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Parents' attitudes regarding their children's play during COVID-19: Impact of socioeconomic status and urbanicity

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A B S T R A C T

Objectives: The COVID-19 pandemic has had a profound impact on the daily routines of parents and children. This study explored the influence of socioeconomic status (SES) and urbanicity on parents' attitudes toward their children's active play opportunities 6 months and 1.5 years into COVID-19.
Methods: A sample of 239 Ontario parents of children aged 12 and younger completed two online surveys (August–December 2020; 2021) to assess parents' intentions, beliefs, and comforts concerning their child's eventual return to play, in addition to various sociodemographic and physical activity variables. Descriptive analyses were run as well as an exploratory factor analysis (EFA) was conducted to group the 14 attitude items into subscales for analysis, to ensure reliability and validity of attitude measures.
Results: In general, parents in communities with more urban features (e.g., densely populated areas), single-parents, full-time employed parents, and parents with lower-incomes were more hesitant to return their children to active play during the pandemic.
Conclusion: Findings from this work highlight SES and urbanicity disparities that continue to exist during COVID-19.

1. Introduction

The benefits of physical activity for children have been well documented (Carson et al., 2017a, 2017b; Chaput et al., 2014; Janssen & LeBlanc, 2010; Poitras et al., 2016); however, since the onset of the COVID-19 in early 2020, opportunities for physical activity have been impacted substantially. Given the severity and communicability of the virus, numerous public health protections, such as physical distancing and lockdowns. Specifically in Ontario, Canada, the government released a series of COVID-19 reopening plans, with public health protections being removed or reinstated dependant on COVID-19 case counts in geographic regions (Government of Ontario, 2020a). These closures resulted in various physical activity-promoting closures such as parks, schools, and recreational facilities. In regions across the province with less active COVID-19 cases, cities/communities were able to reopen sooner, compared to more densely populated cities that remained in stricter lockdowns for more extended time periods occurring during the winter months (November to February 2020–2021; Government of Ontario, 2021a). During the summer months when case counts tended to be lower in Ontario (May to September 2020–2021), more recreational facilities were able to re-open (e.g., community centres, parks; Government of Ontario, 2021a).

The worrisome rates of children's physical inactivity, as noted above, warrant consideration to broader sources of influence that shape children's behaviours (Hu et al., 2021). Parents play a crucial role in predicting their children's health behaviours (Rhodes et al., 2019). The

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instrumentality of their position can be displayed in various ways such as acting as a child's key decision maker, financing (e.g., registration), supporting, and providing transportation to physical activity opportunities (Brown et al., 2016; Neshteruk et al., 2017). Similarly, researchers have found that family characteristics, such as socioeconomic status (SES) and geographic factors can influence a child's engagement in physical activity (e.g., Mitchell et al., 2016; Owen et al., 2022), and that parental fears and/or attitudes can influence a child's opportunities for physical activity (Jelleyman et al., 2019). For example, children in Canada (5–11 years) with university-educated parents (undergraduate or graduate degree) are more likely to reach 12,000 steps per day (~60 min of moderate-to-vigorous physical activity [MVPA]) when compared to their counterparts (children with parents who attained high school or college (diploma, certificate, or apprenticeship); Canadian Fitness and Lifestyle Research Institute, 2019). Additionally, Stearns et al. (2016) found that the child-parent physical activity relationship among 7-to-8-year-olds in Alberta was significant in high-income but not low-income families, further confirming the previous studies findings. These data are also supported by international studies showing that significantly more minutes of MVPA are accumulated across higher socioeconomic status (SES) groups (Love et al., 2019). Although further research is needed to confirm these claims, research to date is supportive of the notion that SES disparities to physical activity in Canada exist (ParticipACTON, 2020; Stearns et al., 2016; Stone et al., 2012).

It is critical to consider how the COVID-19 pandemic has influenced the role of the built environment in relation to children's physical activity levels and opportunities. Some research from early in the pandemic (i.e., 2020–2021) conducted in Croatia found that children in urban areas showed greater declines in physical activity compared to children in suburban or rural areas (Zenic et al., 2020). This finding is supported by a scoping review (n = 21 studies) that explored the influence of physical distancing on children's physical activity during the first year of the pandemic with studies conducted in Europe, the Americas, and China (Yomoda & Kurita, 2021). The authors found that children in rural areas were less likely to experience declines in physical activity, attributing densely populated urban areas with high case counts and additional closures of sport facilitates as likely causes (Yomoda & Kurita, 2021). Canadian-specific research has also described the influence of the built environment on physical activity at earlier stages of the COVID-19 pandemic, showing that living in low-dwelling density (i.e., less populated/less houses) neighbourhoods was a facilitator to outdoor activity (Mitra et al., 2020), while families without backyards or outdoor space struggled to keep their children active (Szpunar et al., 2021). More recently, data from the Canadian Community Health Survey (CCHS) found that youth in urban areas faced significant declines in physical activity compared to pre-pandemic activity levels (~135 min/week), but youth living in rural areas did not (~86 min/week, non-significant; Colley & Watt, 2022). Turning to research regarding characteristics of the built environment during the pandemic, features of the built environment, including walking/cycling infrastructure and recreational facilities were associated with outdoor but not indoor play behaviours in children and youth (Gu et al., 2022). Given country-specific features of the built environment, and the dynamic nature of the COVID-19 pandemic in Ontario, it is important to understand how features of the built environment influence parents' attitudes surrounding their children's activity.

Research exploring the role of SES and urbanicity in facilitating children's physical activity is needed to determine how best to support parents in helping them promote active play (i.e., any form of total body movement that exert energy in a freely chosen, fun, and unstructured manner; Truelove et al., 2017) during and beyond the pandemic, given the impact of and the built environment on resources available to families (e.g., access to recreation facilities, parks, organized sport; (Lambert et al., 2019). As such, it is critical to understand changes (worsening or improving) in parents' attitudes and feelings toward their children's return to active play in the context of the pandemic. To this end, the purpose of this thesis was to explore the influence of family SES indicators (income, employment, education, family situation) and urbanicity (features of the built environment) on parents' attitudes toward their child (ren)'s (<12 years of age) active play (unstructured play, organized and unorganized sport) opportunities 6 months and 1.5 years into the COVID-19 pandemic, and to explore changes over time. To our knowledge, this is the first study of its kind to examine parents' attitudes regarding their children's return to play, and the influence of built environment and SES on these attitudes during the context of the COVID-19 pandemic.

2. Methods

2.1. Study design and procedures

This study reported on data collected as part of the larger repeated measures study. Two online surveys (Survey 1 – [August–December 2020–6 months] and Survey 2 – [August–December 2021] – 1.5 years) were administered using Qualtrics to collect data on parents' perspectives of their children's return to active play during the various time points during the COVID-19 pandemic. The survey reported on children's pre-COVID-19 activities (e.g., sports enrolled in), parents' current plan for their child's return to play (unstructured play, sport), and the activities that children returning to 1.5 years into the pandemic. This study presents cross-sectional and longitudinal findings from Survey 1: 6 months) and Survey 2 (1.5 years). Institutional approval for all study procedures and associated documents was obtained (REB #116331).

3. Participants and recruitment

Given the extremely novel nature of the work, no a-priori hypotheses were defined, and thus no formal power analysis for study hypotheses was conducted. Participants in this study were parents (including guardians) of a child 12 years of age or under residing in Ontario, Canada. Recruitment took place through social media posts (e.g., Facebook) and infographics describing the study (e.g., eligibility criteria, principal investigator's contact information) were circulated. In addition, a member of the research team contacted various sport/physical activity organizations in Ontario and asked them to share the infographic with study details with their communities. Participation in the survey was voluntary, and implied consent was given when participants completed the survey. Before participants could begin the survey, they were prompted with a questionnaire to determine their study eligibility. To be eligible for the study, participants had to be: (1) an Ontario resident, (2) a parent of a child under 12 years (at the time of recruitment ~6 months), (3) had custody of their child at least 50% of the time, and (4) were able to read and write in English. If individuals did not meet these criteria, they were unable to begin the survey. Participants created their own unique identification code by answering a series of simple questions (e.g., what is the first letter of the town/city that you were born?). The same process was followed for the second survey so researchers could link responses at 6 months (Survey 1) and 1.5 years (Survey 2) while maintaining participant anonymity.

3.1. Instrument and tools

Created and available in English, two online Qualtrics surveys were designed by the research team using the best evidence 'at the time' regarding the COVID-19 pandemic situation in Ontario (i.e., closure of facilities, phrased re-opening plans; Government of Ontario, 2020). A letter of information (6 months, 1.5 years) was included at the beginning of each survey to inform participants of the study purpose, procedures, consent process, possible harms/benefits, compensation, and confidentiality. The first survey (n = 162 items), collected information such as participant demographics (n = 16 items, e.g., ethnicity), children's pre-COVID-19 activities (i.e., what sports/unstructured activities children

participated in during 2019; $n = 6$ items), parents' current plans for their child's return to play (unstructured play, sport) during and following the pandemic ($n = 8$ items), measures of parents' risk tolerance ($n = 30$ items), as well as information regarding children and parents' own MVPA ($n = 2$ item). Survey 2 ($n = 58$ survey items) included similar items to Survey 1 but did not include parent demographics or risk tolerance measures. Questions were similarly tailored to the pandemic reopening plans in Ontario at the time of the survey (e.g., has your children *returned* to activities?).

3.2. Demographic questions

Participant demographic questions captured number of children, parent gender, child (ren)'s biological sex, parent and child age, postal code, geographical area type (i.e., rural, urban, suburban), ethnicity, employment status, family situation (i.e., single/dual parent household), highest level of education achieved, housing type, and income (i.e., total annual household income). All indicators of SES were pulled from the demographic section. Similarly, all urbanicity variables (i.e., indices) were created using participant postal codes collected in the demographic section of Survey 1.

3.3. Attitude questions

Parents' attitudes regarding their intentions, beliefs, and comforts of their child's eventual return to play (unstructured activity, sport) in the context of the COVID-19 pandemic were assessed using a 5-point Likert Scale (i.e., 1 – strongly disagree, 5 – strongly agree) at Survey 1 (6 months) and Survey 2 (1.5 years). Parents were asked 14 questions about their attitudes toward their children's return to play (e.g., even if my child can follow physical distancing guidelines, I am still hesitant to return them to active play programming). These attitude questions were designed to capture different aspects of children returning to play in the context of the COVID-19 pandemic (e.g., organized programming, in the home, etc.). As such, subscales within this tool were explored to group parent attitudes that were similar in scope for analysis. Additional details outlining the specifics of this tool, and its previous application, has been published elsewhere (Szpunar et al., 2022).

3.4. Socioeconomic status

Indicators of family SES were assessed using parent-reported data from the demographic section of Survey 1 (employment status, family situation, education, and income). Previous research has suggested that exploring the role of SES on health often uses single measures (often income or education), without justification of its impact on analysis and/or study findings; despite a consensus in the literature that SES is multifactorial and difficult to categorise (Braveman et al., 2005; Duncan et al., 2015). As such, this study used multiple demographic measures to provide a more fulsome overview of different indicators of family SES. Following best practices for measuring SES informed by Diemer et al. (2013), the American Psychological Association, 2022, provides recommendations for researchers to improve the consistency of SES indicators used by researchers. These measurements include proper attention to education, income, occupation, and family size and relationships (e.g., number of children, family situation; American Psychological Association, 2022). Thus, demographic data from Survey 1 relating to parents' level of education (e.g., college, graduate school), total household income, occupation, and family situation (dual or single-parent household), were used as unique indicators for family SES in this thesis.

3.5. Urbanicity

The current study utilizes postal code data collected in the demographic section of Survey 1 to understand how urbanicity influences parents' attitudes to return their children to play during COVID-19. Participant postal codes were used to objectively measure urbanicity using a Geographic Information System (GIS; ArcGIS Pro 2.9.0 software), developed by researchers in the Department of Geography at the authors' host university. This method uses several social environment (e.g., population density) and built environment (e.g., intersection density) indices, as used by other researchers in the geography field (Mitchell et al., 2016). A 1000-m buffer was created around each participant's home postal codes (i.e., from the geographic centre of the postal code), of which the coordinates were derived from the 6-digit Digital Mapping Technologies Inc. (DMTI Spatial Inc, 2020a, b) Spatial single link postal code locations dataset. To Participants' urbanicity was then measured using seven indices; the Canadian Active Living Environment Index, physical environment index (greenness), built environment index (street intersection density), social environment index (population density). A description of all urbanicity variables (indices) is available in Table 1.

4. Data preparation

Statistical analyses and data cleaning were conducted using SPSS (Version 27), the lme4 (Bates et al., 2015) and lmerTest (Kuznetsova et al., 2017) packages in R v. 4.1.3 (R Core Team, Vienna, Austria) using R studio v. 1.3 (RStudio Team, 2020, Boston, MA), and Mplus (v. 8.4; Muthén & Muthén, 2017). Descriptive statistics, including means, standard deviations, and frequencies, were computed for all parent demographics and independent variables, and parents' return to play (unstructured activity, sport) plans for their children. The dataset was checked for missing values and mechanism of missingness were explored, which revealed that data was missing completely at random. Only participants that completed both surveys were included in this study to allow for a comparison across the two time points. Data was checked for extreme outliers, with outliers 3 standard deviations (*SD*) above the mean being truncated to reduce the impact of extreme outliers on analysis.

4.1. Exploratory factor analysis

An exploratory factor analysis (EFA) was conducted to group the 14 attitude items into subscales for analysis, to ensure reliability and validity of attitude measures. The EFA was completed using MPlus (Muthén & Muthén, 2017) to determine the clustering of attitude items into factors by examining geomin (oblique) rotated factor loadings of the model. An eigenvalue ≥ 1 was used to determine the number of factors.

Table 1
Description of urbanicity variables employed.

Urbanicity Variables (Indices)	Description
Active living index (Can-ALE)	The walkability (walking rates) and active transportation of Canadian neighbourhoods.
Greenness (physical environment index)	Quantifies the amount of vegetation from satellite imagery.
Street intersection density (built environment index)	The number of street intersections within a 1000-m buffer of participant postal codes.
Population density (social environment index)	The population density of participant's residence within a 1000-m buffer.
Distance to nearest park (km)	The accessibility of participant postal code to nearest park
Park area (10,000m^2)	Estimates the total park area within a 1000-m buffer of participant postal code.
Number of parks (1000 m)	The number of parks falling within a 1000-m buffer of participant postal codes.

Note. These variables were included because they provide objective data of participant urbanicity (i.e., built environment), and were drawn from a variety of Canadian data sources (e.g., Census dissemination block data, CanMap, etc.; Canadian Institute for Health Information., 2022; Gorelick et al., 2017; Landsat, 2017; Statistics Canada, 2021; USGS, 2017).

The original factor analysis of attitude items (n = 14) indicated a four-factor solution. However, in this analysis, two variables had a factor loading that was less than 0.3 for all factors ('I feel willing to return my child to active play opportunities where they can follow physical distancing guidelines' and 'I feel worried that I will no longer be able to afford by child's extracurricular activities post pandemic'). Therefore, these items were removed, and the final factor analysis was conducted on the 12 remaining items. After the removal of these two items, the factor analysis suggested a three-factor solution. As a result, three attitude subscales emerged: safety-related (2 items), general return to active play (4 items) and active play at home (6 items). See Table 2 for each of the items and their factor loadings from the EFA.

4.2. Measurement of invariance

Measurement of invariance was used to determine if attitude factors measured the same construct across both time points (i.e., 6 months, 1.5). Because the safety related attitudes subscale only had two items that loaded onto it, it was removed from any further analysis. Three levels of measurement invariance were tested including configural (i.e., items load onto same factors across time), metric (i.e., factor loadings are equivalent in strength over time), and scalar (i.e., item intercepts are equivalent across time), with each level building upon the last to achieve stronger forms of invariance (Bialosiewicz et al., 2013, p. 37). The following cut-off values were used to determine invariance: a change in the Comparative Fit Index (CFI) of ≤ -0.01, a change in the root mean square error of approximation (RMSEA) of ≥ 0.015, and a change in standardized root mean square residual (SRMR) of ≥ 0.030 for configural and metric variance and ≥ 0.010 for scalar invariance (Chen, 2007).

Table 2
Parental Attitude Items used in Subscales Developed through the Exploratory Factor Analysis.

	Factor 1	Factor 2	Factor 3
	Safety	General return to active play	Active play at home
I feel that having my child at home with me makes me feel safe (2)	**.48**	.41	.01
I feel that having my child at home with me makes them feel safe (3)	**1.04**	.00	−.17
Even if my child can follow physical distancing guidelines, I am still hesitant to return them to active play programming (4)	−.01	**−.84**	−.04
I am confident that if I return my child to active play, my child will follow Ontario's public health guidelines (e.g., hand sanitizing) (5)	−.19	**.52**	−.01
I am looking forward to allowing my child to interact with others (6)	−.16	**.44**	−.03
I prefer to allow my child to interact with people via social networking sites and screen-based technology than in person (7)	−.03	**−.43**	.11
My child has missed out on health benefits of extracurricular activities due to the COVID-19 pandemic (8)	.06	.02	**−.46**
I have enough skills to support my child's active play at home (9)	.14	−.00	**.67**
I have access to what I need at home to support my child's active play (10)	.05	−.00	**.86**
I have the ability to support my child's physical activity/active play at home without engagement in extra-curricular activities (11)	−.02	.12	**.85**
I have enough access to resources (i.e., space, time, toys) that allow me to support my child's active play (12)	.01	.06	**.78**
I reserve time out of my day to support my child's active play (13)	.17	−.03	**.31**

Results of the invariance tests can be found in Table 3. Configural and metric invariance were achieved. Strict scalar invariance was not achieved. However, because scalar invariance is often difficult to achieve (Bialosiewicz et al., 2013, p. 37), partial scalar invariance was also assessed (i.e., at least half of the intercepts for each factor were invariant across time), and the model met the cut-off for this level of invariance. Thus, the model suggests partial scalar invariance meaning that the attitude factors hold across time points.

4.3. Statistical analyses

Cross-sectional analyses were conducted to determine if the seven urbanicity and four SES indicators influenced parents *general return to active play* and *active play at home* attitudes at 6 months and 1.5 years. Items from each attitude subscale were added to create a single score for each subscale. Negatively worded items (e.g., *My child has missed out on health benefits of extracurricular activities due to the COVID-19 pandemic)* were reverse scored so higher scores indicate more favourable attitudes. Data were inspected prior to analysis to determine if outcomes were normally distributed (skewness <1.5; Tabachnick et al., 2019). Pearson's correlation coefficient was used to determine the bivariate correlations between all continuous, normally distributed, parametric variables with attitudes subscales, and Spearman's Rank Coefficient was used for all continuous variables with non-normal, non-parametric distributions. One-way analysis of variance (ANOVAs) was used to compare means between categorical data sets (i.e., SES indicators) to identify the influence of these indicators on parents' attitudes toward *general return to active play*, and *active play at home* at 6 months, respectively. Post-hoc analyses were completed to determine any between-group differences. All correlations and ANOVAs were repeated to explore these relationships at 1.5 years. Linear mixed effects models were estimated to explore changes in *general return to active play* and *active play at home* attitudes between 6 months and 1.5 years. The models were run with a random intercept to account for the repeated measures design. Additionally, interaction terms were entered to determine if changes in parents' attitudes over time were influenced by SES indicators and urbanicity. To account for the limited power of interaction terms (Champoux & Peters, 1987), and similar to previous studies (D'Haese et al., 2016; Wang et al., 2017), moderation effects were considered significant if $p < .10$ (Twisk, 2006). For categorical moderators with more than two categories, t-scores were calculated to probe differences between individual groups.

5. Results

A total of 800 participants completed Survey 1, and 376 completed Survey 2. Of these, 243 participants completed both surveys, and 239 participants had complete data and were included in analysis. The sample size was sufficient to examine a small-to-moderate sized difference (i.e., d = 0.35) in changes in attitudes based on different indicators of SES as well as to provide reliable estimates from the EFA and CFA analyses.

On average, participants were 38.76 ± 5.72 years old, with the majority self-identifying as female (95.4%), Caucasian (87.0%), living in a detached home (78.2%), employed full-time (69.5%), and as a dual-parent household (85.3%). For complete participant demographics, refer to Table 4. The average *general return to active play* attitude score was 18.79 (*SD* = 3.71) at 6 months, and 20.63 (*SD* = 3.19) at 1.5 years. The average *active play at home* attitude score was 18.53 (*SD* = 5.38) at 6 months, and 17.91 (*SD* = 5.30) at 1.5 years.

Influence of Urbanicity and SES on Parents' Attitudes Toward their Children's Active Play Opportunities.

5.1. At 6 months

The first objective of this study was to explore the influence of SES on parents' attitudes toward their children's general return to active play

Table 3
Measurement invariance results of the 3 parental attitude factor loadings.

	CFI	Δ CFI	SRMR	Δ SRMR	RMSEA (90% CI)	Δ RMSEA
Configural invariance	0.933		0.060		0.054 (0.044–0.064)	
Metric invariance	0.931	−0.002	0.066	0.006	0.053 (0.04–0.063)	−0.001
Scalar invariance	0.895	−0.036	0.077	0.011	0.064 (0.055–0.073)	0.011
Partial scalar invariance	0.923	−0.008	0.068	0.002	0.055 (0.046–0.064)	0.002

Note. CFI = comparative fit index, Δ = change, SRMR = standardized root mean square residual, RMSEA = root mean square error of approximation.

Table 4
Summary of participant demographic data ($n = 239$).

Demographic Factors	*M*	*SD*
Age	38.76	5.72
Number of children	1.76	0.78
	N	***%***
Community type		
Rural	53	22.2%
Suburban	104	43.5%
Urban	82	34.3%
Ethnicity		
Caucasian	208	87%
South Asian	9	3.8%
First Nations/Aboriginal	7	2.9%
Latin American	3	1.3%
East Asian	2	0.8%
Middle Eastern	1	0.4%
Other	6	2.5%
Prefer not to answer	3	1.3%
Employment		
Full-time	166	69.5%
Part-time/occasional	35	15.2%
Unemployed	29	12.6%
Prefer not to answer	9	3.8%
Education		
High school	17	7.1%
College	52	21.8%
Undergraduate	81	33.9%
Graduate school	89	37.2%
Housing type		
Apartment/condo	18	7.6%
Townhouse	12	5.4%
Semi detached	19	7.9%
Detached	187	78.2%
Other	2	0.8%
Income		
≤$59,999	35	14.6%
$60,000-$99,999	48	20.1%
$100,000-$139,999	66	27.6%
≥$140,000	75	31.4%
Prefer not to answer	15	6.3%
Parent Gender		
Female	228	95.4%
Male	10	4.2%
Transgender	1	0.4%
Family situation		
Single parent	29	12.2%
Dual parent	203	85.3%
Other	5	2.1%
Prefer not to answer	1	0.4%

Note. Column total may not always match the total number of participants due to skipped questions.

and active play in the home. Results showed that active living index, street intersection density, population density, and number of parks were inversely correlated to parents' attitudes toward general return to active play at 6 months (Table 5). No significant correlations were noted regarding attitudes toward active play at home ($p > .05$). The correlations between urbanicity variables and parents' attitudes at 6 months are displayed in Table 5.

Differences in attitudes towards active play at home and general attitudes towards active play at 6 months are displayed in Table 6. Results of the one-way ANOVA indicated that parents employed full-time and parents with higher reported household incomes had more positive attitudes toward general return to active play. Further, significant differences in attitudes toward general return to active play were found between income categories (F [3] = 2.803). Post-hoc analysis revealed that participants with a household income $140,000 or greater reported significantly more positive attitudes toward general return to active play than participants with household incomes of $59,000 or less ($MD$ = 1.550, p = .042) and those with household incomes between $60,000 and $99,000 ($MD$ = 1.824, p = .009).

Table 5
Correlations between urbanicity variables and parents' attitudes toward general return to active play and active play at home at 6 months and 1.5 years into COVID-19.

	6 Months		1.5 Years	
Urbanicity Variable	General return to active play	Active play at home	General return to active play	Active play at home
Active living index	−.178**	−.021	−.194**	.009
Greenness	.109	.053	.105	.011
Street intersection density	−.148*	.025	−.155*	.072
Population density	−.153*	−.009	−.190**	.54
Distance to nearest park (m)	−.049	−.085	.026	.115
Park area (10,000m^2)	−.112	.091	−.173*	.064
# of parks (1000 m)	−.154*	.05	−.132	.03
# of children	−.012	.003	.016	.011

Note. *$p < .05$, **$p < .01$.

5.2. At 1.5 years

The correlations between urbanicity variables and parents' attitudes at 1.5 years into the COVID-19 pandemic are displayed in Table 5. Results showed that active living index, street intersection density, population density, and park area were inversely correlated to parents' attitudes toward *general return to active play* (Table 5). Like 6 months, no significant correlations were found between urbanity variables and attitudes toward *active play at home* at 1.5 years ($p > .05$). Additionally, no significant results were found for the one-way ANOVA comparing SES indicators and attitudes toward *general return to active play* or *active play at home* at 1.5 years (Table 6).

5.3. Over time

Results from the linear mixed effects models are displayed in Tables 7 and 8. Parents' attitudes toward *general return to active play* increased over time (MD = 1.758 [1.322, 2.194], $p < .001$); however, there was no significant change in attitudes toward *active play at home* (MD = −0.524 [−1.115, 0.068], p = .84). Changes in attitudes towards active play at home were moderated by park area. Parents that lived in areas with greater park area had a significantly larger decrease in attitudes towards

Table 6
Relationship between SES indicator variables and parents' attitudes toward general return to active play and active play at home at 6 months and 1.5 years into COVID-19.

	6 Months				1.5 Years			
Variable	General return to active play	*p*	Active play at home	*p*	General return to active play	*p*	Active play at home	*p*
	M (*SD*)		*M* (*SD*)		*M* (*SD*)		*M* (*SD*)	
Employment status		**.012**		.077		.166		.195
Full-time ($n = 166$)	19.21 (3.57)		18.10 (5.55)		20.74 (3.05)		17.78 (5.24)	
Parttime/occasional ($n = 35$)	18.03 (3.46)		20.31 (4.37)		20.97 (3.02)		19.31 (4.87)	
Unemployed ($n = 29$)	17.21 (4.46)		18.93 (4.92)		19.54 (3.92)		16.81 (5.86)	
Education		.168		.376		.079		.151
High school ($n = 17$)	20.29 (3.98)		17.29 (5.41)		21.69 (3.11)		16.31 (6.27)	
College ($n = 52$)	17.94 (3.67)		17.86 (5.46)		20.04 (3.18)		16.66 (4.90)	
University ($n = 81$)	18.74 (4.19)		18.48 (5.00)		21.17 (3.29)		18.30 (5.59)	
Graduate school ($n = 89$)	18.94 (3.10)		19.22 (5.65)		20.24 (3.03)		18.45 (4.99)	
Family situation		.508		.192		.239		.063
Dual parent ($n = 203$)	18.70 (3.70)		18.72 (5.49)		20.71 (3.09)		18.11 (5.27)	
Single parent/other ($n = 34$)	19.15 (3.83)		17.39 (4.67)		19.97 (3.76)		16.17 (5.46)	
Total household income		**.041**		.504		.756		.207
≤$59,999 ($n = 35$)	18.14 (3.90)		18.15 (4.66)		20.21 (3.96)		15.70 (5.06)	
$60,000-$99,999 ($n = 48$)	17.87 (3.91)		18.54 (5.59)		20.39 (2.94)		18.21 (5.78)	
$100,000-$139,999 ($n = 66$)	18.83 (3.80)		17.91 (5.69)		20.73 (3.05)		17.80 (5.39)	
≥$140,000 ($n = 75$)	19.69 (3.35)		19.27 (5.55)		20.91 (3.20)		18.10 (5.06)	

Note. M = mean; SD = standard deviation; SES = socioeconomic status; $p < .05$.

Table 7
Moderating effect of urbanicity variables on changes in parents' attitudes toward general return to active play and active play at home between 6 Months and 1.5 Years into COVID-19.

	General return to active play			Active play at home		
Moderator	Moderation effect	95% CI	*p*	Moderation effect	95% CI	*p*
Active living index	0.049	−0.300, 0.399	.783	0.203	−0.278, 0.682	.409
Greenness	−1.238	−5.973, 3.509	.609	−3.056	−9.463, 3.363	.351
Street intersection density	0.000	−0.003, 0.003	.904	0.003	−0.001, 0.008	.185
Population density (1000s)	0.008	−0.302, 0.317	.962	0.151	−0.280, 0.581	.493
Distance to nearest park (km)	−0.021	−0.104, 0.062	.619	0.039	−0.073, 0.151	.495
Park area (10,000m^2)	−0.007	−0.029, 0.015	.540	−0.029	−0.059, 0.000	**.055**
# of parks (1000 m)	0.049	−0.083, 0.181	.464	−0.013	−0.0196, 0.170	.890
# of children	0.100	−0.457, 0.656	.724	−0.190	−0.946, 0.567	.623

Note. CI = confidence interval; $p < .10$.

Table 8
Moderating effect of SES indicators on changes in parents' attitudes toward general return to active play and active play at home between 6 Months and 1.5 Years into COVID-19.

General return to active play					Active play at home				
Moderator	Effect	95% CI	*p*	Moderation effect	Moderator	Effect	95% CI	*p*	Moderation effect
Employment status				**.098**	Employment status				.235
Full time (n = 159)[a]	1.480	0.963, 1.997	< **.001**		Full-time (n = 159)[a]	−0.307	−1.011, 0.397	.392	
Part-time/occasional (n = 30)[a]	2.850	1.688, 4.012	< **.001**		Part-time/occasional (n = 30)	−0.584	−2.199, 1.031	.479	
Unemployed (n = 27)	2.050	0.796, 3.304	**.002**		Unemployed (n = 27)[a]	−1.901	−3.591, 0.211	**.028**	
Education				.164	Education				.787
High School (n = 16)	1.380	−0.221, 2.981	.091		High school (n = 16)	−0.794	−2.999, 1.411	.481	
College (n = 47)	1.910	0.965, 2.855	< **.001**		College (n = 47)	−0.883	−2.177, 0.411	.182	
University (n = 76)[b]	2.350	1.611, 3.089	< **.001**		University (n = 76)	−0.122	−1.139, 0.895	.815	
Graduate School (n = 82)[b]	1.190	0.475, 1.905	.001		Graduate school (n = 82)	−0.688	−1.666, 0.290	.17	
Family Situation				**.061**	Family situation				.816
Dual-parent (n = 201)[c]	1.904	1.432, 2.376	< **.001**		Dual-parent (n = 201)	−0.529	−1.174, 0.116	.109	
Single parent/other (n = 34)[c]	0.699	−0.465, 1.863	.241		Single-parent/other (n = 34)	−0.737	−2.236, 0.889	.375	
Total Household Income					Total household income				.273
≤$59,000 (n = 35)	1.910	0.720, 3.100	**.002**	.317	≤$59,999 (n = 35)	−1.734	−3.351, −0.117	**.037**	

active play at home over time ($p = .055$). No other variables significantly moderated changes in attitudes toward *active play at home* over time. However, of note, parents who were unemployed ($MD = -1.90$, $p = .028$), and from the lowest income households ($MD = -1.73$, $p = .037$), had significant decreases in attitudes toward *active play at home* over time.

For attitudes toward *general return to active play*, employment status significantly moderated changes in attitudes toward *general return to play* ($p = .098$). Parents that were employed full-time had significantly smaller increases in attitudes toward *general return to active play* over time compared to parents who were employed part-time ($MD = 1.37$, $p = .043$). Additionally, family situation significantly moderated changes in attitudes toward general return to active play. Parents from dual-parent households had significantly greater increases in attitudes toward *general return to active play* compared to parents from single-parent households over time ($MD = 1.21$, $p = .061$). No other SES or urbanicity indicators moderated changes in attitudes toward *general return to active play* over time.

6. Discussion

The purpose of this study was to explore the influence of SES and urbanicity on parents' attitudes toward their children's active play (unstructured play, sport) opportunities 6 months and 1.5 years into the COVID-19 pandemic, and to examine changes (worsening or improving) across time. This study highlights several social-ecological factors influencing parents' attitudes and their children's return to play during the COVID-19 pandemic, as well as recommendations to reduce inequities that stem from SES and urbanicity toward children's active play. Multiple findings are discussed below.

In this study, several SES indicators significantly influenced parents' attitudes. Notably, results showed that full-time employed parents and parents with higher-than-average household income felt less hesitant toward their children's general return to active play 6 months into the pandemic, compared to parents that were unemployed or employed part-time, and parents in the lowest income bracket, respectfully. This is not surprising, as a body of research conducted outside the pandemic supports that parental income and employment status are often related to children's engagement in physical activity (Canadian Fitness and Lifestyle Research Institute, 2019; Love et al., 2019; Stearns et al., 2016), meaning that full-time employment and higher income may have enabled parents to feel better able to support their children's return to play in this study.

As evidenced by a systematic review by Khanijahani et al. (2021), SES indicators such as income and employment have also been associated with additional barriers during the pandemic such as poorer housing conditions (e.g., inability to isolate/work from home, difficulty physical distancing), increased exposure to, and worse health outcomes from, COVID-19, and additional hardships such as risk of unemployment and financial worry. Further, Fleming et al. (2023) found that parents who reported they were unable to work during the COVID-19 pandemic experienced additional 'health' related barriers (e.g., fear of their children getting sick if they resumed sport) compared to parents that were employed full-time. This might explain why, in the present study, unemployment was associated with parents' increased hesitancy to return their children to active play at 6 months (in comparison to the pre-pandemic period). It is possible that parents in such circumstances felt less able to prioritize their children's active play because of their employment situation. Conversely, many parents with higher income reported working from home during earlier stages of the pandemic, with stable access to internet, food, and comfortable living conditions (Wanberg et al., 2020), better enabling them to support their children's active play. As such, it is possible that parents in this study with lower household income and those who were unemployed felt less positively about returning their children to play because of increased financial worry or job-related strain.

Interestingly, there were no significant correlations between SES indicators and parents' attitudes (generally, or at home) at 1.5 years. This finding was unexpected, as SES inequities have continued to be exacerbated by the pandemic (Khanijahani et al., 2021), up to 3 years later. It is possible that the perceived threat of the virus was lower 1 year later, or that many parents had returned to in-person work, and that this influenced parents' attitudes surrounding return to play. While more research exploring SES inequities and active play opportunities throughout the pandemic is needed, it is apparent that the COVID-19 pandemic has shed light on pre-existing SES inequities to children's active play, serving as a call to action for governments to create support for parents of low income and unemployment.

With regard to urbanicity, parents living in areas with higher active living index scores (i.e., increased walkability and active transportation), greater street intersection density, population density, and more parks nearby, had less favourable attitudes toward their children's return to active play 6 months into the pandemic; however, no differences were noted in their attitudes toward supporting active play at home (i.e., reported via the play at home attitude subscale). Similar results transpired 1 year later (captured via the follow-up survey; 1.5 years into COVID-19), as parents living in areas with a higher active living index, greater street intersection density, population density, and park area had fewer positive attitudes toward their children's general return to active play. These findings suggest that parents from areas with features more typical of the urban environment were more hesitant to return their children to active play (unstructured activities and sport with friends, etc.) outside of the home at both time points. To expand, large metropolitan areas (e.g., cities) are often considered physical activity-promoting communities as they typically have greater walkability (Shahid & Bertazzon, 2015), and active transportation resources including bike infrastructure (Rothman et al., 2021), multi-use paths (Mitchell et al., 2016), sidewalks (Rothman et al., 2021), and parks nearby (Mitra et al., 2020), but also consist of high-density neighbourhoods and street networks (Sandalack et al., 2013). Much of the pre-pandemic research supports the association between features of the built environment, such as street connectivity, walkability and higher population density, and increased physical activity in the form of active transportation (Kärmeniemi et al., 2018).

The number of parks located near study participants was also associated with less positive (i.e., increased hesitancy) parental attitudes to return their children to active play at 6 months. Similarly, park area was associated with increased general return to play hesitancy at 1.5 years. These findings are interesting, as researchers have noted the importance of access to parks and recreational facilities in high-density areas as an important facilitator to physical activity both before (Mitchell et al., 2016) and during the pandemic (Gu et al., 2022). Mitra et al. (2020) similarly concluded that access to parks (derived from Digital Mapping Technologies Inc. dataset) within a 1-km radius of participants was unexpectedly associated with decreased outdoor activity among children aged 5 to 11, but not amongst youth aged 11–17 years, in April 2020. A possible explanation for this finding is the notion that parents' perspectives of the built environment may be more important than features of the built environment themselves (Cleland et al., 2010; Faulkner et al., 2015). For example, a systematic review found that certain park characteristics (e.g., amenities, sport facilities, clean, safety, paths) are often prioritized by parents of children aged 8–12 years over proximity to parks (Padial-Ruz et al., 2021). This may imply that parents in the present study did not have adequate access to high quality parks despite proximity/park area nearby. Particularly during the uncertainty of the COVID-19 pandemic, and the closures to many features of the built environment (e.g., parks, playground) that came about (Nielson, 2021), it is also possible that parents may have felt concerned about their children's safety, as well as the overall safety of their family and community, while awaiting vaccination and additional information about the virus.

Longitudinal analyses explored the influences of SES and urbanicity

across time to gather a greater understanding of how parents' attitudes shifted as the pandemic has progressed. Not surprisingly, parents' attitudes toward their children's general return to active play significantly increased over time. This is likely due to the novelty of the pandemic wearing off after the initial months (i.e., perceived threat; Trogen & Caplan, 2021), vaccinations becoming available for parents (Government of Canada, 2020b), and increased symptoms of COVID-19 fatigue/burnout (Kerr et al., 2021). Paired with the opening of many sports facilities, community centres, and parks (Nielson, 2021), it is possible that parents felt more capable about returning their children to active play, regardless of the true threat of the virus. Furthermore, many parents began to consider the long-term implications of physical distancing and lack of social interaction over the fear of the virus, as many reported their children experienced psychological concerns such as increased clinginess and dependence on parents (MacDonald & Hill, 2022). Additionally, research during the pandemic has emphasized the role of sport and play on children's mental wellbeing; a study in Canada found that during the COVID-19 pandemic (May 2020), access to outdoor play spaces and quality indoor spaces were significantly associated with improved wellbeing (Mitra et al., 2020). Therefore, it is possible that parents in the present study became increasingly worried about their children's physical and mental health following the prolonged lack of in-person social interactions due to the pandemic, while facing their own burnout toward technology and home-schooling their children, contributing to an overall desire to return their children to active play.

Interestingly, there were significantly greater increases in parents' attitudes toward their children's general return to active play over time reported by parents that were part-time employed compared to parents that were full-time employed. This finding is somewhat surprising given the high cost of organized sport in Ontario, Canada (Cairney et al., 2015). However, this might be attributed to additional time to support children's return to active play among parents who reported part-time employment, considering that other researchers have noted parent work schedules as a prominent barrier to promoting children's activity during the initial stages of the pandemic (i.e., spring 2020; Eyler et al., 2021). Parents who worked part-time may have also had external support (e.g., emotional, financial, etc.) from a partner regarding their children's return to play. To expand, parents in dual-parent households in this study had significantly more positive attitudes toward their children's general return to play over time than parents in single-parent households. It is likely that parents in dual-parent households were better equipped to support the increased demands that parents faced during the pandemic as they navigated their children's online learning, split parental duties, and balanced their own responsibilities (Eyler et al., 2021). Changes in attitudes towards general return to active play were not moderated by any urbanicity factors.

While parents' general attitudes to return their children to active play increased over the study period, parents' attitudes toward active play at home decreased slightly (although this change was not significant). This slight decrease might be a result of parents prioritizing the return to in-person programming over activity in the home, which is consistent with other researchers who found that the home environment became less supportive to physical activity as the pandemic progressed whereby parents placed less importance on prioritizing play at home (Sheldrick et al., 2022). Results from the moderation analysis showed that parents living in neighbourhoods with greater park area reported significantly greater reductions in attitudes towards active play at home over time. This might be a result of parents in these communities placing less value on physical activity inside the home as they were better able to utilize access to the outdoors, and more specifically, lived in environments with larger outdoor facilities such as trails or provincial/national parks nearby (i.e., features more typical of rural environments) to facilitate this. This is consistent with a recent qualitative study in which parents from rural and urban areas were interviewed, with results showing that parents in rural areas more frequently reported natural features (e.g., open fields, woods) that allowed for a greater range of types of active play compared to parents from urban and suburban environments that reported their children played closer to their immediate neighbourhood (e.g., in cul-de-sacs, alleys, sidewalks; Eyler et al., 2021). Undoubtedly, parents from different urbanicities have been impacted disproportionally during the COVID-19 pandemic; future urban planning initiatives should include parents in the design of parks (Padial-Ruz et al., 2021), and prioritize natural features, when possible, to ensure parks are meeting the needs of families and supporting children's physical activity.

Unlike attitudes towards general return to active play, attitudes towards active play at home at 6 months were not related with children's participation in organized sport 1 year later in the main effects model. However, there were some significant moderation effects, which showed that the association differed based on SES factors. Specifically, there was a positive relationship between attitudes toward active play at home at 6 months and return to organized sport 1 year later in dual-parent households, but not single-parent households. It is possible that this association is a result of dual-parent households having the resources at home to support their children's active play at 6 months, but also felt it was important to return their children to play when safe and were more capable to do so because of these resources (e.g., financial, equipment, time). Alternatively, many single parents faced increasing demands during the pandemic such as essential work (Blau et al., 2021; Khanijahani et al., 2021), and as such, may have been less able to support play at home, and to return their children to sport because of logistical barriers. Post et al. (2022) similarly concluded that married parents were more likely to report that their children were likely to return to sport in the next year than non-married parents. These results emphasize the importance of creating adequate supports for parents from various SES indicators to ensure children do not miss out on the important health benefits of physical activity (Tremblay et al., 2016).

Interestingly, results from the logistic regression models indicated that no urbanicity factors moderated the relationship between parents' attitudes (both subscales at 6 months) and children's return to organized sport at 1.5 years. This contradicts other pandemic research suggesting that children in urban areas reported higher levels of sport participation (May 2020–September 2021), which can likely be attributed to living in closer proximity to sport facilities (e.g., community centres, hockey arenas; Fleming et al., 2023). However, research by Caldwell et al. (2022) conducted during the second wave of the pandemic in Canada found no differences in parent-reported outdoor sport participation between children living in rural versus urban areas from a national sample of parents ($n = 1568$). Increased research is needed regarding differences in sport participation between children from different urbanicities in Ontario.

7. Strengths and limitations

To our knowledge, this is one of the first studies to explore the influence of the built environment on parents' changing (albeit worsening) attitudes during the COVID-19 pandemic using objective indicators. An additional strength of this study includes validating the scale used to measure attitudes towards returning to play and taking a multifactorial approach to examining SES and urbanicity. However, despite the noted strengths, several limitations must be discussed. First, given the cross-sectional nature of the analysis at 6 months and 1.5 years, casual inferences cannot be made from these findings. Additionally, although efforts were made to recruit an adequate sample of Ontario parents, only 800 participants completed Survey 1 in its entirety, and many participants ($n = 539$) were lost to follow-up and/or incorrectly entering participant ID. As well, the study sample was predominantly female, Caucasian, dual-parent, and higher income households, which hinders the generalizability of results. Further, demographic information regarding SES indicators was only collected in Survey 1. Although this is typical in research protocol, due to the ever-changing nature of the COVID-19 pandemic, and economic instability

during the pandemic (Khanijahani et al., 2021), it is possible that parent demographics may have changed during the time between Survey 1 and Survey 2. Furthermore, research following the creation of the surveys for this study also recommends the inclusion of pandemic-specific indicators of SES such as pandemic-related loss of employment, additional workload because of frontline occupations, and death of a family member due to COVID-19 (Gauvin et al., 2022), which this study did not include. Another limitation is that urbanicity data were pulled from participant postal code rather than specific home location to uphold participant anonymity. Although a large buffer (1000m) was used to reduce misclassification (Healy & Gilliland, 2012), particularly in rural areas where postal codes cover a greater geographic region, there is less accuracy regarding the unique geographic features compare to urban areas with smaller postal code regions (Healy & Gilliland, 2012). Finally, it is also possible that some factors not discussed in this study including, but not limited to, vaccination status (not yet readily available at 6 months; Canadian Institute for Health Information., 2022), and community case-counts could have influenced parents' attitudes at various time points.

8. Conclusion

The purpose of this study was to explore the influence of SES and urbanicity on parents' attitudes regarding their children's return to active play. The findings of this work posit that more supports are needed for single parents, parents that are employed full-time, have lower income, and those living in communities with features more typical of the urban environment to encourage active play for their children during the pandemic. Given the instrumental role that parents have on their children's level of active play, innovative health promotion efforts need to be tailored to parents, with adequate attention to SES indictors and urbanicity, particularly given their worsened attitudes and comfort levels. This work highlights the necessity to consider parents' attitudes and perspectives, as their stress levels have been linked to children's physical activity avoidance during the COVID-19 pandemic (Khozaei & Carbon, 2022). As such, it is essential that parents are better equipped to support their children gain the benefits associated with active play (Tremblay et al., 2016). The COVID-19 pandemic resulted in, and continues to contribute to, challenging times in Ontario, and inequities toward children's active play needs to remain a priority.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available upon request.

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References

American Psychological Association. (2022). Measuring socioeconomic status and subjective social status. https://www.apa.org/pi/ses/resources/class/measuring-status.

Bates, D., Mächler, M., Bolker, B., & Walker, S. (2015). Fitting linear mixed-effects models using lme4. *Journal of Statistical Software, 67*, 1–48. https://doi.org/10.18637/jss.v067.i01

Bialosiewicz, S., Murphy, K., & Berry, T. (2013). *An introduction to measurement invariance testing: Resource packet for participants*. Claremont Evaluation Center. https://higherlogicdownload.s3-external-1.amazonaws.com/EVAL/AEA%2013%20measurement%20invariance%20resource%20packet.pdf?AWSAccessKeyId=AKIAVRDO7IEREB57R7MT&Expires=1670360808&Signature=vQ4sqZfCqme%2Fv3gVWLQh5JPIJmQ%3D.

Blau, F. D., Koebe, J., & Meyerhofer, P. A. (2021). Who are the essential and frontline workers? *Business Economics, 56*(3), 168–178. https://doi.org/10.1057/s11369-021-00230-7

Braveman, P. A., Cubbin, C., Egerter, S., Chideya, S., Marchi, K. S., Metzler, M., & Posner, S. (2005). Socioeconomic status in health research: One size does not fit all. *JAMA, 294*(22), 2879–2888. https://doi.org/10.1001/jama.294.22.2879

Brown, H. E., Atkin, A. J., Panter, J., Wong, G., Chinapaw, M. J. M., & van Sluijs, E. M. F. (2016). Family-based interventions to increase physical activity in children: A systematic review, meta-analysis and realist synthesis. *Obesity Reviews, 17*(4), 345–360. https://doi.org/10.1111/obr.12362

Cairney, J., Joshi, D., Kwan, M., Hay, J., & Faught, B. (2015). Children's participation in organized sport and physical activities and active free play: Exploring the impact of time, gender and neighbourhood household income using longitudinal data. *Sociology of Sport Journal, 32*(3), 266–283. https://doi.org/10.1123/ssj.2014-0100

Caldwell, H. A. T., Faulkner, G., Tremblay, M. S., Rhodes, R. E., de Lannoy, L., Kirk, S. F. L., Rehman, L., & Moore, S. A. (2022). Regional differences in movement behaviours of children and youth during the second wave of the COVID-19 pandemic in Canada: Follow-up from a national study. *Canadian Journal of Public, 113*(4), 535–546. https://doi.org/10.17269/s41997-022-00644-6

Canadian Fitness and Lifestyle Research Institute. (2019). Bulletin 8: Achieving sufficient steps per day among Canadian children and youth | CFLRI. *Bulletin 8: Achieving Sufficient Steps per Day among Canadian Children and Youth*. https://cflri.ca/bulletin-8-achieving-sufficient-steps-day-among-canadian-children-and-youth.

Canadian Institute for Health Information. (2022). *Canadian COVID-19 intervention timeline |CIHI*. https://www.cihi.ca/en/canadian-covid-19-intervention-timeline.

Carson, V., Chaput, J.-P., Janssen, I., & Tremblay, M. S. (2017a). Health associations with meeting new 24-hour movement guidelines for Canadian children and youth. *Preventive Medicine, 95*, 7–13. https://doi.org/10.1016/j.ypmed.2016.12.005

Carson, V., Lee, E.-Y., Hewitt, L., Jennings, C., Hunter, S., Kuzik, N., Stearns, J. A., Unrau, S. P., Poitras, V. J., Gray, C., Adamo, K. B., Janssen, I., Okely, A. D., Spence, J. C., Timmons, B. W., Sampson, M., & Tremblay, M. S. (2017b). Systematic review of the relationships between physical activity and health indicators in the early years (0-4 years). *BMC Public Health, 17*(5), 854. https://doi.org/10.1186/s12889-017-4860-0

Champoux, J. E., & Peters, W. S. (1987). Form, effect size and power in moderated regression analysis. *Journal of Occupational Psychology, 60*, 243–255. https://doi.org/10.1111/j.2044-8325.1987.tb00257.x

Chaput, J.-P., Carson, V., Gray, C. E., & Tremblay, M. S. (2014). Importance of all movement behaviors in a 24 hour period for overall health. *International Journal of Environmental Research and Public Health, 11*(12). https://doi.org/10.3390/ijerph111212575. Article 12.

Chen, F. F. (2007). Sensitivity of goodness of fit indexes to lack of measurement invariance. *Structural Equation Modeling: A Multidisciplinary Journal, 14*(3), 464–504. https://doi.org/10.1080/10705510701301834

Cleland, V., Timperio, A., Salmon, J., Hume, C., Baur, L. A., & Crawford, D. (2010). Predictors of time spent outdoors among children: 5-year longitudinal findings. *Journal of Epidemiology & Community Health, 64*(5), 400–406. https://doi.org/10.1136/jech.2009.087460

Colley, R., & Watt, J. (2022). The unequal impact of the COVID-19 pandemic on the physical activity habits of Canadians. *Health Reports, 33*(5), 22–33, 10.25318/82-003-x202200500003-eng.

D'Haese, S., Gheysen, F., De Bourdeaudhuij, I., Deforche, B., Van Dyck, D., & Cardon, G. (2016). The moderating effect of psychosocial factors in the relation between neighborhood walkability and children's physical activity. *International Journal of Behavioral Nutrition and Physical Activity, 13*(1), 128. https://doi.org/10.1186/s12966-016-0452-0

Diemer, M. A., Mistry, R. S., Wadsworth, M. E., López, I., & Reimers, F. (2013). Best practices in conceptualizing and measuring social class in psychological research. *Analyses of Social Issues and Public Policy, 13*(1), 77–113. https://doi.org/10.1111/asap.12001

DMTI Spatial Inc. (2020a). *Park sports field point [Map]*. DMTI Spatial Inc. http://geo.scholarsportal.info/#r/details/_uri@=41125589$DMTI_2020_CMCS_ParksSportsFieldPoint&_add:true_nozoom:true.

DMTI Spatial Inc. (2020b). *Park sports field region [Map]*. DMTI Spatial Inc. http://geo2.scholarsportal.info/#r/details/_uri@=11120733$DMTI_2020_CMCS_ParksSportsFieldRegion&_add:true_nozoom:true.

Duncan, G. J., Magnuson, K., & Votruba-Drzal, E. (2015). Children and socioeconomic status. In *Handbook of child psychology and developmental science* (pp. 1–40). John Wiley & Sons, Ltd. https://doi.org/10.1002/9781118963418.childpsy414.

Eyler, A. A., Schmidt, L., Beck, A., Gilbert, A., Kepper, M., & Mazzucca, S. (2021). Children's physical activity and screen time during COVID-19 pandemic: A qualitative exploration of parent perceptions. *Health Behavior and Policy Review, 8*(3), 236–246. https://doi.org/10.14485/hbpr.8.3.5

Faulkner, G., Mitra, R., Buliung, R., Fusco, C., & Stone, M. (2015). Children's outdoor playtime, physical activity, and parental perceptions of the neighbourhood environment. *International Journal of Play, 4*(1), 84–97. https://doi.org/10.1080/21594937.2015.1017303

Fleming, D. J. M., Dorsch, T. E., Serang, S., Hardiman, A. L., Blazo, J. A., Farrey, T., Lerner, J. B., & Solomon, J. (2023). The association of families' socioeconomic and demographic characteristics with parents' perceived barriers to returning to youth sport following the COVID-19 pandemic. *Psychology of Sport and Exercise, 65*, Article 102348. https://doi.org/10.1016/j.psychsport.2022.102348

Gauvin, L., Barnett, T. A., Dea, C., Doré, I., Drouin, O., Frohlich, K. L., Henderson, M., & Sylvestre, M.-P. (2022). Quarantots, quarankids, and quaranteens: How research can contribute to mitigating the deleterious impacts of the COVID-19 pandemic on health behaviours and social inequalities while achieving sustainable change. Scopus *Canadian Journal of Public Health, 113*(1), 53–60. https://doi.org/10.17269/s41997-021-00569-6.

Government of Canada, H. (2020b). COVID-19 vaccines: Authorized vaccines [Navigation page - topic page] https://www.canada.ca/en/health-canada/services/drugs-health-products/covid19-industry/drugs-vaccines-treatments/vaccines.html.

Government of Ontario. (2020a). *Ontario releases COVID-19 response framework to help keep the province safe and open*. News.Ontario.Ca. https://news.ontario.ca/en/release/59051/ontario-releases-covid-19-response-framework-to-help-keep-the-province-safe-and-open.

Government of Ontario. (2021a). *Ontario Moving to step Three of Roadmap to Reopen on july 16*. News.Ontario.Ca. https://news.ontario.ca/en/release/1000501/ontario-moving-to-step-three-of-roadmap-to-reopen-on-july-16.

Gu, X., Keller, J., Zhang, T., Dempsey, D. R., Roberts, H., Jeans, K. A., Stevens, W., Borchard, J., VanPelt, J., & Tulchin-Francis, K. (2022). Disparity in built environment and its impacts on youths' physical activity behaviors during COVID-19 pandemic restrictions. *Journal of Racial and Ethnic Health Disparities*, 1–11. https://doi.org/10.1007/s40615-022-01341-3

Healy, M. A., & Gilliland, J. A. (2012). Quantifying the magnitude of environmental exposure misclassification when using imprecise address proxies in public health research. *Spatial and Spatio-Temporal Epidemiology, 3*(1), 55–67. https://doi.org/10.1016/j.sste.2012.02.006

Hu, D., Zhou, S., Crowley-McHattan, Z. J., & Liu, Z. (2021). Factors that influence participation in physical activity in school-aged children and adolescents: A systematic review from the social ecological model perspective. *International Journal of Environmental Research and Public Health, 18*(6), 3147. https://doi.org/10.3390/ijerph18063147

Janssen, I., & LeBlanc, A. G. (2010). Systematic review of the health benefits of physical activity and fitness in school-aged children and youth. *International Journal of Behavioral Nutrition and Physical Activity, 7*(1), 40. https://doi.org/10.1186/1479-5868-7-40

Jelleyman, C., McPhee, J., Brussoni, M., Bundy, A., & Duncan, S. (2019). A cross-sectional description of parental perceptions and practices related to risky play and independent mobility in children: The New Zealand state of play survey. *International Journal of Environmental Research and Public Health, 16*(2), 262. https://doi.org/10.3390/ijerph16020262

Kärmeniemi, M., Lankila, T., Ikäheimo, T., Koivumaa-Honkanen, H., & Korpelainen, R. (2018). The built environment as a determinant of physical activity: A systematic review of longitudinal studies and natural experiments. *Annals of Behavioral Medicine, 52*(3), 239–251. https://doi.org/10.1093/abm/kax043

Kerr, M. L., Rasmussen, H. F., Fanning, K. A., & Braaten, S. M. (2021). Parenting during COVID-19: A study of parents' experiences across gender and income levels. *Family Relations, 70*(5), 1327–1342. https://doi.org/10.1111/fare.12571

Khanijahani, A., Iezadi, S., Gholipour, K., Azami-Aghdash, S., & Naghibi, D. (2021). A systematic review of racial/ethnic and socioeconomic disparities in COVID-19. *International Journal for Equity in Health, 20*(1), 248. https://doi.org/10.1186/s12939-021-01582-4

Khozaei, F., & Carbon, C.-C. (2022). On the parental influence on children's physical activities and mental health during the COVID-19 pandemic. *Frontiers in Psychology, 13*. https://www.frontiersin.org/articles/10.3389/fpsyg.2022.675529.

Kuznetsova, A., Brockhoff, P. B., & Christensen, R. H. B. (2017). Package "lmerTest": Tests in linear mixed effects models. *Journal of Statistical Software, 82*(13). https://doi.org/10.18637/jss.v082.i13

Lambert, A., Vlaar, J., Herrington, S., & Brussoni, M (2019). What Is the Relationship between the Neighbourhood Built Environment and Time Spent in Outdoor Play? A Systematic Review. *International Journal of Environmental Research and Public Health, 16*(20), 3840. https://doi.org/10.3390/ijerph16203840, 11.

Love, R., Adams, J., Atkin, A., & van Sluijs, E. (2019). Socioeconomic and ethnic differences in children's vigorous intensity physical activity: A cross-sectional analysis of the UK millennium cohort study. *BMJ Open, 9*(5), Article e027627. https://doi.org/10.1136/bmjopen-2018-027627

MacDonald, M., & Hill, C. (2022). The educational impact of the Covid-19 rapid response on teachers, students, and families: Insights from British Columbia, Canada. *Prospects, 51*(4), 627–641. https://doi.org/10.1007/s11125-020-09527-5

Mitchell, C. A., Clark, A. F., & Gilliland, J. A. (2016). Built environment influences of children's physical activity: Examining differences by neighbourhood size and sex. *International Journal of Environmental Research and Public Health, 13*(1). https://doi.org/10.3390/ijerph13010130

Mitra, R., Moore, S. A., Gillespie, M., Faulkner, G., Vanderloo, L. M., Chulak-Bozzer, T., Rhodes, R. E., Brussoni, M., & Tremblay, M. S. (2020). Healthy movement behaviours in children and youth during the COVID-19 pandemic: Exploring the role of the neighbourhood environment. *Health & Place, 65*, Article 102418. https://doi.org/10.1016/j.healthplace.2020.102418

Muthén, L. K., & Muthén, B. O. (2017). Mplus user's guide. In *Muthén & Muthén* (8th ed., p. 950) https://www.statmodel.com/download/usersguide/MplusUserGuideVer_8.pdf.

Neshteruk, C. D., Nezami, B. T., Nino-Tapias, G., Davison, K. K., & Ward, D. S. (2017). The influence of fathers on children's physical activity: A review of the literature from 2009 to 2015. *Preventive Medicine, 102*, 12–19. https://doi.org/10.1016/j.ypmed.2017.06.027

Nielson, K. (2021). *A timeline of COVID-19 in Ontario | Globalnews.ca*. Global News. https://globalnews.ca/news/6859636/ontario-coronavirus-timeline/.

Owen, K. B., Nau, T., Reece, L. J., Bellew, W., Rose, C., Bauman, A., Halim, N. K., & Smith, B. J. (2022). Fair play? Participation equity in organised sport and physical activity among children and adolescents in high income countries: A systematic review and meta-analysis. *International Journal of Behavioral Nutrition and Physical Activity, 19*(1). https://doi.org/10.1186/s12966-022-01263-7

Padial-Ruz, R., Puga-González, M. E., Céspedes-Jiménez, Á., & Cabello-Manrique, D. (2021). Determining factors in the use of urban parks that influence the practice of physical activity in children: A systematic review. *International Journal of Environmental Research and Public Health, 18*(7). https://doi.org/10.3390/ijerph18073648

ParticipACTION. (2020). The role of the family in the physical activity, sedentary and sleep behaviours of children and youth. The 2020 ParticipACTION report card on physical activity for children and youth. https://www.participaction.com/wp-content/uploads/2022/09/2020-Children-and-Youth-Report-Card.pdf.

Poitras, V. J., Gray, C. E., Borghese, M. M., Carson, V., Chaput, J.-P., Janssen, I., Katzmarzyk, P. T., Pate, R. R., Connor Gorber, S., Kho, M. E., Sampson, M., & Tremblay, M. S. (2016). Systematic review of the relationships between objectively measured physical activity and health indicators in school-aged children and youth. *Applied Physiology Nutrition and Metabolism, 41*(Suppl. 3), S197–S239. https://doi.org/10.1139/apnm-2015-0663, 6.

Post, E. G., Rivera, M. J., Doss, D., & Eberman, L. E. (2022). Parent decision-making regarding youth sport participation during the COVID-19 pandemic. *Journal of Community Health, 47*(4), 687–696. https://doi.org/10.1007/s10900-022-01078-4

Rhodes, R. E., Spence, J. C., Berry, T., Faulkner, G., Latimer-Cheung, A. E., O'Reilly, N., Tremblay, M. S., & Vanderloo, L. (2019). Parental support of the Canadian 24-hour movement guidelines for children and youth: Prevalence and correlates. *BMC Public Health, 19*(1), 1385. https://doi.org/10.1186/s12889-019-7744-7

Rothman, L., Hagel, B., Howard, A., Cloutier, M. S., Macpherson, A., Aguirre, A. N., McCormack, G. R., Fuselli, P., Buliung, R., HubkaRao, T., Ling, R., Zanotto, M., Rancourt, M., & Winters, M. (2021). Active school transportation and the built environment across Canadian cities: Findings from the child active transportation safety and the environment (CHASE) study. *Preventive Medicine, 146*, Article 106470. https://doi.org/10.1016/j.ypmed.2021.106470

RStudio Team. (2020). RStudio: Integrated development for R. RStudio, PBC, Boston, MA. http://www.rstudio.com/. https://posit.co/.

Sandalack, B. A., Alaniz Uribe, F. G., Eshghzadeh Zanjani, A., Shiell, A., McCormack, G. R., & Doyle-Baker, P. K. (2013). Neighbourhood type and walkshed size. *Journal of Urbanism: International Research on Placemaking and Urban Sustainability, 6*(3), 236–255. https://doi.org/10.1080/17549175.2013.771694

Shahid, R., & Bertazzon, S. (2015). Local spatial analysis and dynamic simulation of childhood obesity and neighbourhood walkability in a major Canadian city. *AIMS Public Health, 2*(4), 616–637. https://doi.org/10.3934/publichealth.2015.4.616

Sheldrick, M. P. R., Swindell, N. J., Richards, A. B., Fairclough, S. J., & Stratton, G. (2022). Homes became the "everything space" during COVID-19: Impact of changes to the home environment on children's physical activity and sitting. *International Journal of Behavioral Nutrition and Physical Activity, 19*(1), 134. https://doi.org/10.1186/s12966-022-01346-5

Stearns, J. A., Rhodes, R., Ball, G. D. C., Boule, N., Veugelers, P. J., Cutumisu, N., & Spence, J. C. (2016). A cross-sectional study of the relationship between parents' and children's physical activity. *BMC Public Health, 16*(1), 1129. https://doi.org/10.1186/s12889-016-3793-3

Stone, M. R., Faulkner, G. E., Mitra, R., & Buliung, R. N. (2012). Physical activity patterns of children in Toronto: the relative role of neighbourhood type and socio-economic status. *Canadian Journal of Public Health, 103*(6). S9–S9.

Szpunar, M., Vanderloo, L. M., Bruijns, B. A., Truelove, S., Burke, S. M., Gilliland, J., Irwin, J. D., & Tucker, P. (2021). Children and parents' perspectives of the impact of the COVID-19 pandemic on Ontario children's physical activity, play, and sport behaviours. *BMC Public Health, 21*(1), 2271. https://doi.org/10.1186/s12889-021-12344-w

Szpunar, M., Vanderloo, L. M., Bruijns, B. A., Truelove, S., Burke, S. M., Gilliland, J., Irwin, J. D., & Tucker, P. (2022). Parents' attitudes regarding their children's play and sport during COVID-19. *Health Education & Behavior, 49*(6). https://doi.org/10.1177/109019812211167

Tabachnick, B. G., Fidell, L. S., & Ullman, J. B. (2019). *Using multivariate statistics* (7th ed.). Pearson.

Tremblay, M. S., Carson, V., Chaput, J.-P., Connor Gorber, S., Dinh, T., Duggan, M., Faulkner, G., Gray, C. E., Gruber, R., Janson, K., Janssen, I., Katzmarzyk, P. T., Kho, M. E., Latimer-Cheung, A. E., LeBlanc, C., Okely, A. D., Olds, T., Pate, R. R., Phillips, A., & Zehr, L. (2016). Canadian 24-Hour Movement Guidelines for Children and Youth: An integration of physical activity, sedentary behaviour, and sleep. *Applied Physiology Nutrition and Metabolism, 41*(Suppl. 3), S311–S327. https://doi.org/10.1139/apnm-2016-0151, 6.

Trogen, B., & Caplan, A. (2021). Risk compensation and COVID-19 vaccines. *Annals of Internal Medicine, M20–8251*. https://doi.org/10.7326/M20-8251

Truelove, S., Vanderloo, L. M., & Tucker, P. (2017). Defining and measuring active play among young children: A systematic review. *Journal of Physical Activity and Health, 14*(2), 155–166. https://doi.org/10.1123/jpah.2016-0195

Twisk, J. W. R. (2006). *Applied multilevel analysis: A practical guide for medical researchers*. Cambridge University Press.

Wanberg, C. R., Csillag, B., Douglass, R. P., Zhou, L., & Pollard, M. S. (2020). Socioeconomic status and well-being during COVID-19: A resource-based examination. *Journal of Applied Psychology, 105*, 1382–1396. https://doi.org/10.1037/apl0000831

Wang, X., Conway, T. L., Cain, K. L., Frank, L. D., Saelens, B. E., Geremia, C., Kerr, J., Glanz, K., Carlson, J. A., & Sallis, J. F. (2017). Interactions of psychosocial factors

with built environments in explaining adolescents' active transportation. *Preventive Medicine, 100*, 76–83. https://doi.org/10.1016/j.ypmed.2017.04.008

Yomoda, K., & Kurita, S. (2021). Influence of social distancing during the COVID-19 pandemic on physical activity in children: A scoping review of the literature. *Journal of Exercise Science & Fitness, 19*(3), 195–203. https://doi.org/10.1016/j.jesf.2021.04.002

Zenic, N., Taiar, R., Gilic, B., Blazevic, M., Maric, D., Pojskic, H., & Sekulic, D. (2020). Levels and changes of physical activity in adolescents during the COVID-19 pandemic: Contextualizing urban vs. rural living environment. *Applied Sciences, 10*(11). https://doi.org/10.3390/app10113997