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ABSTRACT

Background

Canadians have been gravely impacted by the COVID-19 pandemic, and adults living with children may have been disproportionately impacted. The objective of this study was to describe changes in chronic disease risk factors and current exercise habits among adults living with and without a child younger than 18 years old.

Data and Methods

A repeated cross-sectional study was conducted using data collected from Canadians aged 15 and older via the Canadian Perspective Survey Series (CPSS) in late March (CPSS1, N=4,383), early May (CPSS2, N=4,367) and mid-July 2020 (CPSS4, N=4,050). This analysis included participants aged 25 and older. At three points during 2020, participants reported whether they increased, decreased, or had not changed their consumption of alcohol, tobacco and junk food or sweets, their screen use, and whether they currently exercised indoors or outdoors. Behaviours were compared for adults living with and without a child, and unadjusted odds ratios (OR) and 95% confidence intervals (CI) were estimated using logistic regression.

Results

The presence of a child in the household was associated with higher odds of increased (compared with decreased or no change) alcohol consumption at all three time points, consumption of junk food and sweets at CPSS1 (OR: 1.69, 95% CI: 1.09-2.60), and time on the Internet at CPSS1 (OR: 1.59, 95% CI: 1.05-2.41) and CPSS4 (OR: 1.56, 95% CI: 1.05-2.29). Compared with older adults (aged 55 and older), younger adults (aged 25 to 54) were more likely to exhibit increases in chronic disease risk factors regardless of the presence of a child in the household.

Interpretation

A substantial proportion of Canadian adults reported increased chronic disease risk factors during the pandemic, with greater increases noted among adults living with a child, compared with those living without a child. Public health interventions are urgently needed to mitigate the long-term impact of the pandemic on population health.

Keywords

chronic disease, alcohol, exercise, screen use, junk food, diet, COVID-19

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What is already known on this subject?

- The COVID-19 pandemic has impacted the ability of Canadians to maintain healthy behaviours and habits.
- Adults living with children have experienced unique challenges during the pandemic as they were required to fulfill multiple responsibilities (e.g., working at home while providing child care) and this may have disproportionately impacted their ability to maintain healthy behaviours and habits.

What does this study add?

- Since the start of the pandemic, a high proportion of Canadian adults reported increases in risk factors for chronic disease. Adults living with a child were more likely to report increases in the consumption of alcohol, junk food and sweets, and in Internet use during the first five months of the pandemic, compared with adults living without a child.
- Regardless of the presence of a child in the household, younger adults (aged 25 to 54) were more likely to demonstrate increases in chronic disease risk factors, compared with older adults (aged 55 and older).
- Effective strategies are needed to target and support households with children and to mitigate the long-term impact of the pandemic on population health and chronic disease risk.

Beginning in March 2020, a phased approach to public health preventive measures was implemented to minimize the spread of COVID-19 in Canada. The daily lives of individuals living in Canada changed significantly, with restrictions on travel and public gatherings, closures of schools, outdoor recreation spaces and nonessential businesses (including fitness centres), as well as increased teleworking.[1,2] These restrictions were necessary to control the spread of COVID-19 and mitigate the consequences of the pandemic,[3] but they may have adversely impacted the health behaviours of Canadians.[4] In particular, many parents and caregivers were required to fulfill multiple responsibilities, including working at home while providing child care or supporting virtual learning, which may have impeded their ability to maintain healthy lifestyle behaviours and routines.[5–7] Adults living with children are a high-risk group, as family-level stress has been shown to impact health behaviours and outcomes of parents.[8,9] It is important to understand whether the COVID-19 pandemic has disproportionately impacted the lifestyle behaviours and routines of adults living with children.

Health behaviours, including alcohol and tobacco consumption, poor diet, increased screen use, and physical inactivity, are important risk factors for chronic disease morbidity and mortality.[10–13] International evidence from early in the pandemic has suggested that public health measures during the COVID-19 pandemic were associated with unhealthy dietary habits,[7,14–16] increased screen use,[7,15,16] and reduced physical activity.[7,14,16,17] Findings have been inconsistent for alcohol[14,15,17] and tobacco consumption,[15,17] though these habits may differ by sex and age group. Two studies reported higher physical activity but also higher screen use, and higher alcohol and tobacco consumption among those living with a child, compared with those living without a child.[15,17] Early evidence from a Canadian study investigating risk behaviours in families found that the majority of mothers and fathers reported increased screen time and snack-food intake and decreased physical activity since the start of the COVID-19 pandemic, with mothers reporting the greatest changes.[7] Findings from previous studies on this topic have been mostly drawn from smaller convenience samples at single time points early in the pandemic and have not considered the impact on adults living with a child,[14,16,17] so representative research extending beyond the initial months of the pandemic is needed to address this gap in the literature.

Understanding the impact of the pandemic on chronic disease risk factors is now critical to mitigate any long-term consequences on Canadians. Vulnerable population groups, including adults living with children, need to be carefully considered to inform future population health interventions. The objective of this study was to describe changes in chronic disease risk factors—including alcohol, tobacco, consumption of junk food or sweets, screen use, and current exercise habits—among Canadian adults living with and without a child younger than 18 years old during the COVID-19 pandemic, from late March to mid-July 2020.

Data and methods

Data source

A repeated cross-sectional study was conducted using data from the Canadian Perspectives Survey Series (CPSS), which are monthly national online surveys administered by Statistics Canada to subsamples of respondents from the Labour Force Survey (LFS, a national monthly survey that measures the current state of the Canadian labour market) to capture topics related to the impacts of COVID-19 on Canadians. The CPSS sampling frame included residents of the 10 Canadian provinces, aged 15 years and older. Participants were selected from the LFS rotation groups who last answered in 2019, and one individual per household was randomly invited to join the CPSS. Excluded from the surveys were full-time members of the Canadian Armed Forces, persons living on reserves and other Aboriginal settlements, institutionalized populations, and households in extremely remote areas with very low population density (in total, exclusions represent <2% of the Canadian population aged 15 and older).[18–20]

Public-use microdata files were used from three of the CPSS surveys during the pandemic: *CPSS1- Impacts of COVID-19* administered from March 29 to April 3 (*n*=4,627), *CPSS2- Monitoring the Effects of COVID-19* from May 4 to 10 (*n*=4,600), and *CPSS4- Information Sources Consulted During the Pandemic* from July 20 to 26 (*n*=4,218). Data from CPSS3, CPSS5 and CPSS6 were not used because they did not collect information about the relevant chronic disease risk factors. The response rate for participants who were invited to complete CPSS1 was 63.9%, for CPSS2 was 63.5% and for CPSS4 was 58.2%.[18–20] Analyses included Canadians aged 25 and older. Participants aged 15 to 24 were excluded because it was unclear whether individuals in this category who were living with a child were children themselves. The current study was based on Canadians older than 25, with 4,383 from CPSS1, 4,367 from CPSS2 and 4,050 from CPSS4.

Chronic disease risk factors, presence of a child in the household, and additional variables

The outcomes of interest were self-reported changes in chronic disease risk factors, including change in consumption of alcohol, tobacco, junk food and sweets, and screen use, as well as current exercise habits outdoors or indoors reported in each of the three surveys. Participants were asked, "*Have your weekly habits changed for any of the following activities*?" Activities included *"consuming alcohol," "using tobacco products," "eating junk food or sweets," "watching television," "spending time on the Internet"* and *"playing video games."* Response options were "*increased,*" "*decreased*" or "*no change.*" For this analysis, the response options were collapsed into binary responses of "increased" or "decreased/no change." Current exercise was measured based on participant responses to the following questions: "*Are you doing any of the following activities for your health?*" including *"exercise outdoors"* and *"exercise indoors,"* with response options of "*yes, for my mental health*," "*yes, for my physical health,*" "*yes for both,*" and "*no.*" For this analysis, exercise outdoors and indoors were reported separately, and the response options were collapsed into "yes" for any reason, and "no."

The exposure variable was the presence of a child living in the household. A child younger than 18 years residing in the dwelling was defined based on participants' prior responses to the LFS household and demographics components, which specifically asked for the names, birth dates and ages of all people living in the respondent's household. This information was collected from the LFS in mid-2019 and was updated to reflect the presence of a child younger than 18 residing in the dwelling on the first day the CPSS was administered.[21,22] Information about the parental status of the respondent and child in the household (e.g., age and whether the child has a disability) were not available in the CPSS.

Descriptive characteristics included sex (females vs. males), age group (25 to 34, 35 to 44, 45 to 54, 55 to 64, 65 and older), type of dwelling (single detached house, low-rise apartment less than five storeys, high-rise apartment of five or more storeys, other), the highest level of education attained (less than highschool diploma or equivalent, high-school diploma or equivalent certificate, trade certificate or diploma, college/CEGEP/other university or non-university certificate or diploma, bachelor's degree, university certificate or diploma or degree above bachelor's), household size for individuals aged 15 and older living in the household (1, 2, 3, 4 or more people), immigration status (born in Canada vs. landed/not a landed immigrant), marital status (married, common-law, widowed/separated/divorced, single/never married), and employment status during the week before survey administration (employed at least part of the reference week, employed but absent, not employed).

Statistical analyses

All three surveys were analyzed and reported separately. The CPSS waves included some of the same participants across time, meaning that all analyses herein must be interpreted as a cross-sectional sample with dependency between waves, rather than longitudinal. The data from all three time points cannot be pooled. Descriptive statistics were reported as frequencies and percentages for participants overall and according to the presence of a child in the household across all survey time points. Odds ratios (OR) and 95% confidence intervals (CI) were estimated using binary logistic regressions for the association between the presence of a child in the household (compared with no child) and each chronic disease risk factor. Each risk behaviour was modelled separately. Similarly, the odds of engaging in exercise for health vs. no exercise, for those living with a child in the household compared to no child, was estimated separately for exercise indoors and outdoors. Results for this descriptive study are presented as unadjusted regression analyses.[23] Proportions of increased chronic disease risk factors

Table 1
Weighted demographic characteristics among Canadian adults aged 25 and older, according to the presence of a child younger than 18 years living in the household in CPSS1[a], CPSS2[b] and CPSS4[c]

	CPSS1 (March 29 to April 3, 2020)			CPSS2 (May 4 to 10, 2020)			CPSS4 (July 20 to 26, 2020)		
	Living without a child n=3,280 (69.6%)	Living with a child n=1,103 (30.4%)	Total	Living without a child n=3,295 (71.1%)	Living with a child n= 1.072 (28.9%)	Total	Living without a child n=3,136 (72.4%)	Living with a child n= 914 (27.7%)	Total
	percent								
Sex									
Female	50.1	46.2	48.9	49.2	48.4	49.0	49.3	48.1	49.0
Male	49.9	53.8	51.1	50.8	51.6	51.0	50.7	51.9	51.0
Age group									
25 to 34	17.7	24.1	19.6	17.3	25.3	19.6	18.8	22.2	19.8
35 to 44	8.0	43.5	18.8	8.6	43.9	18.8	8.4	46.0	18.8
45 to 54	15.3	23.2	17.7	15.6	22.8	17.6	14.9	24.4	17.5
55 to 64	25.8	4.7	19.4	25.2	4.9	19.4	24.8	4.9	19.3
65 and older	33.2	4.5	24.5	33.3	3.1	24.6	33.1	2.5	24.6
Type of dwelling									
Single detached house	60.8	65.1	62.1	60.5	66.6	62.2	59.1	65.6	60.9
Low-rise apartment less than five storeys	13.7	8.0	11.9	13.4	8.2	11.9	13.8	7.8	12.2
High-rise apartment five or more storeys	8.7	9.0	8.8	9.2	7.7	8.8	10.2	7.9	9.6
Other	16.8	17.9	17.2	16.9	17.5	17.1	16.9	18.7	17.3
Highest level of education									
Less than high school diploma or equivalent	9.5	5.8	8.4	9.0	5.4	7.9	8.7	2.6	7.0
High school diploma or equivalent certificate	24.9	22.6	24.2	25.5	19.9	23.9	24.8	23.2	24.4
Trade certificate or diploma	11.3	9.1	10.6	11.3	8.6	10.5	11.8	8.4	10.9
College, CEGEP, other university or non-univeristy certificate or diploma below the bachelor's level	23.8	26.3	24.6	23.7	27.9	24.9	24.0	27.8	25.0
Bachelor's degree	20.8	24.7	22.0	20.4	25.4	21.9	20.8	25.3	22.0
University certificate, diploma or degree above bachelor's	9.7	11.5	10.2	10.1	12.8	10.9	9.9	12.7	10.7
Household size[†]									
1	22.7	6.4	17.7	21.7	6.9	17.5	21.9	7.1	17.8
2	55.9	63.0	58.0	55.3	64.8	58.0	56.1	66.0	58.9
3	13.0	14.2	13.4	13.6	15.9	14.3	12.7	14.4	13.1
4 or more	8.5	16.4	10.9	9.4	12.4	10.2	9.3	12.5	10.2
Immigration status									
Born in Canada	79.5	68.7	76.2	79.0	70.2	76.5	77.9	70.2	75.8
Landed and not landed immigrant	20.5	31.3	23.8	21.0	29.8	23.5	22.1	29.9	24.2
Marital status									
Married	54.4	71.6	59.6	54.7	69.2	58.9	52.2	71.0	57.4
Living common-law	11.3	16.4	12.9	10.8	18.5	13.0	10.9	17.5	12.8
Widowed, separated or divorced	13.4	6.1	11.2	13.8	6.4	11.7	15.7	6.0	13.0
Single, never married	20.9	5.9	16.3	20.7	5.9	16.4	21.2	5.5	16.8
Employment status[‡]									
Employed at work at least part of the reference week	42.5	61.5	48.2	42.9	63.9	49.1	46.0	67.3	51.9
Employed but absent from work	9.9	17.5	12.2	8.2	12.9	9.5	7.7	11.5	8.8
Not employed	47.6	21.0	39.6	48.9	23.2	41.4	46.3	21.2	39.3

[a] CPSS1 = Canadian Perspective Survey Series 1, late March, 2020, number is 4,383 weighted to 26,627,032

[b] CPSS2 = Canadian Perspective Survey Series 2, early May, 2020, number is 4,367 weighted to 26,691,332

[c] CPSS4 = Canadian Perspectiive Survey Series 4, mid-July, 2020, number is 4,050 weighted to 26,801,198

[†] Household size was assessed as the number of individuals aged 15 and older living in the household, including the respondent.

[‡] Employment status was based on employment during the reference week, or the week prior to survey administration (e.g., March 22 to 28, 2020 for CPSS1).

Sources: Canadian Perspective Survey Series - Impacts of COVID-19 (CPSS1), Monitoring the Effects of COVID-19 (CPSS2), Information Sources Consulted During the Pandemic (CPSS4).

and current exercise habits were compared by age group (younger adults aged 25 to 54 vs. older adults aged 55 and older) and by sex (females vs. males), and further stratified according to the presence of a child in the household, where possible.

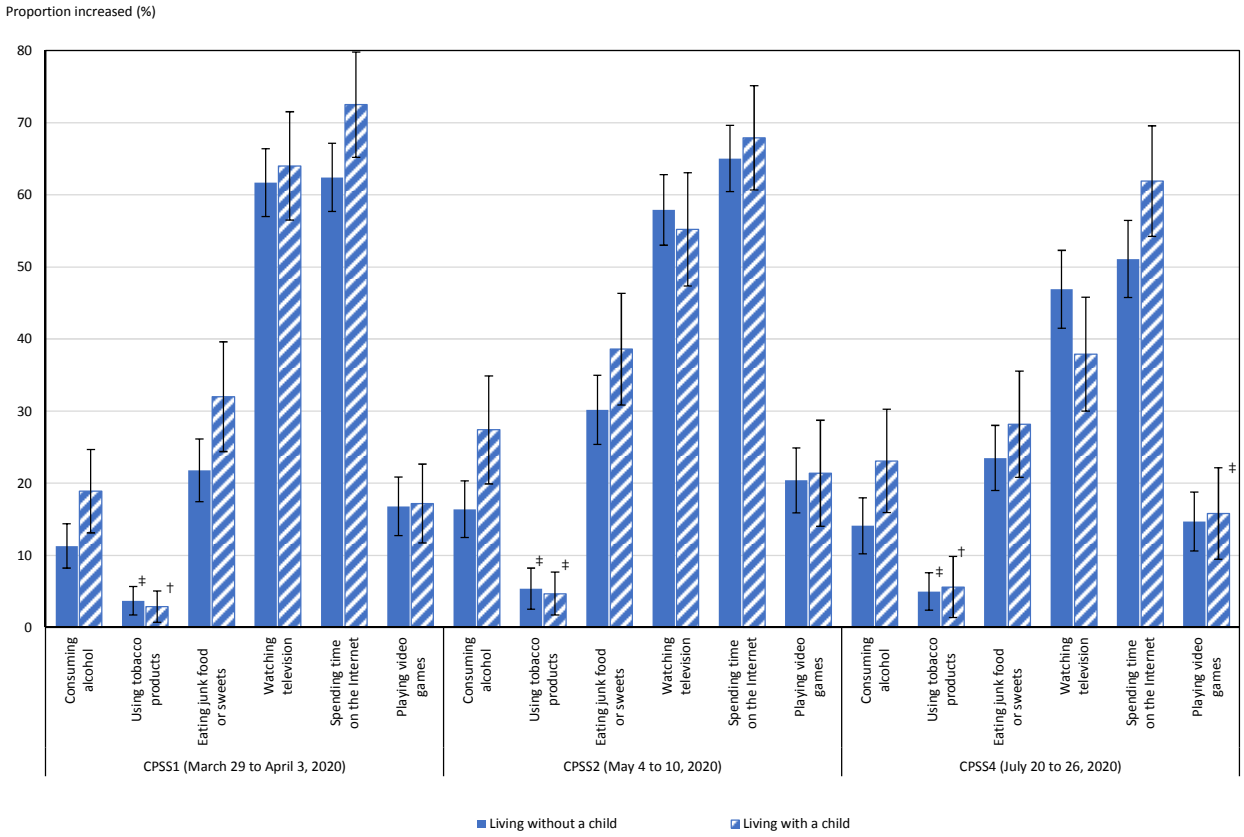
Sampling weights and adjustment factors for variance estimation (in lieu of bootstrap weights) were applied to descriptive estimates and regression modelling to correct for over- and under-sampling and non-response, and to make the results representative of the 10 Canadian provinces. All analyses were performed using SAS statistical software version 9.4 (SAS Institute, North Carolina, United States).

Results

Table 1 presents demographic characteristics overall and according to the presence of a child in the household for CPSS1, CPSS2 and CPSS4. Approximately 30% of adults were living with a child at all time points, and younger participants (25 to 34 years, 35 to 44 years, 45 to 54 years) were more likely to be living with a child, compared with older participants (55 to 64 years, 65 years and older).

Figure 1 presents the proportion of adults reporting increased chronic disease risk factors, by the presence of a child in the household at each survey time point. The proportion of adults

Figure 1
Proportion of Canadian adults 25 and older reporting an increase in chronic disease risk factors, according to the presence of a child younger than 18 years living in the household in CPSS1[a], CPSS2[b] and CPSS4[c]



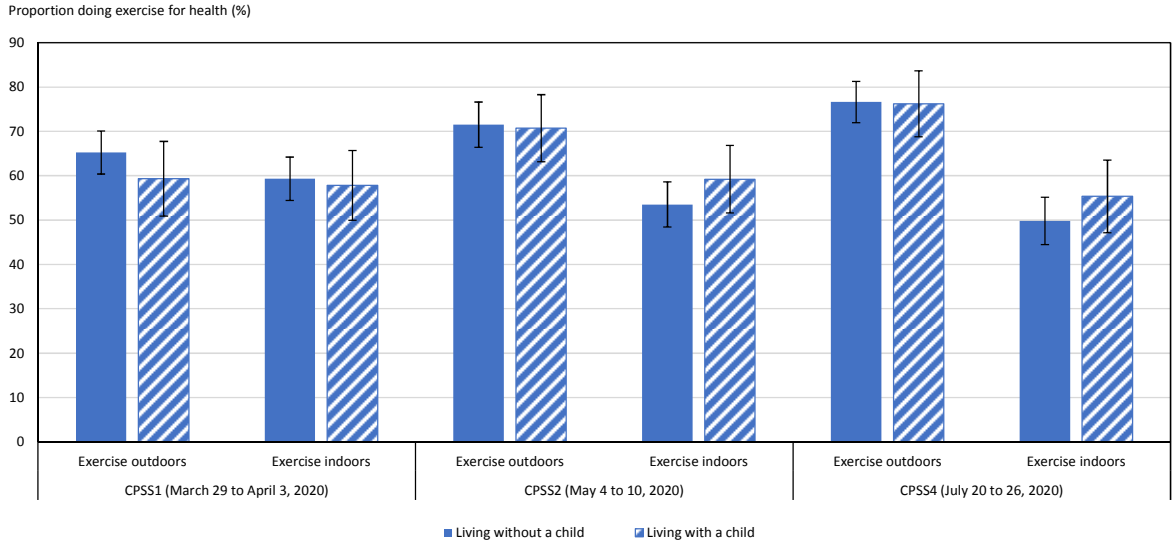
[a] CPSS1 = Canadian Perspecive Survey Series 1, late March, 2020, weighted number is 4,383 weighted to 26,627,032
[b] CPSS2 = Canadian Perspecive Survey Series 2, early May, 2020, weighted number is 4,367 weighted to 26,691,332
[c] CPSS4 = Canadian Perspecive Survey Series 4, mid-July, 2020, weighted number is 4,050 weighted to 26,801,198
† Please note that these estimates and confidence intervals do not meet Statistics Canada's quality standards. Conclusions based on these data will be unreliable, and may be invalid (n < 50).
‡ Warning: Interpret estimate with caution because of low cell count (50 ≤ n ≤ 150), according to Statistics Canada's quality standards.
Note: CPSS = Canadian Perspective Survey Series.
Sources: Canadian Perspective Survey Series - Impacts of COVID-19 (CPSS1), Monitoring the Effects of COVID-19 (CPSS2), Information Sources Consulted During the Pandemic (CPSS4).

reporting increased consumption of alcohol, junk food or sweets, and time on the Internet was consistently greater for adults living with a child than for those without across all three surveys. For example, at CPSS1 in late-March 2020, adults living with a child increased their consumption of alcohol by 19% and of junk food or sweets by 32%, and time on the Internet rose by 73%, while for adults living without a child, these chronic disease risk factors increased by 11%, 22% and 62%, respectively. This trend between those living with and without a child was not observed consistently at all time points for using tobacco products, watching television or playing video games.

Figure 2 displays the proportion of adults that reported exercising outdoors and indoors for health by the presence of a child in the household at each survey time point. The proportion of adults exercising outdoors increased over time, but there was no evidence of a statistically significant difference between those living with and those living without a child at any time point. The proportion of adults exercising outdoors was lower in those living with a child, compared with those who were not at CPSS1 (59% vs. 65%) but was similar at later surveys. The proportion of adults exercising indoors was greater for those living with a child compared with those who were not at CPSS2 (59% vs. 54%) and CPSS4 (55% vs. 50%), but not at CPSS1 (58% vs. 59%), though differences were not statistically significant.

Table 2 includes OR and 95% CI for the association between the presence of a child younger than 18 living in the household compared with no child, and changes in chronic disease risk factors, as well as doing exercise for health. The presence of a child in the household was associated with higher odds of increased (compared with decreased/no change) alcohol

Figure 2
Proportion of Canadian adults 25 and older reporting exercising outdoors and indoors, according to the presence of a child younger than 18 years living in the household in CPSS1[a], CPSS2[b] and CPSS4[c]



[a] CPSS1 = Canadian Perspective Survey Series 1, late March, 2020, number is 4,383 weighted to 26,627,032
[b] CPSS2 = Canadian Perspective Survey Series 2, early May, 2020, number is 4,367 weighted to 26,691,332
[c] CPSS4 = Canadian Perspectiive Survey Series 4, mid-July, 2020, number is 4,050 weighted to 26,801,198
Note: CPSS = Canadian Perspective Survey Series.
Sources: Canadian Perspective Survey Series - Impacts of COVID-19 (CPSS1), Monitoring the Effects of COVID-19 (CPSS2), Information Sources Consulted During the Pandemic (CPSS4).

Table 2
Unadjusted odds ratios for the association of the presence of a child younger than 18 years living in the household compared with no child (reference), in relation to changes in chronic disease risk factors and exercising for health, among Canadian adults aged 25 and older in CPSS1[a], CPSS2[b] and CPSS4[c]

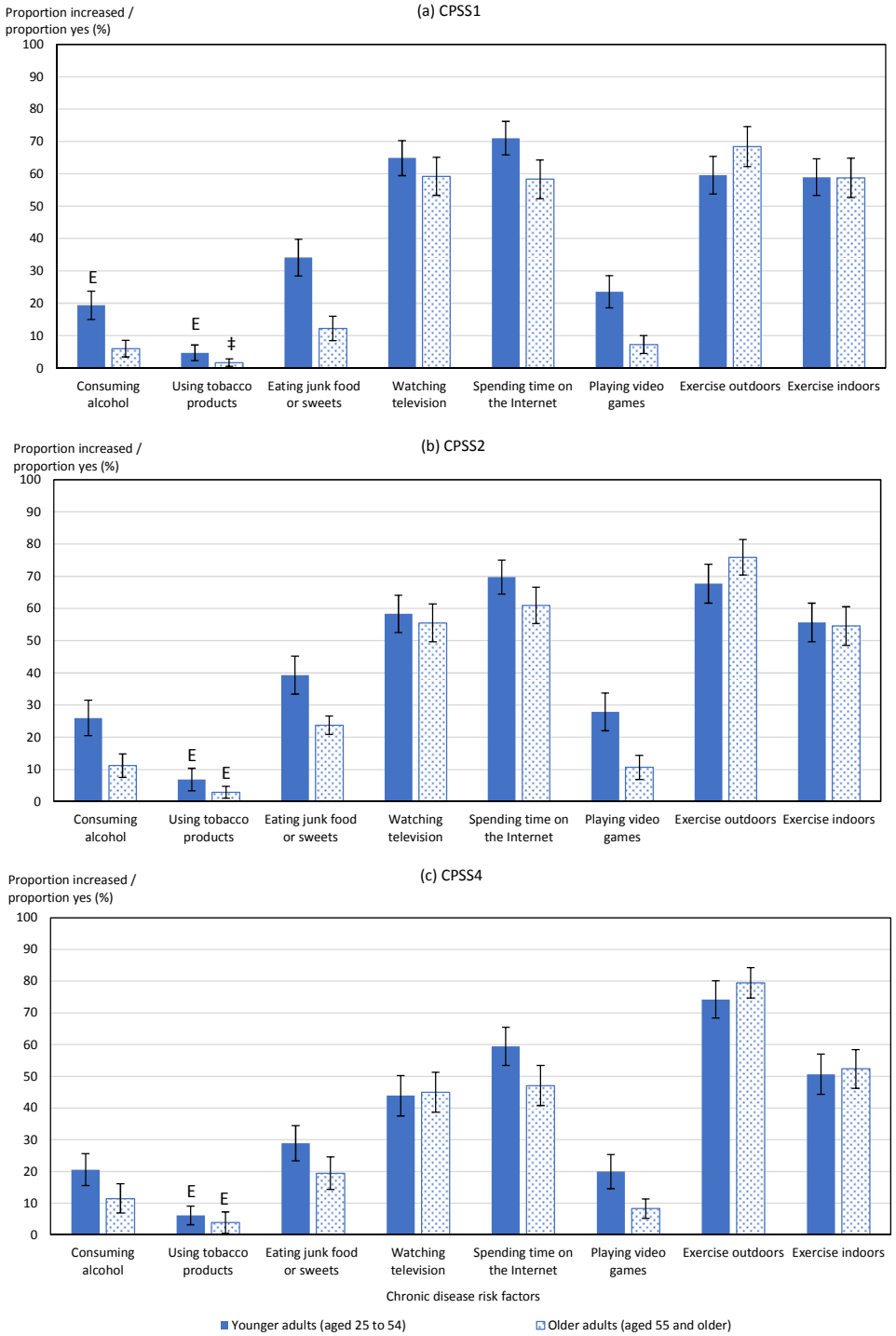
	CPSS1 (March 29 to April 3, 2020) (n=4,383)			CPSS2 (May 4 to 10, 2020) (n=4,367)			CPSS4 (July 20 to 26, 2020) (n=4,050)		
		95% confidence intervall			95% confidence intervall			95% confidence intervall	
Presence of a child living in the household compared with no child (reference)	Odds ratio	upper	lower	Odds ratio	upper	lower	Odds ratio	upper	lower
Consuming alcohol (increased vs. decreased/no change)	1.84 ‡	1.13	2.99	1.93 ‡	1.20	3.09	1.84 ‡	1.10	3.07
Using tobacco products (increased vs. decreased/no change)	0.78	0.30	2.01	0.85	0.36	2.04	1.12	0.42	2.96
Eating junk food or sweets (increased vs. decreased/no change)	1.69 ‡	1.09	2.60	1.46	0.98	2.17	1.28	0.82	1.99
Watching television (increased vs. decreased/no change)	1.10	0.75	1.62	0.90	0.62	1.30	0.69	0.46	1.03
Spending time on the Internet (increased vs. decreased/no change)	1.59 ‡	1.05	2.41	1.14	0.77	1.68	1.56 ‡	1.05	2.29
Playing video games (increased vs. decreased/no change)	1.03	0.64	1.67	1.07	0.64	1.79	1.09	0.61	1.94
Exercise outdoors (yes vs. no)	0.78	0.52	1.17	0.96	0.62	1.50	0.98	0.60	1.58
Exercise indoors (yes vs. no)	0.94	0.64	1.38	1.26	0.87	1.84	1.25	0.84	1.85

[a] CPSS1 = Canadian Perspective Survey Series 1, late March, 2020, number is 4,383 weighted to 26,627,032
[b] CPSS2 = Canadian Perspective Survey Series 2, early May, 2020, number is 4,367 weighted to 26,691,332
[c] CPSS4 = Canadian Perspectiive Survey Series 4, mid-July, 2020, number is 4,050 weighted to 26,801,198
‡ significant association
Sources: Canadian Perspective Survey Series - Impacts of COVID-19 (CPSS1), Monitoring the Effects of COVID-19 (CPSS2), Information Sources Consulted During the Pandemic (CPSS4).

consumption at all three time points, increased consumption of junk food or sweets at CPSS1, and increased time on the Internet at CPSS1 and CPSS4. The presence of a child was not associated with higher odds of an increase in any other chronic disease risk factors, or with exercising outdoors or indoors.

Figure 3 describes chronic disease risk factors by age group at all survey time points. The proportion of younger adults that reported increasing chronic disease risk factors was greater than the proportion of older adults that reported increases in consumption of alcohol and junk food or sweets at CPSS1 and CPSS2, spending time on the Internet at CPSS1 and CPSS4, and playing video games in all surveys. Older adults consistently reported exercising outdoors more than younger adults at all time points, while the proportion of adults exercising indoors was similar between the two age groups. Age-stratified logistic regression analyses comparing the presence of a child living in the household and changes in chronic disease risk factors (and current exercise) were not conducted because of low cell counts in older adults living with a child.

Figure 3
Proportion of Canadian adults 25 and older reporting increased chronic disease risk factors and current exercise habits, according to age group (younger adults aged 25 to 54, and older adults aged 55 and older) in CPSS1[a], CPSS2[b] and CPSS4[c]



[a] CPSS1 = Canadian Perspective Survey Series 1, late March, 2020, number is 4,383 weighted to 26,627,032
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E Use with caution because of low cell count (50 ≤ n ≤ 150), according to Statistics Canada's quality standards.
‡ Please note that these estimates and confidence intervals do not meet Statistics Canada's quality standards (n<50). Conclusions based on these data will be unreliable, and may be invalid.
Notes: CPSS = Canadian Perspective Survey Series. In CPSS1, CPSS2 and CPSS4, 2,178 (49.6%), 2,131 (56.1%) and 1,880 (56.1%) were younger adults (aged 25 to 54), and 2,205 (50.4%), 2,236 (43.9%), and 2,170 (43.9%) were older adults (aged 25 to 54), respectively. For consuming alcohol, eating junk food or sweets, watching television, spending time on the internet, and playing video games, estimates displayed are the proportion reporting an increase in the risk behaviour within the particular age group. For exercise outdoors and indoors, estimates displayed are the proportion reporting engaging in the activity for physical or mental health within the age group.
Sources: Canadian Perspective Survey Series - Impacts of COVID-19 (CPSS1), Monitoring the Effects of COVID-19 (CPSS2), Information Sources Consulted During the Pandemic (CPSS4).

Chronic disease risk factors by sex at all survey time points, further stratified by the presence of a child living in the household, were examined (data not shown). Males and females reported similar increases in most chronic disease risk factors and engaged in exercise similarly. Females and males living with a child generally reported higher proportions of increased risk behaviours than those living without a child.

Interpretation

Since the start of the COVID-19 pandemic, a high proportion of Canadian adults reported increases in chronic disease risk factors caused by the adoption of unhealthy lifestyle behaviours. Adults living with a child, compared with those living without, were more likely to report increased consumption of alcohol and junk food or sweets, and Internet use during the first five months of the pandemic. Although not statistically different, adults living with a child exercised outdoors slightly less than those living without a child in late March 2020, when public health preventive measures were introduced, while adults living with a child exercised indoors to a greater extent as the pandemic progressed in early May and in late July 2020.

Previous studies comparing chronic disease risk factors between those living with and without a child during the COVID-19 pandemic are limited.[17,24–26] Few of our associations were statistically significant, although our findings demonstrate some similarities with previous studies. The presence of a child in the household has been significantly and positively associated with increased alcohol intake,[17,24–26] with estimated increases for adults living with a child ranging from 28 to 51%, compared with 16 to 33% for those not living with a child.[17,24,26] Increasing alcohol intake may be a means of coping with deteriorations in mental health and stressors related to the pandemic.[26] Pandemic-related stress has been discussed as a potential contributor to increased alcohol consumption, which may lead to longer-term effects. These include the normalization of drinking at home, drinking in an attempt to alleviate symptoms of stress and anxiety, and alcohol dependence.[27–29] Furthermore, the reported increase of tobacco use in our study was low compared with other studies, and did not appear to differ according to the presence of a child in the household.[17,25]

The impact of the pandemic on adults living with a child may depend on the adult's involvement in roles related to child care and how these roles have changed since the start of the pandemic. Key factors reported by parents living in Canada as increasing stress during the pandemic included difficulty with homeschooling and balancing parenting roles—such as housework and keeping children engaged in activities—especially in addition to working full-time hours from home.[7] Further, factors related to parenting, including child age and shared custody, have been associated with adherence to public health preventive measures.[30] It was not possible to consider these factors in the study, and future studies investigating the impact of the pandemic on those living with children should consider how child care and related roles have changed.

In terms of evaluating health equity and understanding if increased chronic disease risk factors are consistent across age groups and sex, it has been reported that younger adults and females have been more negatively impacted by the pandemic. This is depicted by higher stress or poor mental health,[25,31–33] which may be associated with the adoption of unhealthy lifestyle behaviours.[34] The reported increase in most chronic disease risk factors was more common for younger adults, while the proportion of adults engaging in indoor and outdoor exercise during the pandemic was similar between younger and older adults. A recent study using CPSS1 and CPSS2 data demonstrated that maladaptive health habits were highest among millennials (aged 15 to 34). Further, the highest rates of anxiety and concerns related to COVID-19 were among younger adults.[35] Younger adults may be more concerned with secondary implications, including social connections and family stress, than chronic disease risk factors, while older adults may be more adaptive to the implementation of public health preventive measures that restrict social lifestyles. It was not possible to investigate the impact of living with a child on risk behaviours in older adults because of limited cell counts. Future research should consider any positive impact that intergenerational households may have on the health of older adults, as intergenerational programs enhance quality of life and satisfaction of older adults.[36,37]

Previous evidence suggests that females, including mothers and other caregivers, have been more adversely affected during the pandemic compared with males.[7,24–26,31–33] The findings of this study do not indicate that the proportions of increased chronic disease risk factors differed by sex, regardless of living with or without a child, but detailed data on gender-related variables were not available. Among 254 families living in Ontario, mothers (compared with fathers) reported the greatest increases in negative health behaviours early in the pandemic, including eating more snack foods—and more food in general—as well as greater screen time.[7] Conversely, among a subsample of 618 Canadian parents living with a child at home, more men reported increased alcohol use, compared with women.[26] Findings may have differed, as it was not possible to determine the relationship and role of adults living with a child in the present analysis. Nevertheless, determining the extent to which public health preventive measures related to COVID-19 differentially impact population subgroups is fundamental to creating equitable policies and interventions.

Strengths of this study include the use of CPSS data, which are a representative sample of Canadians derived from the LFS. The CPSS was also one of few data collection mechanisms in place during the first few months of the pandemic. Conversely, the current study is not without its limitations. The cross-sectional study design did not include pre-pandemic data and the surveys employed questions that required self-reported recall of changes in behaviours or current exercise; the validity of these questions

are unknown and may be a potential source of measurement error. The reasons participants changed their behaviours were not captured and the measures of health behaviours were quite broad. Additionally, it was not possible to differentiate between possible negative or positive aspects of a behaviour. For example, it is unknown whether Internet use was for tracking the news cycle, work, school, or connecting with family and friends. Further, no data were available on the frequency or level of engagement in risk behaviours, which is important when considering the impact on health and chronic disease. For instance, although alcohol consumption has increased, it is not known by how much, and other Canadian survey data suggest binge drinking is a particular concern among adults living with children.[38] The variable for living with a child was derived from the LFS in mid-2019 and household arrangements may have changed during the pandemic, resulting in misclassification of child status, which may have affected the associations observed. Lastly, it is a limitation that the CPSS does not provide information on the parental status of the respondent, whether the adults living with a child were primary caregivers, and what their role was in relation to child care and facilitating remote learning. Also, the CPSS does not provide information on the child in the household (e.g., age or disability status).

This study contributes to the emerging literature on changes in chronic disease risk factors and current exercise habits during the COVID-19 pandemic. The results suggest that many risk behaviours of adults living with a child have increased to a greater extent than adults living without a child. The worsening in most risk behaviours is prominent among younger adults aged 25 to 54 compared with older adults aged 55 and older. These findings contribute to a broader understanding of health behaviours during adverse times and highlight the need for effective strategies to target and support families and households with children. This work may support governments, clinicians and public health professionals in encouraging health-promoting behaviours among Canadians, and in anticipating potential, harmful downstream effects of the pandemic with respect to chronic disease incidence. Future research is needed to investigate temporal changes in health behaviours, with emphasis on population subgroups who are most at risk for chronic disease development and progression.

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