Changes in indicators of child and youth physical activity in Canada, 2005–2016

Joel D. Barnes, MSc, Mark S. Tremblay, PhD

ABSTRACT

Physical activity trend analysis enables the monitoring and surveillance of physical activity indicators and the identification of areas that should be targeted for intervention and promotion, which is particularly important at present because so few school-aged children and youth in Canada adhere to the Canadian Physical Activity Guidelines for Children and Youth. In this commentary, we demonstrate through a descriptive temporal trend analysis of grade changes in the *ParticipACTION Report Card on Physical Activity for Children and Youth* that there have been positive changes in several indicators of physical activity support (family, school, community and environment, government, non-government) in Canada over the last 12 years. However, these changes have seldom resulted in the desired behavioural-level modifications or been associated with any meaningful increase in the prevalence of children and youth meeting the Canadian Physical Activity Guidelines for Children and Youth. This suggests that physical activity intervention and promotion efforts may need to focus more on directly targeting the physical activity behaviours of Canadian children and youth, or that alternate approaches are required.

KEY WORDS: Assessment; surveillance; monitoring; evaluation; sedentary; play; sport

La traduction du résumé se trouve à la fin de l'article.

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Physical inactivity is a global health concern¹ and a key prevention target given its association with multiple negative health consequences (e.g., fourth leading risk factor for mortality worldwide,² economic cost of \$10 billion annually in Canada³). Indicators of child and youth physical activity and related supports are measured periodically in Canada^{4–9} in order to better understand and address this global health concern within the Canadian and pediatric contexts. This collection of data at multiple time points enables the monitoring and surveillance of physical activity indicators, and may help with the identification of areas that should be targeted for intervention and promotion.¹⁰ There is an immediate need for this because so few school-aged children and youth in Canada (9%) adhere to the Canadian Physical Activity Guidelines for Children and Youth,¹¹ which recommend at least 60 minutes of moderate- to vigorous-intensity physical activity on a daily basis.¹²

In this commentary, we demonstrate that there have been positive changes in several indicators of physical activity support (family, school, community and environment, government, non-government) in Canada over the last 12 years. However, these changes have seldom resulted in the desired behavioural-level modifications or been associated with any meaningful increase in the prevalence of children and youth meeting the Canadian Physical Activity Guidelines for Children and Youth. This leads to the tentative conclusion that physical activity intervention and promotion efforts may need to focus more on directly targeting the physical activity behaviours of Canadian children and youth, or that alternate approaches are required (e.g., less structure and more freedom to move and play¹³).

ParticipACTION Report Card on Physical Activity for Children and Youth

The *ParticipACTION Report Card on Physical Activity for Children and Youth* (formerly (2005–2014) the *Active Healthy Kids Canada Report Card on Physical Activity for Children and Youth*) is a comprehensive assessment of child and youth physical activity in Canada that has been released annually since 2005.¹⁴ Each year, the best available Canadian data are synthesized from multiple sources (national surveys, peer-reviewed literature, grey literature, etc.) and assessed by an interdisciplinary report card research committee of physical activity experts from across the country using a letter-grade system (A, B, C, D, F). For each indicator, the grade assigned in a given year is generally based on the proportion of children and youth in Canada meeting a single or multiple benchmark(s): A = 81–100%, B = 61–80%, C = 41–60%, D = 21–40%, F = 0–20%.¹⁵

The number of indicators graded has varied by year and ranged anywhere from 10 in the *2014 Report Card* to 24 in the *2012 Report Card*. Regardless of the number, the indicators generally fall into one of three categories: physical activity-related behaviours; settings and sources of influence; and strategies and investments (Figure 1).¹¹ This methodology for assessing child and youth physical activity, which has been described more completely elsewhere,¹⁵ has been applied in approximately 30 different jurisdictions, both within Canada and around the world.¹⁶

Author Affiliations

Children's Hospital of Eastern Ontario Research Institute, Ottawa, ON

Correspondence: Joel D. Barnes, Healthy Active Living and Obesity Research Group, Children's Hospital of Eastern Ontario Research Institute, 401 Smyth Road, Ottawa, ON K1H 8L1, Tel: 613-737-7600, E-mail: jlbarnes@cheo.on.ca

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Figure 1. Summary of the physical activity indicators in the 2016 *ParticipACTION Report Card on Physical Activity for Children and Youth*, by category

Grade change analysis

We performed a descriptive temporal trend analysis of the *Report Card's* physical activity indicators that spanned its 12-year history in order to determine where changes in physical activity behaviours and related supports have occurred since 2005 and whether additional, or different, targeted physical activity promotion efforts are needed. The 10 indicators in the 2014 *Report Card*¹⁷ were the frame of reference for the analysis. All letter grades between 2005 and 2016 were converted to numeric ordinal scores (A = 5, B = 4, C = 3, D = 2, F = 1). In years where there were more than 10 indicators, related indicators were grouped together (e.g., physical activity programming at school, training of school personnel and social support for physical activity at school in the 2007 *Report Card*¹⁸ were grouped together as a single school indicator) and their ordinal scores averaged to give a single ordinal score. For ease of analysis, signed letter grades were treated as non-signed letter grades (e.g., A+, A-, A = 5). Delta (δ) scores were then calculated by subtracting ordinal scores year over year. For example, if an indicator improved by one letter grade in a two-year span, this was represented by $\delta = +1$. If an indicator declined by one letter grade or did not change in a two-year span, $\delta = -1$ and $\delta = 0$ respectively. When a comparison could not be made in a two-year span due to a missing grade or indicator, this was represented by a double hyphen (--). In order to arrive at an estimate of the overall change since 2005, net δ scores were then calculated by summing the yearly δ scores for each indicator. The frequency of grade changes year over year was also tabulated. Results of this descriptive analysis are in Table 1.

There are several caveats related to the *Report Card* process that may affect the comparability of the grades year over year: first, the members on the research committee did vary by year. However,

many members served on the committee for several years at a time and there are even several long-standing members who have served on the committee since the first release of the *Report Card* in 2005, one of whom is an author of this commentary (MST). Therefore, despite the change in the committee year over year, there was also continuity. Second, as the *Report Card* process evolved and data and guidelines improved, so did the benchmarks. For example, in the early years of the *Report Card* (2005–2010), the benchmark for overall physical activity was the proportion of children and youth accumulating at least 90 minutes of physical activity per day. With the release of new Canadian Physical Activity Guidelines for Children and Youth in 2011, the benchmark changed to the proportion of children and youth accumulating at least 60 minutes of moderate- to vigorous-intensity physical activity per day. Finally, the change in the proportion of the population meeting a benchmark required for a shift in grade to occur varies from 1%–20% (Figure 1). In the 2016 *Report Card*, for example, the active transportation grade is a D because 25% of children and youth typically use active modes of transportation to get to and from places (e.g., school). Using the quintile-based grading scheme mentioned above, a 16% increase will be required in 2017 for the grade to change from a D to a C. Had the original proportion been 35%, only a 6% increase would be required. These caveats signal the need for some caution when interpreting this grade change analysis.

DISCUSSION

Based on this analysis, there were 25 grade changes between 2005 and 2016, with more than half (64%; 16/25) representing improvements. Most of the 10 indicators related to child and youth physical activity in Canada had net δ scores that were

Table 1. Grade changes in the *ParticipACTION Report Card on Physical Activity for Children and Youth*, by indicator and year

Indicator	Delta scores (δ)												Grade change frequency
	2005–2006	2006–2007	2007–2008	2008–2009	2009–2010	2010–2011	2011–2012	2012–2013	2013–2014	2014–2015	2015–2016	Net δ	
Behaviours that contribute to overall physical activity													
Overall physical activity	D to D = 0	D to F = -1	F to F = 0	F to F = 0	F to F = 0	F to F = 0	F to F = 0	F to D = +1	D to D = 0	D to D = 0	D to D = 0	0	2
Organized sport participation	C to C = 0	C to C = 0	C to C = 0	C to C = 0	C to C = 0	C to C = 0	C to C = 0	C to C = 0	C to C = 0	C to B = +1	B to B = 0	+1	1
Active play	INC to INC = --	INC to INC = --	INC to INC = --	INC to INC = --	INC to INC = --	F to F = 0	F to F = 0	F to INC = --	INC to INC = --	INC to INC = --	F to D = +1	+1	1
Active transportation	INC to INC = --	D to INC = --	D to D = 0	D to D = 0	D to D = 0	D to D = 0	D to D = 0	D to D = 0	D to D = 0	D to D = 0	D to D = 0	0	0
Sedentary behaviours	C to D = -1	D to D = 0	D to F = -1	F to F = 0	F to F = 0	F to F = 0	F to F = 0	F to F = 0	F to F = 0	F to D = +1	D to F = -1	-2	4
Settings and sources of influence													
Family and peers	D to D = 0	D to D = 0	D to C = +1	C to C = 0	C to D = -1	D to D = 0	D to D = 0	D to C = +1	C to C = 0	C to C = 0	C to C = 0	+1	3
School	F to INC = --	F to C = +2	C to C = 0	C to C = 0	C to C = 0	C to C = 0	C to C = 0	C to C = 0	C to C = 0	C to C = 0	C to B = +1	+3	2
Community and environment	C to B = +1	B to C = -1	C to C = 0	C to C = 0	C to C = 0	C to B = +1	B to B = 0	B to B = 0	B to B = 0	B to B = 0	B to A = +1	+2	4
Strategies and investments													
Government	C to C = 0	C to C = 0	C to C = 0	C to C = 0	C to C = 0	C to C = 0	C to D = -1	D to C = +1	C to C = 0	C to B = +1	B to B = 0	+1	3
Non-government	INC to INC = --	INC to INC = --	INC to C = --	C to B = +1	B to C = -1	C to C = 0	C to A = +2	A to B = -1	B to A = +1	A to A = 0	A to A = 0	+2	5
Note: For cells without a numeric δ score (- -), one of several possible scenarios applies. In one or both of the years compared: 1) the indicator did not exist, 2) there was no grade for the indicator, or 3) the grade was an incomplete. If there was only a grade for the indicator in the second of the two years compared, a δ score was calculated when there was a grade for the indicator prior to the two years compared. "INC" means the indicator did not exist or there was no grade for the indicator.													

Note: For cells without a numeric δ score (-), one of several possible scenarios applies. In one or both of the years compared: 1) the indicator did not exist, 2) there was no grade for the indicator, or 3) the grade was an incomplete. If there was only a grade for the indicator in the second of the two years compared, a δ score was calculated when there was a grade for the indicator prior to the two years compared. "INC" means the indicator did not exist or there was no grade for the indicator.

positive (70%; 7/10), thus indicating general improvement in the last 12 years. Only one indicator (sedentary behaviours) had a net δ score that was negative (δ sedentary behaviours = -2).

All of the indicators that fall under the category of settings and sources of influence underwent a net positive change to their grades (δ family and peers = +1, δ school = +3, δ community and environment = +2), as did the strategies and investments indicators (δ government = +1, δ non-government = +2). Indeed, the majority of grade changes were in these five indicators (68%; 17/25) and generally represent structural improvements (e.g., availability of physical activity infrastructure, presence of physical activity policies, public and private spending on physical activity initiatives).

By contrast, very little change was seen in the behaviours that contribute to overall physical activity. Only two of these behavioural indicators had a net δ score greater than zero (δ organized sport participation = +1, δ active play = +1). Although the organized sport participation indicator currently has a high grade (B in 2016) and, therefore, less room for improvement, this is not true for the other behavioural indicators. In 2016, for example, overall physical activity, active transportation and sedentary behaviours had grades in the D or F range due to the low prevalence (<30%) of children and youth in Canada currently adhering to the Canadian Physical Activity and Sedentary Behaviour Guidelines,¹⁹ and actively commuting to/from school.¹¹ A ceiling effect cannot easily explain why these indicators have been resilient to change in the last 12 years.

The apparent structural-behavioural divide, where improvements in policies, programs, investments and infrastructure do not manifest in the desired behavioural-level changes, has been noted elsewhere.¹³ Representatives from 15 countries from around the world met in Toronto at the 2014 Global Summit on the Physical Activity of Children to release their physical activity report cards, which were developed according to the *ParticipACTION Report Card methodology*¹⁵ and included nine core indicators for comparison. One of the findings coming out of the Summit was that there was a pattern of higher physical activity and lower sedentary behaviour in countries with relatively poor infrastructure (middle and low income countries) and, conversely, lower physical activity and higher sedentary behaviour in countries with relatively better infrastructure (high income countries).¹³ It was further observed that less structure was often associated with greater freedom (e.g., more unstructured play time, greater active transportation and independent mobility) and vice versa.¹³ This relationship between physical activity and infrastructure, which may be mediated by several variables, including national gross domestic product, has also been noted elsewhere.²⁰

Is a shift in focus needed?

The diversity of initiatives underway in Canada to address the low levels of physical activity in Canadians is encouraging.²¹⁻²³ In addition to the many other factors that must be in place for these initiatives to have optimal impact and success (e.g., multi-sectoral participation, robust and transparent evaluation), our descriptive physical activity trend analysis suggests that some of the focus in these programs and strategies may need to be shifted away from more structured contexts of physical activity to enable more natural, ubiquitous and habitual physical activity behaviours

(e.g., active play, active transportation, outdoor time²⁴) of children and youth to flourish. With years of concerted efforts toward structural changes producing undetectable improvements in healthy active living behaviours, it could be that these upstream investments require yet more time before positive changes in downstream behaviours will be seen. It is also possible that these investments have staved off further declines in healthy active living behaviours, but without any positive changes evident. Or it may be that “less is more”. Given the opportunity and freedom, most children and youth like to move; perhaps we just need to let them.

SUMMARY

Based on a descriptive analysis of the change in grades in the *ParticipACTION Report Card on Physical Activity for Children and Youth* between 2005 and 2016, there have been several positive net changes in the last 12 years. However, the indicators that have undergone improvements (organized sport participation, active play, family and peers, school, community and environment, government, non-government) are mostly structural or focused on organized or institution-centric approaches. Most physical activity behaviours (overall physical activity, active transportation, sedentary behaviours) have not improved since 2005. This disconnect suggests that future efforts need to explore alternate approaches, including those associated with less structure and increased freedom and opportunity to move; such characteristics are associated with increased physical activity and decreased sedentary behaviours.^{13,23}

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RÉSUMÉ

L'analyse des tendances de l'activité physique permet de contrôler et de surveiller les indicateurs d'activité physique et de déterminer les aspects à cibler à des fins d'intervention et de promotion, ce qui est particulièrement important à l'heure actuelle du fait que si peu d'enfants d'âge scolaire et de jeunes au Canada respectent les Directives canadiennes en matière d'activité physique à l'intention des enfants et des jeunes. Dans notre commentaire, nous démontrons, à partir d'une analyse descriptive des tendances temporelles des notes attribuées dans le *Bulletin canadien de l'activité physique chez les jeunes* de ParticipACTION, qu'il y a eu des changements positifs dans plusieurs indicateurs de soutien à l'activité physique (famille, école, communauté et environnement, gouvernement, non-gouvernement) au Canada au cours des 12 dernières années. Ces changements ont toutefois rarement entraîné les modifications comportementales souhaitées ou été associés à des hausses concrètes de la prévalence du respect des Directives canadiennes en matière d'activité physique à l'intention des enfants et des jeunes par les enfants et les jeunes. Cela indique que les efforts d'intervention et de promotion de l'activité physique pourraient devoir cibler plus directement les habitudes d'activité physique des enfants et des jeunes canadiens, ou que des démarches parallèles sont nécessaires.

MOTS CLÉS : appréciation; surveillance; contrôle; évaluation; sédentaire; jeu; sport