, Galland BC, Campbell AJ, Elder DE. Parent knowledge of children's sleep: A systematic review. *Sleep Med Rev*. 2017;31:39-47.
169. McDowall PS, Elder DE, Campbell AJ. Relationship between parent knowledge of child sleep, and child sleep practices and problems: A pilot study in a children's hospital cohort. *J Paediatr Child Health*. 2017;53:788-793.
170. Roberts KC, Yao X, Carson V, Chaptu JP, Janssen I, Tremblay MS. Meeting the Canadian 24-hour movement guidelines for children and youth. *Health Rep*. 2017;28(10):3-7.
171. Talarico R, Janssen I. Compositional associations of time spent in sleep, sedentary behavior and physical activity with obesity measures in children. *Int J Obes*. 2018;42:1508-1514.
172. Faight EL, Qian W, Carson VL, Storey KE, Faulkner G, Veugelers PJ, Leatherdale ST. The longitudinal impact of diet, physical activity, sleep, and screen time on Canadian adolescents' academic achievement: An analysis from the COMPASS study. *Prev Med*. 2019;125:24-31.
173. Walsh JJ, Barnes JD, Cameron JD, Goldfield GS, Chaput JP, Gunnell KE, Ledoux AA, Zemek RL, Tremblay MS. Associations between 24 hour movement behaviours and global cognition in US children: A cross-sectional observational study. *Lancet Child Adolesc Health*. 2018;2:783-791.
174. Guerrero MD, Barnes JD, Walsh JJ, Chaput JP, Tremblay MS, Goldfield G. 24-hour movement behaviours and impulsivity. *Pediatr*. 2019;144:e20190187.
175. Butler GP, Roberts KC, Kropac E, Rao DP, Branchard B, Prince SA, Wendy T, Gayatri J. At-a-glance: Conceptualizing a framework for the surveillance of physical activity, sedentary behaviour and sleep in Canada. *Health Promot Chronic Dis Prev Can*. 2019;39:201-204
176. Tremblay MS, Longmuir PE, Barnes JD, Belanger K, Anderson KD, Bruner B, Copeland JL, Delisle Nyström C, Gregg MJ, Hall N, Kolen AM, Lane KN, Law B, MacDonald DJ, Martin LJ, Saunders TJ, Sheehan D, Stone MR, Woodruff SJ. Physical literacy levels of Canadian children aged 8-12 years: Descriptive and normative results from the RBC Learn to Play-CAPL project. *BMC Public Health*. 2018;18(Suppl 2):1036.
177. Collins H, Booth JN, Duncan A, Fawkner S. The effect of resistance training interventions on fundamental movement skills in youth: a meta-analysis. *Sports Med Open*. 2019;5:17.
178. Cairney J, Dudley D, Kwan M, Bulten R, Kriellaars D. Physical literacy, physical activity and health: Toward an evidence-informed conceptual model. *Sports Med*. 2019;49:371-383.
179. Bopp T, Stelfox M, Weatherall B, Spratt S. Promoting physical literacy for disadvantaged youth living with chronic disease. *Am J Health Educ*. 2019;50:153-158.
180. Roetert EP, Ellenbecker TS, Kriellaars D. Physical literacy: Why should we embrace this construct? *Br J Sports Med*. 2018;52:1291-1292.
181. Roach L, Keats M. Skill-based and planned active play versus free-play effects on fundamental movement skills in preschoolers. *Percept Mot Skills*. 2018;125:651-668.
182. Arbour-Nicitopoulos K, Boross-Harmer A, Leo J, Allison A, Bremner R, Taverna F, Sora D, Wright V. Igniting fitness possibilities: A case study of an inclusive community-based physical literacy program for children and youth. *Leisure*. 2018;42:69-92.
183. MacDonald DJ, Saunders TJ, Longmuir PE, Barnes JD, Belanger K, Bruner B, Copeland JL, Gregg MJ, Hall N, Kolen AM, Law B, Martin LJ, Sheehan D, Woodruff SJ, Tremblay MS. A cross-sectional study exploring the relationship between age, gender, and physical measures with adequacy in and predilection for physical activity. *BMC Public Health*. 2018;18(Suppl 2):1038.
184. Delisle Nyström C, Barnes JD, Tremblay MS. An exploratory analysis of missing data from the Royal Bank of Canada (RBC) Learn to Play - Canadian Assessment of Physical Literacy (CAPL) project. *BMC Public Health*. 2018;18(Suppl 2):1046.
185. Edwards LC, Bryant AS, Keegan RJ, Morgan K, Cooper SM, Jones AM. 'Measuring' physical literacy and related constructs: A systematic review of empirical findings. *Sports Med*. 2018;48:659-682.
186. Tremblay MS, Costas-Bradstreet C, Barnes JD, Bartlett B, Dampier D, Lalonde C, Leidl R, Longmuir P, McKee M, Patton R, Way R, Yessis J. Canada's physical literacy consensus statement: Process and outcome. *BMC Public Health*. 2018;18(Suppl 2):1034.
187. Cairney J, Velhuizen S, Graham J, Rodriguez C, Bedard C, Bremer E, Kriellaars D. A construct validation study of PLAYfun. *Med Sci Sports Exerc*. 2018;50:855-862.
188. Bremer E, Graham JD, Bedard C, Rodriguez C, Kriellaars D, Cairney J. The association between PLAYfun and physical activity: A convergent validation study. *Res Q Exerc Sport*. 2019;16:1-9. In press
189. Steams J, Wohlers B, McHugh TL, Kuzik NO, Spence JC. Reliability and validity of the PLAYfun tool with young people in northern Canada. *Meas in Phys Educ and Exerc Sci*. 2019;23:47-57.

190. Gunnell KE, Longmuir PE, Woodruff SJ, Barnes JD, Belanger K, Tremblay MS. Revising the motivation and confidence domain of the Canadian assessment of physical literacy. *BMC Public Health*. 2018;18(Suppl 2):1045.
191. Gunnell KE, Longmuir PE, Barnes JD, Belanger K, Tremblay MS. Refining the Canadian Assessment of Physical Literacy based on theory and factor analyses. *BMC Public Health*. 2018;18(Suppl 2):1044.
192. Robinson DB, Randall L. Marking physical literacy or missing the mark on physical literacy? A conceptual critique of Canada's physical literacy assessment instruments. *Meas Phys Educ Exerc Sci*. 2017;21:40-55.
193. BMC Public Health. Supplement on Canadian Assessment of Physical Literacy. www.bmcpublichealth.biomedcentral.com/articles/supplements/volume-18-supplement-2.
194. MacDonald DJ, Saunders TJ, Longmuir PE, Barnes JD, Belanger K, Bruner B, Copeland JL, Gregg MJ, Hall N, Kolen AM, Law B, Martin LJ, Sheehan D, Woodruff SJ, Tremblay MS. A cross-sectional study exploring the relationship between age, gender, and physical measures with adequacy in and predilection for physical activity. *BMC Public Health*. 2018;18(Suppl 2):1038.
195. Lang JJ, Chaput JP, Longmuir PE, Barnes JD, Belanger K, Tomkinson GR, Anderson KD, Bruner B, Copeland JL, Gregg MJ, Hall N, Kolen AM, Lane KN, Law B, MacDonald DJ, Martin LJ, Saunders TJ, Sheehan D, Stone MR, Woodruff SJ, Tremblay MS. Cardiorespiratory fitness is associated with physical literacy in a large sample of Canadian children aged 8 to 12 years. *BMC Public Health*. 2018;18(Suppl 2):1041.
196. Belanger K, Barnes JD, Longmuir PE, Anderson KD, Bruner B, Copeland JL, Gregg MJ, Hall N, Kolen AM, Lane KN, Law B, MacDonald DJ, Martin LJ, Saunders TJ, Sheehan D, Stone M, Woodruff SJ, Tremblay MS. The relationship between physical literacy scores and adherence to Canadian physical activity and sedentary behaviour guidelines. *BMC Public Health*. 2018;18(Suppl 2):1042.
197. Law B, Bruner B, Scharoun Benson SM, Anderson K, Gregg M, Hall N, Lane K, MacDonald DJ, Saunders TJ, Sheehan D, Stone MR, Woodruff SJ, Belanger K, Barnes JD, Longmuir PE, Tremblay MS. Associations between teacher training and measures of physical literacy among Canadian 8- to 12-year-old students. *BMC Public Health*. 2018;18(Suppl 2):1039.
198. Yi KJ, Cameron E, Patey M, Loucks-Atkinson A, Loeffler TA, McGowan E, Sullivan AM, Borduas C, Buote R. University-based physical literacy programming for children: Canadian community stakeholders' recommendations. *Health Promot Int*. 2018;34:992-1001.
199. Fortnum K, Furzer B, Reid S, Jackson B, Elliott. The physical literacy of children with behavioural and emotional mental health disorders: A scoping review. *Mental Health and Physical Activity*. 2018;15:95-131.
200. So S, Patterson C, Evans C, Wales PW. Motor proficiency and generalized self-efficacy toward physical activity in children with intestinal failure. *J Pediatr Gastroenterol Nutr*. 2019;68:7-12.
201. Pohl D, Alpous A, Hamer S, Longmuir PE. Higher screen time, lower muscular endurance, and decreased agility limit the physical literacy of children with epilepsy. *Epilepsy Behav*. 2019;90:260-265.
202. Tomkinson GR, Lang JJ, Tremblay MS, Dale M, LeBlanc AG, Belanger K, Ortega FB, Léger L. International normative 20 m shuttle run values from 1 142 026 children and youth representing 50 countries. *Br J Sports Med*. 2017;51:1545-1554.
203. Smith JJ, Eather N, Weaver RG, Riley N, Beets MW, Lubans DR. Behavioral correlates of muscular fitness in children and adolescents: A systematic review. *Sports Med*. 2019;49:887-904.
204. Colley RC, Clarke J, Doyon CY, Janssen I, Lang JJ, Timmons BW, Tremblay MS. Trends in physical fitness among Canadian children and youth. *Health Rep*. 2019;30(10):3-13.
205. Tomkinson GR, Lang JJ, Blanchard J, Leger LA, Tremblay MS. The 20-m shuttle run: Assessment and interpretation of data in relation to youth aerobic fitness and health. *Pediatr Exerc Sci*. 2019;31:152-63.
206. Lang JJ, Tomkinson GR, Janssen I, Ruiz JR, Ortega FB, Leger L, Tremblay MS. Making a case for cardiorespiratory fitness surveillance among children and youth. *Exerc Sport Sci Rev*. 2018;46:66-75.
207. Lang JJ, Larouche R, Tremblay MS. The association between physical fitness and health in a nationally representative sample of Canadian children and youth aged 6 to 17 years. *Health Promot Chronic Dis Prev Can*. 2019;39:104-111.
208. Lang JJ. Exploring the utility of cardiorespiratory fitness as a population health surveillance indicator for children and youth: An international analysis of results from the 20-m shuttle run test. *Appl Physiol Nutr Metab*. 2018;43:211.
209. Tambalis KD, Panagiotakos DB, Psarra G, Sidossis LS. Association of cardiorespiratory fitness levels with dietary habits and lifestyle factors in schoolchildren. *Appl Physiol Nutr Metab*. 2019;44:539-45.
210. Smouter L, Smolarek AC, Souza WC, Lima VA, Mascarenhas LPG. Cardiorespiratory fitness associated to teenagers' fat: Vo2max cutoff point. *Rev Paul Pediatr*. 2019;37:73-81.
211. Eddolls W, McNarry, MA., Lester, L., Winn, CON., Stratton, G., Mackintosh, KA. The association between physical activity, fitness and body mass index on mental well-being and quality of life in adolescents. *Qual Life Res*. 2018;27:2313-20.
212. Henriksson P, Leppanen MH, Henriksson H, Delisle Nystrom C, Cadenas-Sanchez C, Ek A, Ruiz JR, Ortega FB, Lof M. Physical fitness in relation to later body composition in pre-school children. *J Sci Med Sport*. 2019;22:574-9.
213. Mintjens S, Menting MD, Daams JG, van Poppel MNM, Roseboom TJ, Gemke R. Cardiorespiratory fitness in childhood and adolescence affects future cardiovascular risk factors: A systematic review of longitudinal studies. *Sports Med*. 2018;48:2577-605.
214. Henriksson P, Henriksson H, Tynelius P, Berglind D, Lof M, Lee IM, Shiroma EJ, Ortega FB. Fitness and body mass index during adolescence and disability later in life: A cohort study. *Ann Intern Med*. 2019;170:230-9.
215. Burns RD, Brusseau TA, Fu Y. Moderators of school-based physical activity interventions on cardiorespiratory endurance in primary school-aged children: A meta-regression. *Int J Environ Res Public Health*. 2018;15:e1764.
216. Rhodes RE, Blanchard CM, Quinlan A, Naylor PJ, Warburton DER. Family physical activity planning and child physical activity outcomes: A randomized trial. *Am J Prev Med*. 2019;57:135-44.

217. Ross R, Blair SN, Arena R, Church TS, Despres JP, Franklin BA, Haskell WL, Kaminsky LA, Levine BD, Lavie CJ, Myers J, Niebauer J, Sallis R, Sawada SS, Sui X, Wisløff U; American Heart Association Physical Activity Committee of the Council on Lifestyle and Cardiometabolic Health; Council on Clinical Cardiology; Council on Epidemiology and Prevention; Council on Cardiovascular and Stroke Nursing; Council on Functional Genomics and Translational Biology; Stroke Council. Importance of assessing cardiorespiratory fitness in clinical practice: a case for fitness as a clinical vital sign: a scientific statement from the American Heart Association. *Circulation*. 2016;134:e653-99.
218. Hoffmann MD, Colley RC, Doyon CY, Wong SL, Tomkinson GR, Lang JJ. Normative-referenced percentile values for physical fitness among Canadians. *Health Rep*. 2019;30(10):14-22.
219. Silva DAS, Lang JJ, Barnes JD, Tomkinson GR, Tremblay MS. Cardiorespiratory fitness in children: Evidence for criterion-referenced cut-points. *PLoS One*. 2018;13:e0201048.
220. Canadian Society for Exercise Physiology. Canadian Physical Activity Guidelines for Adults (18-64 years). Ottawa: Canadian Society for Exercise Physiology; 2011. URL: www.csep.ca/CMFiles/Guidelines/CSEP_PAGuidelines_adults_en.pdf.
221. Clarke J, Colley R, Janssen I, Tremblay MS. Accelerometer-measured moderate-to-vigorous physical activity of Canadian adults, 2007 to 2017. *Health Rep*. 2019;30(8):3-10.
222. Rhodes RE, Spence JC, Berry T, Faulkner G, Latimer-Cheung AE, O'Reilly N, Tremblay MS, Vanderloo L. Parental support of the Canadian 24-hour movement guidelines for children and youth: prevalence and correlates. *BMC Public Health*. 2019;19:1385.
223. Lau EY, Faulkner G, Qian W, Leatherdale ST. Longitudinal associations of parental and peer influences with physical activity during adolescence: findings from the COMPASS study. *Health Promot Chronic Dis Prev Can*. 2016;36:235-242.
224. Kracht CL, Sisson SB. Sibling influence on children's objectively measured physical activity: a meta-analysis and systematic review. *BMJ Open Sport Exerc Med*. 2018;4:e000405.
225. Niermann CYN, Gerards SMPL, Kremers SPJ. Conceptualizing family influences on children's energy balance-related behaviors: Levels of interacting family environmental subsystems (The LIFES Framework). *Int J Environ Res Public Health*. 2018;15:eE2714.
226. Reimers AK, Schmidt SCE, Demetriou Y, Marzi I, Woll A. Parental and peer support and modelling in relation to domain-specific physical activity participation in boys and girls from Germany. *PLoS One*. 2019;14:e0223928.
227. Salway RE, Sebire SJ, Solomon-Moore E, Thompson JL, Jago R. Associations within school-based same-sex friendship networks of children's physical activity and sedentary behaviours: a cross-sectional social network analysis. *Int J Behav Nutr Phys Act*. 2018;15:18.
228. Swanson KC, Nettel-Aguirre A, McCormack GR. Popularity and friendships and their relationship to physical activity before and after transition to a higher school grade. *Int J Environ Res Public Health*. 2019;16:e2782.
229. Lindsay AC, Arruda CAM, De Andrade GP, Machado MMT, Greaney ML. Parenting practices that may encourage and discourage physical activity in preschool-age children of Brazilian immigrant families: A qualitative study. *PLoS One*. 2019;14:e0214143.
230. Carbert NS, Brussoni M, Geller J, Mâsse LC. Familial environment and overweight/obese adolescents' physical activity. *Int J Environ Res Public Health*. 2019;16:e2558.
231. Liszewska N, Scholz U, Radtke T, Horodyska K, Liszewski M, Luszczynska A. Association between children's physical activity and parental practices enhancing children's physical activity: The moderating effects of children's BMI z-score. *Front Psychol*. 2018;8:2359.
232. Messing S, Rütten A, Abu-Omar K, Ungerer-Röhrich U, Goodwin L, Burlacu I, Gediga G. How can physical activity be promoted among children and adolescents? A systematic review of reviews across settings. *Front Public Health*. 2019 Mar 19;7:55.
233. Rhodes RE, Berry T, Faulkner G, Latimer-Cheung AE, O'Reilly N, Tremblay MS, Vanderloo L, Spence JC. Application of the multi-process action control framework to understand parental support of child and youth physical activity, sleep, and screen time behaviours. *Appl Psychol Health Well Being*. 2019;11:223-239.
234. Rhodes RE, Nwachukwu N, Quinlan A. Family exergaming: Correlates and preferences. *Games Health J*. 2018;7:188-196.
235. Stearns JA, Godley J, Veugelers PJ, Ekwaru JP, Bastian K, Wu B, Spence JC. Associations of friendship and children's physical activity during and outside of school: A social network study. *SSM Popul Health*. 2018;7:008-8.
236. Reimers AK, Boxberger K, Schmidt SCE, Niessner C, Demetriou Y, Marzi I, Woll A. Social support and modelling in relation to physical activity participation and outdoor play in preschool children. *Children*. 2019;6:e115.
237. Canadian Fitness and Lifestyle Research Institute. School policies supporting physical activity and sport. Bulletin 1: Encouraging active school bulletin series. Ottawa: Canadian Fitness and Lifestyle Research Institute; 2016.
238. Canadian Fitness and Lifestyle Research Institute. Instruction of physical education. Bulletin 18: Encouraging active schools bulletin series. Ottawa: Canadian Fitness and Lifestyle Research Institute; 2018.
239. Canadian Fitness and Lifestyle Research Institute. Networking, partnerships, and shared use of resources within the community. Bulletin 10: Encouraging active schools bulletin series. Ottawa: Canadian Fitness and Lifestyle Research Institute; 2017.
240. Canadian Fitness and Lifestyle Research Institute. Onsite school facilities supporting physical activity and sport. Bulletin 2: Encouraging active schools bulletin series. Ottawa: Canadian Fitness and Lifestyle Research Institute; 2016.
241. Canadian Fitness and Lifestyle Research Institute. Availability of on-site amenities supporting physical activity and sport. Bulletin 4: Encouraging active schools bulletin series. Ottawa: Canadian Fitness and Lifestyle Research Institute; 2016.
242. Canadian Fitness and Lifestyle Research Institute. Off-site school facilities for physical activity and sport in schools. Bulletin 3: Encouraging active schools bulletin series. Ottawa: Canadian Fitness and Lifestyle Research Institute; 2016.
243. Canadian Fitness and Lifestyle Research Institute. Ratings of facilities for meeting students' needs for physical activity at school. Bulletin 5: Encouraging active schools bulletin series. Ottawa: Canadian Fitness and Lifestyle Research Institute; 2016.

244. Canadian Fitness and Lifestyle Research Institute. Barriers and supports for physical activity within the school. Bulletin 11: Encouraging active schools bulletin series. Ottawa: Canadian Fitness and Lifestyle Research Institute; 2017.
245. Gray HL, Buro AW, Barrera Ikan J, Wang W, Stern M. School-level factors associated with obesity: A systematic review of longitudinal studies. *Obes Rev.* 2019;20:1016-1032.
246. Fitzpatrick C, Alexander S, Henderson M, Barnett TA. Prospective associations between play environments and pediatric obesity. *Am J Health Promot.* 2019;33:541-548.
247. Daly-Smith AJ, Zwolinsky S, McKenna J, Tomporowski PD, Defeyter MA, Manley A. Systematic review of acute physically active learning and classroom movement breaks on children's physical activity, cognition, academic performance and classroom behaviour: understanding critical design features. *BMJ Open Sport Exerc Med.* 2018;4:e000341.
248. Lubans DR, Beauchamp MR, Diallo TMO, Peralta LR, Bennie A, White RL, Owen K, Lonsdale C. School physical activity intervention effect on adolescents' performance in mathematics. *Med Sci Sports Exerc.* 2018;50:2442-2450.
249. Egger F, Benzing V, Conzelmann A, Schmidt M. Boost your brain, while having a break! The effects of long-term cognitively engaging physical activity breaks on children's executive functions and academic achievement. *PLoS One.* 2019;14:e0212482.
250. Vanderloo LM, Tucker P. Physical activity and sedentary behavior legislation in Canadian childcare facilities: an update. *BMC Public Health.* 2018;18:475.
251. Allison KR, Philipneri AN, Vu-Nguyen K, Manson HE, Dwyer JJM, Hobin E, Ng B, Li Y. School and classroom effects on Daily Physical Activity (DPA) policy implementation fidelity in Ontario classrooms: A multi-level analysis. *BMC Public Health.* 2018;18:802.
252. Driediger M, Vanderloo LM, Burke SM, Irwin JD, Gaston A, Timmons BW, Johnson AM, Tucker P. The implementation and feasibility of the supporting physical activity in the childcare environment (SPACE) intervention: A process evaluation. *Health Educ Behav.* 2018;45:935-944.
253. Harvey J, Pearson ES, Sanzo P, Lennon AE. Exploring the perspectives of 10-, 11-, and 12-year-old primary school students on physical activity engagement—"Cause you can't just be sitting at a desk all the time!" *Child Care Health Dev.* 2018;44:433-442.
254. Burns RD, Brusseau TA, Fu Y. Moderators of school-based physical activity interventions on cardiorespiratory endurance in primary school-aged children: A meta-regression. *Int J Environ Res Public Health.* 2018;15:e1764.
255. Bremer E, Graham JD, Veldhuizen S, Cairney J. A program evaluation of an in-school daily physical activity initiative for children and youth. *BMC Public Health.* 2018;18:1023.
256. Economos CD, Mueller MP, Schultz N, Gervis J, Miller GF, Pate RR. Investigating best practices of district-wide physical activity programmatic efforts in US schools: A mixed-methods approach. *BMC Public Health.* 2018;18:992.
257. McKernan C, Montemurro G, Chahal H, Veugelers PJ, Gleddie D, Storey KE. Translation of school-learned health behaviours into the home: Student insights through photovoice. *Can J Public Health.* 2019;110:821-830.
258. Canadian Fitness and Lifestyle Research Institute. Policies for safe active transportation routes in community development. Bulletin 10: Municipal opportunities for physical activity bulletin series. Ottawa: Canadian Fitness and Lifestyle Research Institute; 2017.
259. Canadian Fitness and Lifestyle Research Institute. Availability of physical activity and sport strategies. Bulletin 15: Municipal opportunities for physical activity bulletin series. Ottawa: Canadian Fitness and Lifestyle Research Institute; 2017.
260. Canadian Fitness and Lifestyle Research Institute. Availability of transportation plans. Bulletin 14: Municipal opportunities for physical activity bulletin series. Ottawa: Canadian Fitness and Lifestyle Research Institute; 2017.
261. Canadian Fitness and Lifestyle Research Institute. Availability of facilities supporting community physical activity and sport. Bulletin 9: Municipal opportunities for physical activity bulletin series. Ottawa: Canadian Fitness and Lifestyle Research Institute; 2017.
262. Canadian Fitness and Lifestyle Research Institute. Pedestrian and (active) transportation friendly supports. Bulletin 8: Municipal Opportunities for Physical Activity Bulletin Series. Ottawa: Canadian Fitness and Lifestyle Research Institute; 2016.
263. Canadian Fitness and Lifestyle Research Institute. Networking with partners for the provision of physical activity opportunities. Bulletin 1: Municipal opportunities for physical activity bulletin series. Ottawa: Canadian Fitness and Lifestyle Research Institute; 2016.
264. Canadian Fitness and Lifestyle Research Institute. Perceived infrastructure barriers and needs. Bulletin 11: Municipal opportunities for physical activity bulletin series. Ottawa: Canadian Fitness and Lifestyle Research Institute; 2017.
265. Statistics Canada. Table 252-0051 – incident-based crime statistics, by detailed violations, annual (number unless otherwise noted), CANSIM (database). Ottawa: Statistics Canada, 2018. URL: goo.gl/u4KTUo.
266. Keighley K. Police-reported crime statistics in Canada, 2016. *Juristat.* 2017. URL: www.statcan.gc.ca/pub/85-002-x/2017001/article/54842-eng.htm.
267. Hassan OB, Herman KM, Kryzanowski CD, Faulkner GE. Active living in Saskatchewan: A review of official community plans. *Can J Public Health.* 2018;108:e551-e557.
268. Arbour-Nicitopoulos KP, Grassmann V, Orr K, McPherson AC, Faulkner GE, Wright FV. A scoping review of inclusive out-of-school time physical activity programs for children and youth with physical disabilities. *Adapt Phys Activ Q.* 2018;35:111-138.
269. Larouche R, Blanchette S, Faulkner G, Riazzi N, Trudeau F, Tremblay MS. Correlates of children's physical activity: A Canadian multisite study. *Med Sci Sports Exerc.* 2019; 51: 2482-2490.
270. Mölenberg FJM, Noordzij JM, Burdorf A, van Lenthe FJ. New physical activity spaces in deprived neighborhoods: Does it change outdoor play and sedentary behavior? A natural experiment. *Health Place.* 2019;58:102151.
271. Pate RR, Frongillo EA, McIver KL, Colabianchi N, Wilson DK, Collie-Akers VL, Schultz JA, Reis J, Madsen K, Woodward-Lopez G, Berrigan D, Landgraf A, Nagaraja J, Strauss WJ; Healthy Communities Study Team. Associations between community programmes and policies and children's physical activity: the Healthy Communities Study. *Pediatr Obes.* 2018;Suppl 1:72-81.

272. Wahi G, Wilson J, Oster R, Rain P, Jack SM, Gittelsohn J, Kandasamy S, de Souza RJ, Martin CL, Toth E, Anand SS. Strategies for promoting healthy nutrition and physical activity among young children: Priorities of two Indigenous communities in Canada. *Curr Dev Nutr*. 2019;4:nzz137.
273. McGregor L, Maar M, Young N, Toulouse P. Keeping kids safe: caregivers' perspectives on the determinants of physical activity in rural Indigenous communities. *Rural Remote Health*. 2019;19:4833
274. Hudson B, Spence JC, McHugh TLF. An exploration of the physical activity experiences of Northern Aboriginal youth: A community-based participatory research project. *Qualitative Research in Sport, Exercise and Health*. 2020. In press.
275. White MP, Alcock I, Grellier J, Wheeler BW, Warber SL, Bone A, Depledge MH, Fleming LE. Spending at least 120 minutes a week in nature is associated with good health and wellbeing. *Sci Rep*. 2019;9:7730.
276. Massougbodji J, Lebel A, De Wals P. Individual and school correlates of adolescent leisure time physical activity in Quebec, Canada. *Int J Environ Res Public Health*. 2018;15:e412.
277. Remmers T, Thijs C, Ettema D, de Vries S, Slingerland M, Kremers S. Critical hours and important environments: Relationships between afterschool physical activity and the physical environment using GPS, GIS and accelerometers in 10–12-year-old children. *Int J Environ Res Public Health*. 2019;16:e3116.
278. Lambert A, Vlaar J, Herrington S, Brussoni M. What is the relationship between the neighbourhood built environment and time spent in outdoor play? A systematic review. *Int J Environ Res Public Health*. 2019;16:e3840
279. Umstätt Meyer MR, Bridges CN, Schmid TL, Hecht AA, Pollack Porter KM. Systematic review of how Play Streets impact opportunities for active play, physical activity, neighborhoods, and communities. *BMC Public Health*. 2019;19:1-16.
280. Bridges CN, Prochnow TM, Wilkins EC, Pollack Porter KM, Umstätt Meyer MR. Examining the implementation of play streets: A systematic review of the grey literature. *J Public Health Manag Pract*. 2019. In press.
281. Smith C, Clark AF, Wilk P, Tucker P, Gilliland JA. Assessing the effectiveness of a naturally occurring population-level physical activity intervention for children. *Public Health*. 2019;178:62-71.
282. Olsen JR, Mitchell R, McCrorie P, Ellaway A. Children's mobility and environmental exposures in urban landscapes: A cross-sectional study of 10–11 year old Scottish children. *Soc Sci Med*. 2019;224:11-22.
283. Taylor L, Clark A, Wilk P, Button B, Gilliland J. Exploring the effect of perceptions on children's physical activity in varying geographic contexts: Using a structural equation modelling approach to examine a cross-sectional dataset. *Children*. 2018;5:159.
284. Taylor LG, Clark AF, Gilliland JA. Context Matters: Examining children's perceived barriers to physical activity across varying Canadian environments. *Heal Place*. 2018;54:221-228.
285. Government of Canada. Budget 2018. Ottawa: Government of Canada; 2018. URL: www.budget.gc.ca/2018/docs/plan/budget-2018-en.pdf
286. Canadian Heritage. 2017-18 Department results report. Ottawa: Government of Canada; 2018. URL: www.canada.ca/content/dam/pch/documents/corporate/publications/plans-reports/departmental-results-report-2017-18/2017-18_pch_drr-eng.pdf
287. Government of Canada. Chapter 2 – Communities built for change. Ottawa: Government of Canada. URL: www.budget.gc.ca/2017/docs/plan/chap-02-en.html?=&wbdisable=true
288. Government of Ontario. Improving well-being for students across Ontario: province boosting active transportation, breakfast programs to help students thrive. Toronto: Government of Ontario; 2017. URL: www.news.ontario.ca/edu/en/2017/09/improving-well-being-for-students-across-ontario.html
289. Active & Safe Routes to School. Ontario invests in active school travel. Peterborough: Active & Safe Routes to School; 2017. URL: www.saferoutestoschool.ca/ontario-invests-in-active-school-travel
290. Government of Canada. Multi-sectoral partnerships to promote healthy living and prevent chronic disease. Ottawa: Government of Canada; 2018. URL: www.canada.ca/en/public-health/services/funding-opportunities/multi-sectoral-partnerships-promote-healthy-living-prevent-chronic-disease.html
291. Government of Canada. Sport Canada: Sport participation. Ottawa: Government of Canada; 2018. URL: www.canada.ca/en/canadian-heritage/services/sport-participation.htm
292. Canadian Heritage. 2020-2021 Call for concepts for the innovation initiative. Government of Canada; 2018. URL: www.canada.ca/en/canadian-heritage/campaigns/call-concepts-innovation-initiative.html
293. Government of Canada. Support for social development in Indigenous communities – Sport support program. Ottawa: Government of Canada; 2018. URL: www.canada.ca/en/canadian-heritage/services/funding/sport-support/social-development-indigenous-communities.html
294. Participation Nation. Play4fun. Newfoundland and Labrador: Participation Nation; 2018. URL: www.schoolsportsnl.ca/participation-nation/play-4-fun/
295. goPEI. PEI: Government of Prince Edward Island. URL: www.gopei.ca
296. Nova Scotia. Let's Get Moving Nova Scotia is an action plan to create a more active, inclusive and healthier population. Nova Scotia, 2018. URL: www.novascotia.ca/letsgetmoving/
297. Québec Policy on Physical Activity, Sport and Recreation. Quebecers on the move! 2019; Québec. URL: www.education.gouv.qc.ca/en/municipalities/politique-de-lactivite-physique-du-sport-et-du-loisir/quebecers-on-the-move/
298. Ministry of Heritage, Sport, Tourism, and Culture Industries. Ontario's after school program. Ontario: Ministry of Heritage, Sport, Tourism, and Culture Industries, 2018. URL: www.mtc.gov.on.ca/en/sport/afterschool/after_school.shtml
299. Healthy Together Now. Manitoba: Healthy Together Now. 2018. URL: www.healthytogethernow.net
300. Active Saskatchewan Strategic Plan. Let's get moving Saskatchewan. Saskatchewan, 2019. URL: www.saskatchewaninmotion.ca/assets/uploads/rfm/ActiveSask-StratPlan-2019-2022.pdf

301. Generation Health. Inspiring healthier BC families. British Columbia: Generation Health. URL: www.generationhealth.ca/about-us/ - top
302. Department of Community and Government Services. Grants and contributions call for applications, sport, and recreation division. Nunavut, 2019. URL: www.gov.nu.ca/community-and-government-services/news/grants-and-contributions-call-applications-sport-and
303. Government of Northwest Territories. After school physical activity program. Yellowknife: Government of Northwest Territories. URL: www.maca.gov.nt.ca/en/services/after-school-physical-activity-program.
304. Recreation and Parks Association of the Yukon. RPAY. Yellowknife: Recreation and Parks Association of the Yukon. URL: www.rpay.ca
305. Carson V, Lee EY, Hewitt L, Jennings C, Hunter S, Kuzik N, Stearns JA, Unrau SP, Poitras VJ, Gray C, Adamo KB, Janssen I, Okely AD, Spence JC, Timmons BW, Sampson M, Tremblay MS. Systematic review of the relationships between physical activity and health indicators in the early years (0-4 years). *BMC Public Health*. 2017;17(Suppl 5):854
306. Chaput JP, Colley RC, Aubert S, Carson V, Janssen I, Roberts KC, Tremblay MS. Proportion of preschool-aged children meeting the Canadian 24-Hour Movement Guidelines and associations with adiposity: results from the Canadian Health Measures Survey. *BMC Public Health*. 2017;17(Suppl 5):829.
307. Lee EY, Hesketh KD, Hunter S, Kuzik N, Rhodes RE, Rinaldi CM, Spence JC, Carson V. Meeting new Canadian 24-Hour Movement Guidelines for the Early Years and associations with adiposity among toddlers living in Edmonton, Canada. *BMC Public Health*. 2017;17(Suppl 5):840
308. Bruijns BA, Truelove S, Johnson AM, Gilliland J, Tucker P. Infants' and toddlers' physical activity and sedentary time as measured by accelerometry: a systematic review and meta-analysis. *Int J Behav Nutr Phys Act*. 2020;17:14.
309. Statistics Canada. Table 13-10-0339-01. Average time spent being physically active. Ottawa: Statistics Canada; 2019. URL: www150.statcan.gc.ca/t1/tb1/en/tv.action?pid=1310033901&pickMembers%5B0%5D=3.1&pickMembers%5B1%5D=5.5
310. Stone MR, Houser NE, Cawley J, Kolen AM, Rainham D, Rehman L, Turner J, Kirk SFL. Accelerometry-measured physical activity and sedentary behaviour of preschoolers in Nova Scotia, Canada. *Appl Physiol Nutr Metab*. 2019;44:1005-1011.
311. Crane JR, Naylor PJ, Temple VA. The physical activity and sedentary behaviour patterns of children in kindergarten and grade 2. *Children*. 2018;5:e131.
312. Ruiz RM, Sommer EC, Tracy D, Banda JA, Economos CD, JaKa MM, Evenson KR, Buchowski MS, Barkin SL. Novel patterns of physical activity in a large sample of preschool-aged children. *BMC Public Health*. 2018;18:242.
313. ParticipACTION. The biggest risk is keeping kids indoors. The 2015 ParticipACTION report card on physical activity for children and youth. Toronto: ParticipACTION; 2015. URL: www.participation.com/en-ca/thought-leadership/report-card/archive?year=2015
314. ParticipACTION. Are Canadian kids too tired to move? The 2016 ParticipACTION report card on physical activity for children and youth. Toronto: ParticipACTION; 2016. URL: www.participation.com/en-ca/thought-leadership/report-card/archive?year=2016
315. Poitras VJ, Gray CE, Janssen X, Aubert S, Carson V, Faulkner G, Goldfield GS, Reilly JJ, Sampson M, Tremblay MS. Systematic review of the relationships between sedentary behaviour and health indicators in the early years (0–4 years). *BMC Public Health*. 2017;17:868.
316. Chaput JP, Gray CE, Poitras VJ, Carson V, Gruber R, Olds T, Weiss SK, Connon Gorber S, Kho ME, Sampson M, Belanger K, Eryuzlu S, Callender L, Tremblay MS. Systematic review of the relationships between sleep duration and health indicators in school-aged children and youth. *Appl Physiol Nutr Metab*. 2016;41:s266-S282.
317. Vanderloo LM, Tucker P, Johnson AM, Burke SM, Irwin JD. Environmental influences on preschoolers' physical activity levels in various early-learning facilities. *Res Q Exerc Sport*. 2015;86:360-370.
318. Truelove S, Bruijns BA, Vanderloo LM, O'Brien KT, Johnson AM, Tucker P. Physical activity and sedentary time during childcare outdoor play sessions: a systematic review and meta-analysis. *Prev Med*. 2018;108:74-85.
319. Vanderloo LM, Martyniuk OJ, Tucker P. Physical and sedentary activity levels among preschoolers in home-based childcare: a systematic review. *J Phys Act Health*. 2015;12:879-889.
320. O'Brien KT, Vanderloo LM, Bruijns BA, Truelove S, Tucker P. Physical activity and sedentary time among preschoolers in centre-based childcare: a systematic review. *Int J Behav Nutr Phys Act*. 2018;15:117.
321. Statler J, Wilk P, Timmons BW, Collet R, Tucker P. Habitual physical activity levels and sedentary time of children in different childcare arrangements from a nationally representative sample of Canadian preschoolers. *J Sport Health Sci*. 2019. In press.
322. Tucker P, Vanderloo LM, Johnson AM, Shauna BM, Irwin JD, Gaston A, Driediger M, Timmons. Impact of the *Supporting Physical Activity in the Childcare Environment (SPACE)* intervention on preschoolers' physical activity levels and sedentary time: A single-blind cluster randomized controlled trial. *Int J Behav Nutr Phys Act*. 2017;14:120.
323. Carson V, Langlois K, Colley RC. Associations between parent and child sedentary behaviour and physical activity in early childhood. *Health Rep*. 2020;31(2):3-10.
324. Garriguet D, Colley RC, Bushnik T. Physical activity and sedentary behaviour among Canadian parents and children living in the same household. *Health Rep*. 2017; 28(6):3-11.
325. Blum RM, Rinehart Mann P. Reducing the Risk: Connections That Make a Difference in the Lives of Youth. Bethesda; 2012. <https://files.eric.ed.gov/fulltext/ED412459.pdf>.
326. Robb MB. The new normal: parents, teens, screens, and sleep in the United States. San Francisco: Common Sense Media; 2019. <https://www.common Sense Media.org/research/the-new-normalparents-teens-and-devices-around-the-world>.
327. Brindova D, et al. How parents can affect excessive spending of time on screen-based activities. *BMC Public Health*. 2014;14:1261.

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