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ABSTRACT

Background

Canadian and international research has shown that the COVID-19 pandemic has led to changes in health behaviours, including physical activity.

Methods

The Canadian Community Health Survey asked Canadian youth (12 to 17 years) and adults (18 years and older) to report the amount of time they spent in the past seven days engaged in physical activity across the following domains: recreation, transportation, household or occupation, and school (youth only). The present analysis compares the physical activity from two cross-sectional samples collected during the fall of 2018 (n=13,482) and the fall of 2020 (n=27,234).

Results

Youth reported accumulating, on average, two hours less physical activity per week in the fall of 2020 compared with the fall of 2018 (-129 minutes per week). The percentage of youth meeting the Canadian physical activity recommendation for children and youth dropped from 50.8% in the fall of 2018 to 37.2% in the fall of 2020. Physical activity decreased more among youth living in urban (-135 minutes per week) compared with rural (-86 minutes per week) areas. Physical activity decreased more among youth from Ontario (-168 minutes per week), Quebec (-121 minutes per week) and the Prairies (-106 minutes per week) compared with youth from the Atlantic provinces (-38 minutes per week) and British Columbia (-75 minutes per week). There was no change in the percentage of adults aged 18 and older meeting the Canadian physical activity recommendation between the fall of 2018 (52.7%) and the fall of 2020 (53.3%). Weekly physical activity was stable between fall 2018 and fall 2020 among 18 to 49 year olds, while significant increases were observed among adults aged 50 to 64 years (+41 minutes per week), 65 to 79 years (+55 minutes per week) and 80+ years (+20 minutes per week). Increases in physical activity among adults were statistically significant only among non-immigrant, non-Indigenous, those not designated as a visible minority, those living in urban areas and those with a postsecondary degree.

Interpretation

The COVID-19 pandemic had a detrimental impact on the physical activity of youth but not adults. The findings of this study add to a growing body of evidence that shows the considerable impact the pandemic has had on many aspects of Canadian life, including physical activity.

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What is already known on this subject?

- Maintaining an adequate level of physical activity is associated with lower risk of death and chronic disease.
- Some studies indicate that physical activity decreased during the COVID-19 pandemic because of the public health restrictions that were put in place to reduce virus transmission.
- Canadian adults maintained their physical activity during the pandemic and older adults increased their physical activity.
- A decline in physical activity was observed among Canadian youth. This was largely attributed to decreases in recreation and school-based physical activity.

What does this study add?

- The COVID-19 pandemic had a minimal impact on the physical activity habits of Canadian adults (+16 minutes per week, on average). There was some variation on how the pandemic impacted physical activity across age groups, sexes, sociodemographic factors, population groups and geography.
- On average, Canadian youth were getting two hours less of physical activity per week in the fall of 2020 compared with the fall of 2018. The decrease in physical activity among youth was evident across sexes, sociodemographic factors and population groups. There was some variation by region and between those living in urban areas versus those living in rural areas.

Starting in March 2020, lockdowns and closures because of the COVID-19 pandemic altered the daily movement and exercise habits of many Canadians. While public health restrictions are put in place to reduce virus transmission,[1] prolonged restrictions can lead to changes in health behaviours, such as physical activity. Maintaining an adequate level of physical activity is associated with a lower risk of death and chronic disease, including cardiovascular disease, diabetes, depression, anxiety, dementia and several cancers.[2] In the context of the COVID-19 pandemic, ample evidence points to the importance of physical activity in mitigating the impact of pandemic-associated stress on individuals.[3,4] Further, evidence also suggests that being physically fit is positively associated with improved immune function.[5] International[6-9] and Canadian[10-13] research studies show that many people decreased their level of physical activity during the COVID-19 pandemic. Using the same data as a previous publication that reported that physical activity remained stable from the fall of 2018 to the fall of 2020 among adults, but decreased among youth,[14] the present paper is a more in-depth analysis that examines whether the impact of the pandemic on physical activity was consistent across sociodemographic characteristics, population groups and geography.

The social determinants of health framework describes how social, economic and political factors influence health.[15] The COVID-19 pandemic put a spotlight on these inequalities[16] as there was a disproportionate impact of COVID-19 cases and deaths across the diverse Canadian population.[17] For example, data from Toronto and Ottawa indicate that COVID-19 cases were 1.5 to 5 times higher in racialized populations.[18] Black Canadians were three times more likely to report COVID-19 symptoms, were more likely than the national average to work in jobs requiring face-to-face exposure (41% versus 25%), and were more likely than the national average to report layoffs and financial stress during the pandemic (56% versus 43%).[19] First Nations people living on reserve had a 69% higher infection rate compared with the general population.[20] These preliminary findings of inequity in the impact of COVID-19 may suggest that COVID-19 created an additional burden on the health behaviours, specifically in terms of physical activity, of some Canadian subpopulations.

The Canadian Community Health Survey (CCHS) is an annual cross-sectional survey that collects information related to health status, health care utilization and health determinants for the Canadian population. Information about physical activity, including breakdown by domain (recreation, transportation, household or occupation, and school), was collected from CCHS participants during the fall of 2020 (i.e., during the pandemic) using the same questionnaire modules used with participants in the fall of 2018 (i.e., before the pandemic). This continuity in questionnaire content facilitates a comparison between a period before the pandemic and a period during the pandemic. The purpose of this study is to compare physical activity before and during the COVID-19 pandemic by comparing the September to December 2020 data from the 2020 CCHS with the October to December 2018 data from the 2018 CCHS. This study examines this comparison through a health equity lens to illustrate the differential impact across the Canadian population in physical activity.

Methods

Data source

The CCHS is an annual cross-sectional survey that collects information related to health status, health care utilization and health determinants for the Canadian population. The present analysis compares the September to December 2020 data (adults: n=25,661; youth: n=1,573) with the October to December segment of the 2018 data file (adults: n=12,376; youth: n=1,106). Data from 2019 were not used as the physical activity module was optional content in 2019 and therefore not amenable to producing nationally representative estimates. The present analysis does not included data collected in the territories as two consecutive full years of data are required to produce territorial estimates.

The COVID-19 pandemic had major impacts on the data collection operations for the 2020 CCHS. The collection was stopped in mid-March, towards the end of the first collection period, and did not resume until September. The second, third and fourth quarterly samples were collected during very short collection periods of about five weeks each from September to December. The impossibility of conducting in-person interviews, the shorter collection periods and collection capacity issues resulted in a significant decrease in response rates. As with previous CCHS cycles, survey weights were adjusted to minimize any potential bias that could arise from survey non-response. Non-response adjustments and calibration using available auxiliary information were applied and are reflected in the survey weights provided with the data file. Extensive validations of survey estimates were also performed and examined from a bias analysis perspective. Despite these rigorous adjustments and validations, the high non-response rate increases the risk of a remaining bias and the magnitude of its potential impact on estimates produced using the survey data. Therefore, users are advised to use the 2020 CCHS data with caution, especially when creating estimates for small subpopulations or when comparing them with other CCHS years.[21]

Physical activity questions

CCHS respondents were asked to provide estimates of the time they spent in the past seven days engaged in the following domains of physical activity: transportation, recreation, occupation or household, and school-based (youth only). The wording of the survey questions is included below. If respondents replied yes to any of these questions, they were then asked which days they did these activities and the total time for the week.

- In the last 7 days, did you use active ways like walking or cycling to get to places such as work, school, the bus stop, the shopping centre or to visit friends?
- In the last 7 days, did you do sports, fitness or recreational physical activities, organized or non-organized, that lasted a minimum of 10 continuous minutes?
- In the last 7 days, did you do any other physical activities while at work, in or around your home or while volunteering? Examples are carrying heavy loads, shoveling, and household chores such as vacuuming or washing windows. Please remember to only include activities that lasted a minimum of 10 continuous minutes.
- Youth only: In the last 7 days, did you do sports, fitness or recreational physical activities while at school?

Values greater than two hours per day in any of the above domains were identified as outliers and recoded to two hours. As per the new Canadian 24-Hour Movement Guidelines, adults (18 years and older) were classified as meeting the physical activity recommendation if their weekly sum of physical activity was equal to or greater than 150 minutes.[22] Youth (12 to 17 years) were classified as meeting the physical activity recommendation if their average daily amount of moderate-to-vigorous physical activity (in all domains of physical activity) was equal to or greater than 60 minutes.[22]

Income, education, immigrant status and geography

Income deciles were recoded into quintiles as per survey recommendations.[21] In the adult analysis, respondent education was recoded into three levels: less than high school, high school graduate with no postsecondary education, or postsecondary degree. In the youth analysis, the highest level of household education was recategorized into two levels: high school graduation or less, or more than high school education. Immigrant status was coded as landed immigrant or Canadian-born individual. A series of geography variables was used to determine whether living in a population centre versus a rural area had any impact on physical activity. Geography variables included on the CCHS file allowed the data to be disaggregated into urban versus rural, as well as core, fringe or rural area within a census metropolitan area (CMA) or census agglomeration (CA); population centre outside of a CMA and CA; rural area outside of a CMA or CA; or secondary core. A population size variable was also used to disaggregate the data into rural areas (fewer than 1,000 people), small population centres (1,000 to 29,999 people), medium population centres (30,000 to 99,999 people) or large urban population centres (100,000 people or more). The data were also disaggregated into five regions of Canada: British Columbia, Prairies (Alberta, Saskatchewan and Manitoba), Ontario, Quebec and the Atlantic provinces.

Visible minority designation and Indigenous identity

The term "visible minority" refers to a person who belongs to a visible minority group as defined by the *Employment Equity Act*[23] as "persons, other than Aboriginal peoples, who are non-Caucasian in race or non-white in colour." The visible minority population consists of the following groups: South Asian,

Chinese, Black, Filipino, Latin American, Arab, Southeast Asian, West Asian, Korean and Japanese. Indigenous group refers to whether the person is First Nations (North American Indian), Métis or Inuk (Inuit). A person may be included in more than one of these three specific groups. Aboriginal peoples of Canada (referred to here as Indigenous peoples) are defined under Section 35(2) of the *Constitution Act, 1982* as including Indian, Inuit and Métis peoples.[23]

Statistical analysis

Descriptive statistics were used to produce weighted means of minutes of physical activity and weighted percentages of the respondents meeting physical activity recommendations. Variance of the estimates was examined using 95% confidence intervals with bootstrap weights. Survey weights were applied to the data to address non-response bias and to make the results representative of the Canadian population. Analyses were conducted using SAS (version 9.4), and differences between the fall of 2018 and the fall of 2020 periods were tested using contrast statements within the PROC DESCRIPT procedure in SAS-callable SUDAAN (version 11.0.3). Differences in physical activity within each survey year (e.g., between males and females) were also tested using the PROC DESCRIPT procedure in SAS-callable SUDAAN.

Table 1
Descriptive characteristics of youth sample aged 12 to 17 years for the fall of 2018 and the fall of 2020

	Fall 2018		Fall 2020		Average daily minutes of physical activity						Percentage meeting the physical activity recommendation					
					Fall 2018			Fall 2020			Fall 2018			Fall 2020		
		Weighted		Weighted		95% confidence interval			95% confidence interval			95% confidence interval			95% confidence interval	
Full sample	Number	percentage of sample	Number	percentage of sample	Mean	from	to	Mean	from	to	%	from	to	%	from	to
Sex																
Both sexes	1,106	100.0	1,573	100.0	74.7	68.6	80.8	56.3 ***	52.6	60.0	50.8	46.4	55.2	37.2 ***	34.2	40.3
Males§	553	49.6	813	51.3	83.4	72.9	94.0	61.0 ***	55.4	66.5	55.3	48.8	61.7	39.5 ***	35.5	43.8
Females	553	50.4	760	48.7	66.1 †	59.7	72.5	51.5 *†	46.5	56.4	46.4 †	40.4	52.5	34.8 *†	30.6	39.2
Household education																
High school	156	14.9	212	12.9	67.3	52.1	82.5	54.9	44.5	65.2	41.8	31.7	52.6	35.7	27.0	45.5
More than high school§	920	85.1	1,305	87.1	75.6	69.1	82.1	57.7 ***	53.7	61.8	52.1	47.3	56.9	37.8 ***	34.2	41.4
Socioeconomic factors and population groups																
Lone-parent household[a]																
Yes	213	21.4	320	21.3	76.3	60.4	92.2	53.1 *	44.2	62.1	46.5	36.9	56.4	32.9 *	26.2	40.3
No§	781	66.3	1,070	64.9	75.5	68.7	82.4	56.5 ***	52.5	60.5	51.8	46.6	56.9	38.7 ***	35.1	42.5
Lone-child household[a]																
Yes	171	15.9	240	15.6	66.3	50.4	82.2	44.3 *‡	37.4	51.1	46.4	35.5	57.6	31.0 *‡	24.0	38.9
No§	823	71.8	1,150	70.6	77.8	70.7	84.9	58.2 ***	54.0	62.4	51.4	46.4	56.3	38.7 ***	35.1	42.4
Income quintiles																
1	202	21.7	283	20.9	65.0	52.6	77.5	53.4	42.4	64.4	41.3 †	32.5	50.8	31.2	24.5	38.8
2	232	22.5	297	18.7	85.1	66.9	103.3	55.3 *	46.4	64.1	51.1	41.4	60.8	35.2 *	28.1	43.1
3	236	22.3	326	22.1	71.3	59.8	82.8	63.3	55.4	71.1	51.5	41.6	61.3	42.1	35.2	49.3
4	236	18.0	372	21.4	75.9	66.4	85.3	53.4 ***	46.6	60.3	53.5	43.4	63.3	35.9 *	30.0	42.2
5§	200	15.5	295	16.9	76.6	66.1	87.2	57.6 *	48.0	67.3	59.5	48.8	69.4	40.7 *	32.3	49.8
Immigrant																
Yes	119	14.1	205	18.2	77.7	61.7	93.7	51.5 *	39.5	63.4	56.2	43.4	68.3	34.9 *	25.9	45.2
No§	987	85.9	1,368	81.8	74.2	67.6	80.8	57.8 ***	53.7	62.0	49.9	45.3	54.6	37.4 ***	33.7	41.4
Designated as a visible minority																
Yes	204	29.9	335	33.8	68.5	56.5	80.6	53.6 *	44.7	62.4	47.1	38.0	56.5	33.9 *	27.8	40.5
No§	790	70.1	1,206	66.2	77.1	69.7	84.6	58.8 ***	54.9	62.7	51.5	46.2	56.7	38.8 ***	34.8	43.0
Indigenous																
Yes	101	6.0	124	5.8	83.7	66.7	100.6	56.3 *	44.5	68.1	67.3	54.7	77.8	37.5 ***	26.6	49.8
No§	1,005	94.0	1,449	94.2	74.1	67.7	80.5	56.7 ***	52.8	60.6	49.8 †	45.2	54.4	36.9 ***	33.9	40.1
Geographical variables and region of Canada																
Rural/urban																
Rural	342	19.2	446	17.2	72.8	63.3	82.2	60.4	51.3	69.6	50.4	43.2	57.6	39.8 *	33.8	46.1
Population centres§	764	80.8	1,127	82.8	75.2	67.9	82.4	55.9 ***	51.5	60.2	50.9	45.7	56.1	36.4 ***	32.7	40.3
Population size																
Rural	342	19.2	446	17.2	72.8	63.3	82.2	60.4	51.3	69.6	50.4	43.2	57.6	39.8 *	33.8	46.1
Small population centres	230	12.9	290	12.0	77.1	68.0	86.3	57.3 *	47.4	67.2	56.7	48.1	64.8	38.3 *	30.0	47.4
Medium population centres	125	7.9	186	8.8	78.0	62.0	94.0	59.5 ***	48.7	70.3	48.6	37.7	59.6	40.9	31.8	50.7
Large population centres§	409	60.0	651	62.0	74.4	65.0	83.7	55.1	49.6	60.5	50.0	43.4	56.6	35.4 ***	31.1	39.9
Region																
Atlantic	164	6.5	170	5.8	63.3 †	54.3	72.3	57.8 †	48.6	67.0	49.3 †	40.1	58.6	41.1 †	32.2	50.7
Quebec	246	22.3	386	21.3	66.6 †	57.0	76.2	49.3 *‡	43.5	55.1	47.8 †	39.2	56.5	30.1 ***‡	25.0	35.8
Ontario	302	39.3	413	39.6	80.3	67.1	93.4	56.3 *†	48.7	63.9	53.0	44.2	61.7	36.8 *†	31.1	43.0
Prairies	246	19.0	446	21.2	69.8	60.4	79.2	54.7 *†	48.4	61.0	48.7	40.8	56.6	35.3 *†	30.3	40.7
British Columbia§	148	12.9	158	12.0	84.7	70.1	99.2	73.9	64.4	83.5	53.1	42.2	63.6	50.7	42.6	58.7

* significantly different from the fall of 2018 estimate ($p < 0.05$)
*** significantly different from the fall of 2018 estimate ($p < 0.001$)
§ reference category
† significantly different from reference category ($p < 0.05$)
‡ significantly different from reference category ($p < 0.001$)
[a] Weighted percentage of sample does not add up to 100% because of a third category not included where lone-parent (12.5% in 2018 and 13.8% in 2020) and lone-child (12.4% in 2018 and 13.8% in 2020) status was unknown.
Sources: Canadian Community Health Survey (October to December 2018 subsample) and Canadian Community Health Survey (September to December 2020 subsample).

Table 2
Descriptive characteristics of adult sample aged 18 and older for the fall of 2018 and the fall of 2020

	Fall 2018		Fall 2020		Average daily minutes of physical activity						Percentage meeting the physical activity recommendation					
					Fall 2018			Fall 2020			Fall 2018			Fall 2020		
					95% confidence interval			95% confidence interval			95% confidence interval			95% confidence interval		
Full sample	Number	Weighted percentage of sample	Number	Weighted percentage of sample	Mean	from	to	Mean	from	to	%	from	to	%	from	to
Age groups and sex																
Sex																
Both sexes	12,376	100.0	25,661	100.0	38.7	37.3	40.1	41.0 *	39.9	42.1	52.7	50.9	54.4	53.3	52.1	54.5
Males[§]	5,750	49.8	11,254	48.8	43.8	41.7	45.9	46.7 *	44.7	48.6	56.1	53.6	58.5	56.0	54.1	57.9
Females	6,626	50.2	14,407	51.2	33.6 ‡	31.9	35.3	35.6 ‡	34.1	37.1	49.3 ‡	46.9	51.7	50.7 ‡	48.9	52.5
Both sexes																
18 to 34 years[§]	2,560	29.4	2,677	26.9	46.1	43.4	48.9	46.4	43.8	49.1	61.5	58.1	64.9	59.2	56.3	62.0
35 to 49 years	2,571	24.7	3,684	23.8	43.5	40.6	46.3	42.7	40.4	45.1	57.9	54.7	61.1	56.9	54.2	59.5
50 to 64 years	3,249	25.3	5,098	25.9	37.2 ‡	34.8	39.6	43.0 ***†	40.9	45.2	51.2 ‡	47.9	54.5	55.6 *†	53.0	58.2
65 to 79 years	3,092	16.2	10,969	18.5	27.3 ‡	25.1	29.4	35.1 ***‡	33.1	37.1	39.4 ‡	36.7	42.2	45.3 ***‡	43.4	47.2
80 years and older	904	4.3	3,233	5.0	12.4 ‡	10.2	14.6	15.2 *‡	13.3	17.2	20.4 ‡	16.2	25.5	22.5 ‡	19.9	25.2
Males																
18 to 34 years[§]	1,200	30.5	1,241	28.0	51.0	46.9	55.0	52.0	47.7	56.2	64.8	59.8	69.6	58.0	53.5	62.3
35 to 49 years	1,211	24.4	1,645	23.7	50.8	46.2	55.3	48.6	44.9	52.4	63.6	58.8	68.0	52.5	47.9	57.0
50 to 64 years	1,558	26.4	2,305	25.8	40.8 ‡	36.9	44.7	48.7 *	45.1	52.3	51.7 ‡	47.1	56.3	50.7	46.2	55.1
65 to 79 years	1,427	14.9	4,822	17.9	30.4 ‡	26.8	34.0	39.8 ***‡	37.1	42.4	42.1 ‡	38.0	46.3	37.2 *‡	33.5	41.0
80 years and older	354	3.7	1,241	4.5	14.9 ‡	10.7	19.0	19.2 ‡	15.5	22.9	21.8 ‡	15.6	29.6	19.4 ‡	13.8	26.5
Females																
18 to 34 years[§]	1,360	28.3	1,436	25.8	41.0	37.4	44.6	40.6	37.2	44.1	60.5	56.3	64.6	57.8	53.5	61.9
35 to 49 years	1,360	25.0	2,039	23.8	36.4	32.7	40.1	37.1	34.1	40.1	60.4 †	56.1	64.4	53.5	50.2	56.8
50 to 64 years	1,691	24.1	2,793	25.9	33.3 ‡	30.6	35.9	37.6 *	35.0	40.3	56.8 ‡	53.2	60.3	54.5 ‡	51.0	57.9
65 to 79 years	1,665	17.5	6,147	19.2	24.7 ‡	21.9	27.4	30.9 *‡	27.9	33.9	49.5 ‡	46.9	52.2	41.5 ‡	38.3	44.8
80 years and older	550	5.0	1,992	5.4	10.6 ‡	8.1	13.0	12.1 ‡	10.2	14.0	26.3 ‡	22.2	31.0	19.3 ‡	16.4	22.7
Socioeconomic factors and population groups																
Respondent education																
Less than high school	1,856	10.9	3,893	9.5	26.7 ‡	22.9	30.5	29.6 ‡	26.2	33.0	33.1 ‡	29.2	37.2	34.3 ‡	31.1	37.6
High school graduate	2,901	25.0	5,705	22.7	41.3	38.3	44.3	41.1	38.3	43.9	53.0	49.5	56.4	52.0 †	49.1	54.9
Postsecondary degree[§]	7,469	64.1	15,874	67.8	39.7	38.2	41.3	42.5 *	41.1	43.9	56.0	54.0	58.1	56.4	55.0	57.9
Income quintiles																
1	2,660	21.2	5,427	19.9	37.2 †	34.0	40.4	36.9 ‡	34.3	39.6	49.4 ‡	45.3	53.5	46.7 ‡	43.8	49.6
2	2,553	19.7	5,677	20.0	33.3 ‡	30.3	36.3	39.1 *‡	36.4	41.8	44.3 ‡	40.9	47.8	49.7 *‡	47.1	52.3
3	2,355	20.2	5,185	19.7	40.5	37.4	43.6	39.9 †	37.1	42.7	54.6 †	51.1	58.1	52.3 ‡	49.2	55.3
4	2,367	19.5	4,801	20.1	38.8 †	35.9	41.7	41.9 †	39.4	44.4	54.8 †	51.3	58.2	55.3 ‡	52.7	57.9
5[§]	2,441	19.4	4,571	20.3	43.8	41.2	46.4	47.1	44.2	50.0	60.5	57.2	63.7	62.4	59.1	65.5
Immigrant																
Yes	2,200	28.0	4,087	26.3	33.5 ‡	30.8	36.3	34.8 ‡	32.5	37.1	47.8	44.0	51.7	48.1	45.4	50.7
No[§]	10,176	72.0	21,574	73.7	40.7	39.2	42.2	43.2 *	42.0	44.5	54.5	52.8	56.3	55.2	53.9	56.5
Indigenous																
Yes	606	3.8	912	3.0	42.6	35.0	50.2	47.9	39.8	56.0	47.0	39.8	54.4	56.1	50.3	61.8
No[§]	11,770	96.2	24,749	97.0	38.5	37.1	39.9	40.8 *	39.7	41.9	52.9	51.1	54.7	53.2	52.0	54.4
Designated as a visible minority																
Yes	1,432	24.6	2,109	20.9	32.3 ‡	29.4	35.3	33.8 ‡	30.8	36.8	46.0 ‡	41.6	50.4	46.3 ‡	42.8	49.8
No[§]	10,185	75.4	23,139	79.1	40.7	39.1	42.2	43.2	42.0	44.5	55.4	53.6	57.2	55.5	54.2	56.7
Visible minority group																
South Asian	254	4.8	461	5.4	25.7 ‡	20.8	30.7	32.7 †	24.3	41.1	35.1 ‡	26.5	44.9	41.8 †	34.0	50.0
Chinese	300	5.0	484	4.5	30.8 †	25.0	36.6	28.6 ‡	23.4	33.7	44.9 †	35.3	55.0	43.0 ‡	35.6	50.7
Black	171	2.6	317	2.7	36.7 E	23.8	49.6	32.8 †	24.4	41.2	47.6	34.5	61.0	51.5 †	41.3	61.7
Filipino	103	2.1	215	2.0	32.5	23.1	41.8	41.7	30.4	53.0	37.9 E	27.1	50.0	47.2	37.0	57.7
Latin American	84	1.3	131	1.2	48.5 E	33.4	63.6	40.8	30.4	51.2	66.3	49.7	79.7	54.3	41.6	66.5
Arab	91	1.9	134	1.7	30.6 E	20.6	40.7	33.0 †	24.3	41.8	42.6 E	29.8	56.5	44.1 †	32.4	56.5
Southeast Asian	61	1.1	132	1.3	34.0 E	23.3	44.7	31.5 †E	21.9	41.0	68.2 E	43.6	85.6	46.3 E†	33.2	59.9
Other visible minorities	368	5.6	235	2.0	33.7 †	27.2	40.2	40.3	31.2	49.4	50.3 †	41.9	58.6	54.7	44.1	65.0
Not a visible minority[§]	10,185	75.4	23,139	79.1	40.7	39.1	42.2	43.2 *	42.0	44.5	55.4	53.6	57.2	55.5	54.2	56.7
Geographic variables and region of Canada																
Geography																
Core[§]	7,021	71.1	14,985	72.3	38.5	36.7	40.2	40.5	39.1	41.8	53.5	51.2	55.7	53.8	52.3	55.3
Fringe	385	2.9	724	2.9	36.2	30.5	41.9	39.9	33.0	46.8	47.9	40.1	55.7	54.6	47.4	61.5
Rural inside CMA/CA	980	5.9	2,296	6.6	42.5	38.4	46.6	43.5	39.3	47.7	55.6	50.9	60.2	51.7	47.6	55.8
Population centre outside CMA/CA	1,195	5.1	2,226	4.8	37.5	33.4	41.7	44.0 *	39.3	48.6	49.8	44.5	55.1	51.4	47.3	55.5
Rural outside CMA/CA	2,424	10.8	4,890	9.8	39.5	36.4	42.5	41.1	38.1	44.0	48.8 †	45.7	51.9	48.6 †	45.8	51.5
Secondary core	371	4.2	540	3.6	38.2	30.6	45.8	44.2	36.9	51.5	51.6	44.2	58.8	59.8	52.9	66.4
Rural/urban																
Rural	3,404	16.7	7,186	16.4	40.6	38.2	43.0	42.0	39.7	44.4	51.2	48.5	53.9	49.9 †	47.6	52.1
Population centres[§]	8,972	83.3	18,475	83.6	38.3	36.7	39.9	40.8 *	39.6	42.1	52.9	50.9	55.0	54.0	52.6	55.3
Population size																
Rural	3,404	16.7	7,186	16.4	40.6	38.2	43.0	42.0	39.7	44.4	51.2	48.5	53.9	49.9 †	47.6	52.1
Small population centres	2,470	11.9	5,138	12.5	38.7	35.7	41.8	41.8	39.1	44.5	51.2	47.4	55.0	53.1	50.5	55.7
Medium population centres	1,680	9.5	3,276	9.5	40.7	36.9	44.6	41.2	37.7	44.7	53.0	49.2	56.8	52.4	48.9	55.9
Large population centres[§]	4,822	61.8	10,061	61.6	37.9	35.9	39.8	40.6 *	39.0	42.1	53.3	50.7	55.8	54.4	52.7	56.1
Region																
Atlantic	1,611	6.6	5,628	6.6	39.6 ‡	36.2	43.0	39.9 ‡	36.7	43.0	49.7 ‡	46.2	53.1	50.9 ‡	47.6	54.1
Quebec	2,749	23.0	4,318	22.7	32.8 ‡	30.3	35.3	34.0 ‡	31.8	36.2	47.8 ‡	44.6	50.9	48.6 ‡	45.7	51.4
Ontario	3,706	39.3	6,893	39.4	38.2 †	35.6	40.8	39.7 ‡	37.5	41.8	51.0 ‡	47.8	54.2	50.9 ‡	48.6	53.1
Prairies	2,624	17.8	5,887	17.4	38.9 ‡	36.1	41.7	43.3 *‡	41.1	45.6	54.8 ‡	51.3	58.1	56.1 ‡	53.7	58.5
British Columbia[§]	1,686	13.3	2,935	13.9	49.5	46.2	52.9	54.0	50.5	57.4	64.6	61.1	68.0	65.4	62.2	68.6

[E] use with caution
* significantly different from the fall of 2018 estimate ($p < 0.05$)
*** significantly different from the fall of 2018 estimate ($p < 0.001$)
[§] reference category
[†] significantly different from reference category ($p < 0.05$)
[‡] significantly different from reference category ($p < 0.001$)
Notes: CMA = census metropolitan area. CA = census agglomeration.
Sources: Canadian Community Health Survey (October to December 2018 subsample) and Canadian Community Health Survey (September to December 2020 subsample).

Results

Differences in physical activity between 2018 and 2020—by age and sex

The magnitude of change in the percentage of Canadians meeting the physical activity recommendations from the fall of 2018 to the fall of 2020 differed by age and sex (see tables 1 and 2). The percentage of youth meeting the recommendation was 14 percentage points lower in 2020 compared with 2018 ($p < 0.001$), with the gap slightly wider among males compared with females. No differences in meeting the recommendation between 2018 and 2020 were observed among adults aged 18 to 49 years. An overall increase was observed among adults aged 50 to 64 years (+4 percentage points, $p < 0.05$) and adults aged 65 to 79 years (+6 percentage points, $p < 0.001$). No change was observed among those aged 80 and older. The average change in weekly minutes of physical activity by age group and sex is shown in Figure 1. Youth reported accumulating, on average, two hours less of physical activity per week in the fall of 2020 compared with the fall of 2018 ($p < 0.001$). Very little change was observed among younger adults (18 to 49 years), while adults aged 50 years and older reported accumulating between twenty minutes to an hour more of physical activity per week in the fall of 2020 compared with the fall of 2018.

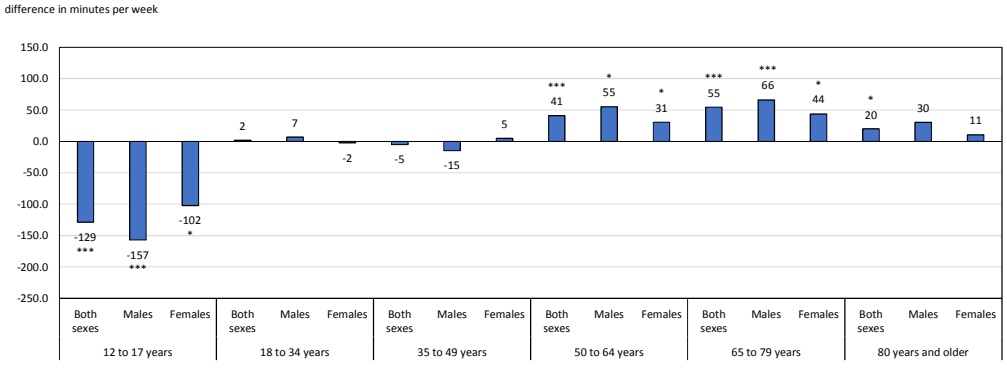
Differences in physical activity between 2018 and 2020 by sociodemographic characteristics and population group—youth

Average weekly minutes of physical activity were lower among youth in the fall of 2020 compared with the fall of 2018 regardless of income, highest level of household education, family structure, immigrant status, visible minority status or Indigenous identity (Figure 2). The magnitude of difference between the two time points was greater among immigrants compared with non-immigrants (-184 minutes versus -115 minutes per week) and Indigenous people versus non-Indigenous people (-192 minutes versus -122 minutes per week), while the difference was greater among youth not designated as a visible minority (-128 minutes per week) compared with those who were designated as a visible minority (-105 minutes per week). Youth from households where the highest level of education was high school reported a smaller decrease in weekly minutes of physical activity (-87 minutes per week) compared with youth from households where the highest level of education was greater than high school (-125 minutes per week). No meaningful differences were observed in the magnitude of the decrease in physical activity by family structure (i.e., lone-parent and lone-child household).

Differences in physical activity between 2018 and 2020 by sociodemographic characteristics and population group—adults

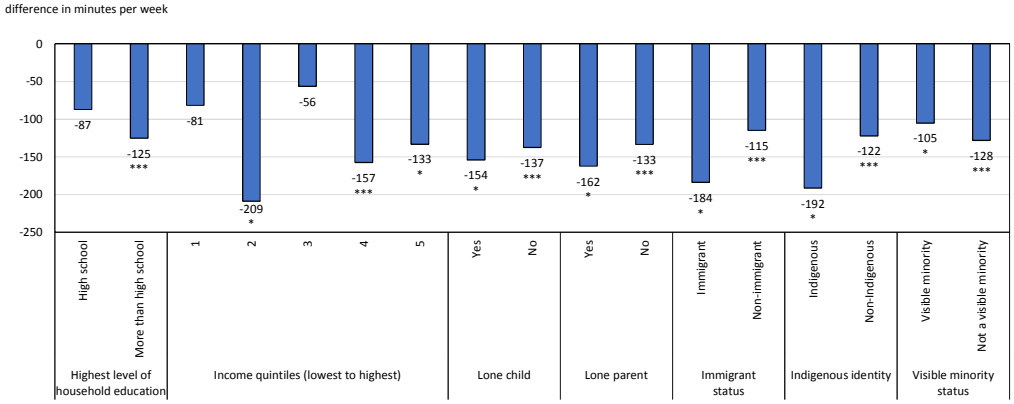
Across the three respondent education categories, only the increase in physical activity in adults with a postsecondary degree or higher (+19 minutes per week) was significant ($p < 0.05$) (Figure 3). The differences in physical activity between population groups should be interpreted with caution because of an imbalance in sample size and the associated variability of estimates between immigrant, visible minority and Indigenous identity groups when compared with non-immigrant, non-visible minority and non-Indigenous groups, respectively (refer to Table 2 to see the marked differences in sample sizes). The increase in weekly physical activity was significant among non-immigrants (+18 minutes per week) but not among immigrants (+9 minutes per week). The increase in weekly physical activity was significant among those not designated as a visible minority (+18 minutes per week) but not among those designated as a visible minority (+10 minutes per week). The increase in weekly physical activity was higher among those identifying as Indigenous (+38 minutes per week) compared with those who did not identify as Indigenous (+16 minutes per week);

Figure 1
Difference between the fall of 2018 and the fall of 2020 in minutes of reported physical activity per week, by age group and sex



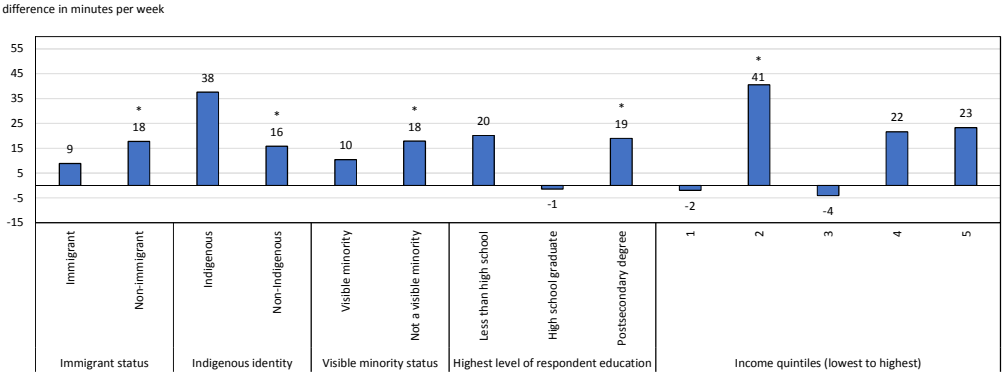
* significant difference between the fall of 2018 and the fall of 2020 ($p < 0.05$)
*** significant difference between the fall of 2018 and the fall of 2020 ($p < 0.001$)
Sources: Canadian Community Health Survey (October to December 2018 subsample) and Canadian Community Health Survey (September to December 2020 subsample).

Figure 2
Difference between the fall of 2018 and the fall of 2020 in minutes of reported physical activity per week, by population group, education and income among youth aged 12 to 17 years



* significant difference between the fall of 2018 and the fall of 2020 ($p < 0.05$)
*** significant difference between the fall of 2018 and the fall of 2020 ($p < 0.001$)
Sources: Canadian Community Health Survey (October to December 2018 subsample) and Canadian Community Health Survey (September to December 2020 subsample).

Figure 3
Difference between the fall of 2018 and the fall of 2020 in minutes of reported physical activity per week, by population group, education and income among adults



* significant difference between the fall of 2018 and the fall of 2020 ($p < 0.05$)
Sources: Canadian Community Health Survey (October to December 2018 subsample) and Canadian Community Health Survey (September to December 2020 subsample).

however, only the non-Indigenous difference was statistically significant.

Differences in physical activity between 2018 and 2020 by geography—youth

The difference in the average amount of weekly physical activity between the fall of 2018 and the fall of 2020 was greater among youth living in population centres (-135 minutes per week) compared with those living in rural areas (-86 minutes per week) (Figure 4). A significant difference between 2018 and 2020 was observed in youth living in Ontario (-168 minutes per week), Quebec (-121 minutes per week) and the Prairies (-106 minutes per week) when compared with those living in the Atlantic provinces (-38 minutes per week) or British Columbia (-75 minutes per week), where the differences were not statistically significant.

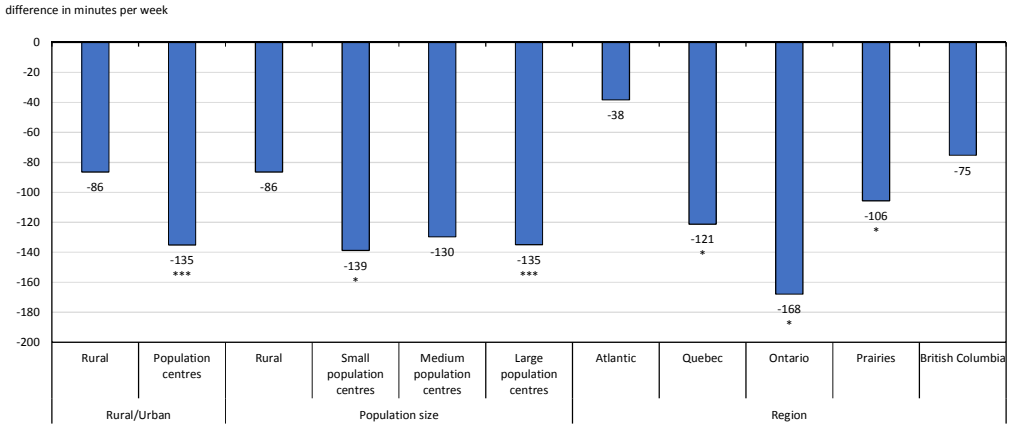
Differences in physical activity between 2018 and 2020 by geography—adults

The difference in the average amount of weekly physical activity between the fall of 2018 and the fall of 2020 was greater among adults living in population centres (+17 minutes per week) compared with those living in rural areas (+10 minutes per week) (Figure 5). On average, the amount of weekly physical activity among adults was higher in the fall of 2020 compared with the fall of 2018 in all regions of Canada, with the greatest increases observed in the Prairies and British Columbia (both +31 minutes per week).

Discussion

The present analysis is a follow-up to a study published in 2021 that highlighted how the impact of COVID-19 on physical

Figure 4
Difference between the fall of 2018 and the fall of 2020 in minutes of reported physical activity per week, by geographic variables and region of Canada among youth



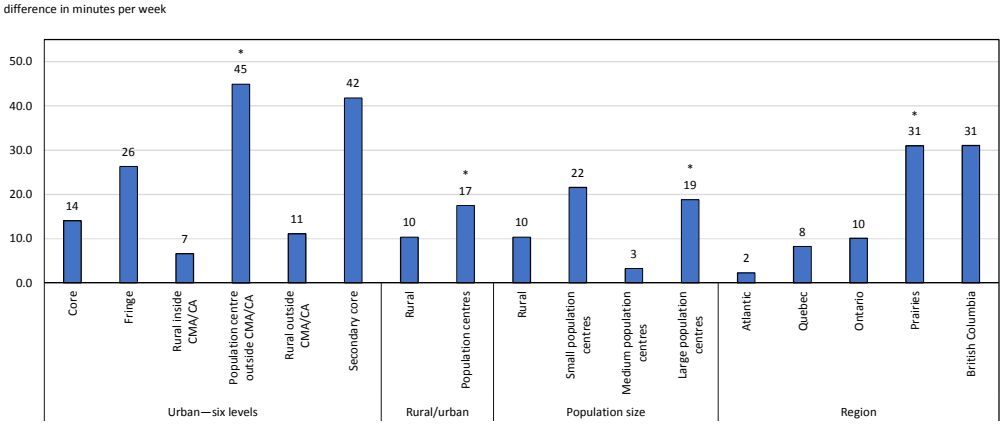
* significant difference between the fall of 2018 and the fall of 2020 ($p < 0.05$)
*** significant difference between the fall of 2018 and the fall of 2020 ($p < 0.001$)
Sources: Canadian Community Health Survey (October to December 2018 subsample) and Canadian Community Health Survey (September to December 2020 subsample).

activity was different for youth compared with adults in Canada.[14] While adults appear to have been able to maintain stable levels of physical activity during the COVID-19 pandemic, youth reported less physical activity during the fall of 2020 compared with two years prior. The findings of the present study provide important complementary information relating to whether specific groups were impacted more than others in their ability to engage in physical activity during the pandemic.

According to data collected between 2014 and 2017 using the same questionnaire module as was used in the present study, 59% of Canadian youth were meeting the physical activity recommendation.[24] The pre-pandemic estimate from the current study (fall of 2018) indicates that 51% of youth were meeting the physical activity recommendation. This pre-pandemic stability provides an important multi-year baseline with which to compare the estimates from during the pandemic. According to data from the fall of 2020, 37% of Canadian youth were meeting the physical activity recommendation, representing a 14 percentage point drop when compared with fall of 2018. In the fall of 2020, while most regions of Canada were under a state of emergency, which included restrictions on gatherings and social contacts, variation in public health restrictions, school closures, and the cancellation of sports and recreation existed between regions. For youth, interruptions in schooling and organized sports and activities were important contributors to the observed decline in overall physical activity.[14] Others have noted the important contribution that school and organized activities make towards overall physical activity among children and youth.[25] Further, parents noted challenges in controlling screen time for their children given the sudden reliance on screens for schooling and the majority of social connections.[26] The greatest declines among youth were observed in Ontario, Quebec and the Prairies. While beyond the scope of the current analysis, differences in local lockdown measures during the fall of 2020 may explain, in part, the differences observed between regions.[27] For example, all organized sports were cancelled and fitness facilities were closed in Quebec as of October 7, 2020, and, in the fall of 2020, secondary school students in Ontario and Quebec divided their time between remote and in-person learning. In contrast, schools in British Columbia and the Atlantic provinces remained open during that time with some minor restrictions on extracurricular activities.

Comparisons with other studies are difficult as other surveys implemented in Canada during the pandemic did not use the same questionnaire module used by Statistics Canada in its health surveys. In a national survey of parents in April 2020, Canadian parents reported that their children were less active, played outside less, were more sedentary, engaged in more recreational screen-based activities and slept more during the early days of the pandemic compared with before.[12] A follow-up survey compared the April 2020 results with the October 2020 results and found that the percentage of children (5 to 11 years) meeting the physical activity recommendation decreased from 19.0% to 15.3% among girls and 27.9% to 19.7% among boys, while remaining relatively stable among youth (12 to 17 years), with no change among girls and a drop from 14.8% to 11.8% among boys.[13] According to the studies by Moore et al., the amount of physical activity among youth was low in the immediate pandemic period and remained low six months later. It is unknown how these pandemic values compare with pre-pandemic values given that this specific survey was not conducted prior to the pandemic. The values in adherence to the physical activity recommendation observed by these previous studies are also much lower than those observed in both the baseline period of the current study (i.e., 51% of youth met the guidelines in the fall of 2018) and the pandemic period (i.e., 37% of youth met the recommendation in the fall of 2020). It is important to note that different questionnaire design and sampling strategies between the present study and the other Canadian studies[12,13] preclude direct comparisons. The consistency in questionnaire content in 2018 and 2020 is therefore a notable strength of the present paper.

Figure 5
Difference between the fall of 2018 and the fall of 2020 in minutes of reported physical activity per week, by geographic variables and region of Canada among adults



* significant difference between the fall of 2018 and the fall of 2020 ($p < 0.05$)
Notes: CMA = census metropolitan area. CA = census agglomeration.
Sources: Canadian Community Health Survey (October to December 2018 subsample) and Canadian Community Health Survey (September to December 2020 subsample).

Youth living in rural areas reported a less dramatic decrease in their average weekly physical activity (-86 minutes per week) compared with youth living in population centres (-135 minutes per week). While qualitative information about the reasons for being active or inactive are not available in the CCHS, it is possible that access to outdoor space promoted more physical activity.[28,29] This is consistent with findings from Mitra et al., who reported that low dwelling density and access to parks in high-density neighbourhoods increased the odds of outdoor activities among Canadian children and youth during the pandemic.[30] The same difference in rural versus urban status was not evident in the present study for adults. Adults living in population centres increased their physical activity more than those living in rural areas. Taken together, these findings are consistent with previous research that shows that living in highly walkable neighbourhoods supports physical activity among adults but not among children and youth.[31]

Two previous Canadian studies noted the importance of financial well-being to support children's physical activity during the COVID-19 pandemic.[32,33] The youth results of the present analysis run counter-intuitive to those findings as youth from higher income and more educated households reported greater decreases in physical activity from before the pandemic to during the pandemic than those from lower income and less educated households. That said, the children from higher income families are more likely to participate in organized sports and activities,[34,35] and these were limited or canceled to varying degrees during the pandemic. Immigrant status, Indigenous identity and visible minority status did not appear to influence the magnitude of change in physical activity for youth from before the pandemic to during the pandemic. The income-related findings for adults did not show a clear trend in the present analysis to suggest that income was positively or negatively associated with a change in physical activity during the pandemic (Figure 3). Data from the Retail Commodity Survey indicated that Canadians spent an estimated $211.4 million on exercise equipment at retail stores—an increase of 24% from the fourth quarter of 2018.[36] While beyond the scope of this study, a deeper examination of who was driving this increase in spending may shed light on the specific groups who opted to, or were able to, make these purchases to support their exercise habits.

The findings of the present study suggest that adults who did not report belonging to a visible minority group experienced a greater increase in physical activity during the pandemic compared with those designated as a visible minority. This was also true for non-immigrants compared with immigrants. The present study observed that physical activity increased more among Indigenous people compared with non-Indigenous people. These results must be interpreted with caution given the small sample sizes for some of the population groups. A close examination of the confidence intervals for the estimates shows high sample variability for some of the population groups for which the sample size was particularly small. This high sample variability precludes reaching statistical significance when testing the difference between 2018 and 2020 data despite an absolute mean difference in the amount of weekly physical activity that is not that different between these groups (e.g., those designated as a visible minority versus those who are not). In fact, Indigenous adults reported an average increase of 38 minutes per week of physical activity. This is not a statistically significant change because of the low sample size and high sample variability, but it is larger in magnitude than the average increase reported by non-Indigenous adults (+16 minutes per week) that did reach statistical significance because of a larger sample size. Exclusive reliance on p-values and statistical significance is not advisable, and a careful examination of the effect size is also important.[37] These results are a good example of why larger samples in some population groups are needed to properly disaggregate data to understand the challenges faced by specific population groups in Canada during the pandemic and beyond. Previous Canadian research has suggested that

recent immigrants are less active than established immigrants.[38] This is consistent with the modest difference observed in the present study. Very little information exists regarding the physical activity differences among population groups designated as visible minorities within Canada. While not necessarily comparable with the Canadian context, American data indicate that White people are more active during recreation than Black and Hispanic people, but that Black and Hispanic people tend to accumulate more work-related activity compared with White people.[39] These findings illustrate a difference by population group, but also highlight the interaction of a population group with employment type and income—a type of analysis that requires even larger sample sizes within population subgroups.

The present study leverages high-quality and large-scale population surveillance data from the CCHS to provide information on how the COVID-19 pandemic impacted the physical activity of Canadians. One of the key strengths of this study is the common questionnaire module implemented during the baseline period of the fall of 2018 and during the COVID-19 period of 2020. Other surveys implemented in response to the pandemic did not have pre-pandemic baseline data with which to compare.[12,13] An additional strength of the present study was the control for the effect of seasonality on physical activity habits by using the fall period at both time points. The bias concerns noted in the CCHS due to a low response rate are mitigated by a relatively large sample size overall and the survey weighting approach. Despite these strengths, this study highlights the need for more data to be collected in large-scale Canadian health surveys among specific population groups. Doing so would facilitate more robust analyses to truly understand how, and to what extent, some population groups were differentially impacted by the pandemic. Larger sample sizes would also allow for data to be further broken down by multiple determinants. This type of information is integral to fulfilling the Chief Public Health Officer's call to take an equity-based approach to the recovery from the COVID-19 pandemic and to address inequalities among Canadians when it comes to health and health behaviours.[19] Another limitation is the reliance on self-reported physical activity information as self-reporting can be impacted by bias and issues related to recall. Finally, there was a wide range of ongoing public health restrictions in various domains (i.e., school, work and society) in the fall of 2020. The present analysis did not examine the physical activity levels by specific restriction at the individual level but instead provides a high-level comparison of a time when there were no public health restrictions in Canada (the fall of 2018) with a time when many Canadians were living with a range of different public health restrictions (the fall of 2020).

Physical activity is an important determinant of health. Restrictions imposed during the COVID-19 pandemic in Canada meant that Canadians were challenged to find new and innovative ways to maintain their exercise habits. The drop in physical activity among youth is concerning as it may lead to long-lasting disengagement from organized sports and activities. Continuous surveillance of the participation rates among youth will be important moving forward. As the country emerges from the challenges imposed by the COVID-19 pandemic between 2020 and 2022, ongoing periodic assessments of lifestyle habits among Canadians will be important. Doing so will offer some insight into who may need more support, after the pandemic, to readopt or improve healthy lifestyle habits.

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