



Subjective well-being of Canadian children and youth during the COVID-19 pandemic: The role of the social and physical environment and healthy movement behaviours

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ARTICLE INFO

Keywords:

Subjective well-being
 COVID-19 pandemic
 Child and adolescent health
 Physical activity
 Screen time
 Emotional health
 Social-ecological environment

ABSTRACT

The current COVID-19 pandemic has disrupted daily behaviours of children and youth. Yet, little is known about how they are mentally coping with the pandemic-time changes to their lives. This study explores children and youths' self-reported subjective well-being (SWB) during the pandemic, and provides novel insights into the correlates of potential decrease, using data from a pan-Canadian online survey of 932 children/youth and their parents. SWB was measured based on perceived changes in 12 affective/emotional states. The results indicate that in spring 2020, at the height of the first wave of the pandemic, many children and youth were more bored (37.6%) and worried (31%) compared to pre-pandemic time. At the same time, many self-reported that they felt calmer (31.9%) and more rested (30%). A latent class analysis revealed that nearly half (49.4%) of surveyed children and youth reported patterns in changes in their emotional state that may contribute to lower SWB. Results from binomial logistic regression suggest that socio-demographic characteristics and size of the municipality were not associated with low pandemic-time SWB. Instead, other potentially modifiable factors such as having access to friends, indoor and outdoor spaces/places to play and exercise, and healthy movement behaviours during the pandemic, were correlated with a lower likelihood of reporting low SWB. The findings can inform pandemic-time public health policy relating to physical distancing, and in the longer term, mental and physical health promotion. The results will also help improve urban planning and design practices in creating healthier, more resilient and equitable communities.

1. Introduction

The currently ongoing COVID-19 pandemic has significantly disrupted daily behaviours of children and adults alike. Following the World Health Organization (WHO) announcement of a global pandemic on March 11, 2020, Canadian children and adults were advised to “stay at home” when possible and maintain physical distancing when outside. Similar measures were taken worldwide to reduce the spread of the novel coronavirus. An emerging international research has reported significant decline in children and youths' physical activity levels during the pandemic, and an increase in sedentary behaviour and screen time (Merano et al., 2020; Moore et al., 2020; Xiang et al., 2020). In general, children were spending less time outdoors at the height of the pandemic in Spring 2020 (Mitra, et al., 2020; Moore et al., 2020).

The physical distancing measures also limited children and youths' opportunities for face-to-face social interaction. Online or hybrid schooling further limited face-to-face interaction with peers and teachers while increasing screen time. Conceivably, all these conditions may lead to a decline in mental or psychological health, but little is known about how children and youth are mentally coping with the pandemic-time enforced changes to their lives. A small but emerging literature has explored children's mental disorder during the COVID-19 pandemic (Racine et al., 2020). For example, self-report (either by child or parent) studies found high levels of anxiety, depression, psychological distress, and DSM-5 (Diagnostic and Statistical Manual of Mental Disorders- 5th edition) symptoms including clinginess, inattention, irritability, worry, poor appetite and sleep disorders (Duan et al., 2020; Jiao et al., 2020; Xie et al., 2020).

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<https://doi.org/10.1016/j.pmedr.2021.101404>

Received 8 January 2021; Received in revised form 9 May 2021; Accepted 12 May 2021

Available online 18 May 2021

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Beyond mental illness or disorder, however, children and youths' subjective well-being (SWB) during the pandemic remains less studied. SWB is defined in terms of an individual's positive emotions and satisfaction with life (Diener et al., 2002; Russell, 1980). In a study of service workers with 2–7 years old children from one large US city, Gassman-Pines et al. (2020) found no statistical change in children's uncooperative behaviour or them being sad or worried during the pandemic. Another qualitative study of 250 children aged 3–12 years from a Spanish region reported mixed results, where children reported being happy and relaxed during lockdown, but at the same time reported many negative emotions including fear, nervousness, worries, sadness, and anger (Mondragon et al., 2020). Clearly, there exists a scarcity of research on children's pandemic-time SWB outcomes using robust measures and population-representative data.

In positive psychology, a field of study that focuses on positive subjective experiences to improve the quality of life, understanding and enabling improved SWB is considered as an important preventative measure in the promotion of mental health (Seligman and Csikszentmihalyi, 2000; Seligman et al., 2005; Siegel, 2016). To this end, we explore self-reported pandemic-time changes in emotions among Canadian children and youth aged 9–15 years (as measures of their levels of SWB), using data from a national online survey and a latent class analysis (LCA) approach. We also examine the correlates of pandemic-time SWB. Recent research on children's pandemic-time mental health has produced mixed results regarding the potential influence of age and sex of a child and the urban versus rural residential location (Duan et al., 2020; Racine et al., 2020). Household financial hardship was associated with poor mental health and negative mood (Gassman-Pines et al., 2020; Racine et al., 2020). Previously, a systematic literature review by Wu et al. (2017) identified more physical activity and less sedentary activity to be positively associated with better health-related quality of life among children and adolescents, but such relationship has not been studied in the context of the COVID-19 pandemic.

More specifically, this research explores 1) the levels of SWB among Canadian children and youth during the COVID-19 pandemic, and 2) the association between the social and physical environment, healthy movement behaviours of these children and youth, and their pandemic-time SWB. The results begin to provide novel insights that can inform pandemic-time public health policy relating to physical distancing, and in the longer term, mental and physical health promotion. The results will also help improve urban planning and design practices in creating healthier, more resilient and equitable communities.

2. Methods

2.1. Survey design and data collection

The data comes from the COVID-19 Child and Youth Well-being Study conducted by Maximum City, which is a Canadian public engagement and education organization that is focused on youth engagement in urban problem solving (maximumcity.ca). Maximum City designed and conducted an online survey in May 2020, at the height of pandemic-related restrictions in most of Canada. A reputable third-party market research company (Canadian Viewpoint) was hired to conduct the survey and consequently, a cross-sectional sample of 932 pairs of Canadian children aged between 9 and 15 years, and their parent or caregiver, were recruited from Canadian Viewpoint's online panel (Maximum City, 2020). Parents were invited via email to participate in an online survey. Parents filled out part of the survey where they provided information on socio-demographic characteristics and household changes during the pandemic (e.g., changes in income). Followed by that, one 9–15 year old child filled out the rest of the survey, where they self-reported their age, emotions, movement behaviours and other perceptions.

The sample closely aligns with provincial-level population and household income distribution across Canada. For the purpose of this

paper, ethics approval for analysis of secondary data was obtained from Ryerson University's Research Ethics Board (#REB 2020–443).

2.2. Measures

2.2.1. Subjective well-being (SWB)

SWB was measured in terms of a child's/ youth's emotional (i.e., affective) evaluation of their daily life. An understanding of emotions also provides insight into the broader cognitive evaluation of life, which is the other key component of SWB (Diener et al., 2002; Russell, 1980). We have adopted Russell's theorization of psychological construct of emotions (Barrett and Russell, 1998; Russell, 1980, 2003) and explored 12 measures of affects or feelings across two intersecting dimensions, namely: valence (low to high pleasure) and arousal (low to high activation). More specifically, we explored emotions or feelings that were (1) Pleasant and involved high activation (Happy; Excited or interested), (2) Pleasant but involved low activation (Calm; Rested; Included or supported; In control), (3) Unpleasant and involved high activation (Worried; Angry), and (4) Unpleasant and involved low activation (Sad; Alone or unsupported; Tired; Bored). In the online survey, Canadian children and youth responded to the following multi-select question: "Compared to before COVID-19, I now feel more ...", and the respondents could select one or multiple feelings from a list of these 12 options. Those who did not select any change in emotions (n = 59) were excluded from our analysis.

2.2.2. Social and physical environment

Parents reported how their pandemic-time income might have affected their ability to meet household needs (no change or no impact; little impact; major impact). Children and youth agreed or disagreed on two statements focused on their social environment, namely: (1) Friend to share feelings ("I have a friend I can talk to about how I am feeling"), and (2) Household adult to share feelings with ("I have an adult family member I can talk to about how I am feeling. For example, a parent or grandparent"). This data was collected on a 5-point Likert scale, which were later converted to binary responses ("Yes" included responses "agree" and "agree a little", while "No" included responses "I don't disagree or agree", "disagree a little" and "disagree"). More specifically, two variables were included in the multivariate analysis.

The neighbourhood environment could not be examined objectively in the absence of detailed residential location data. However, survey respondents self-reported access to indoor and outdoor spaces/places by responding to two statements, using a similar Likert-scale described above: "There are enough places for me to play or exercise outside of my home. For example, a backyard, park or shared outdoor space." and "There is enough space for me to play inside my home." The responses were converted to binary responses ("Yes" included responses "agree" and "agree a little", while "No" included responses "I don't disagree or agree", "disagree a little" and "disagree"). Based on the responses, children and youth were grouped into four categories in terms of their access to indoor and outdoor play opportunities: (1) Access to both outdoor and indoor spaces/ places; (2) Access to outdoor places but no indoor spaces; (3) Access to indoor spaces but no outdoor places; and (4) No access to outdoor or indoor places/ spaces (this option was used as the reference in multivariate analysis). We identified children and youth living in small (<100,000 population), medium (100,000 to 400,000 population) and large (greater than 400,000 population) municipalities.

2.2.3. Healthy movement behaviours

We explored four movement behaviours during the COVID-19 pandemic, following the Canadian 24-Hour Movement Guidelines for Children and Youth (Tremblay et al., 2016)- (1) physical activity or exercise; (2) screen time (e.g., playing video games, watching TV or social media); (3) sleep duration; and (4) sleep quality (spending more versus less time trying to fall asleep). To this end, children and youth responded to four questions on a 5-point Likert scale, ranging from

“Much less” to “Much more” (compared to the pre-pandemic time). The responses were grouped into three categories, namely: less than before (combining responses “a lot less” and “a little less”); same as before (for response “about the same”); and more than before (combining response “a little more” and “a lot more”). Sleep quality data was reverse coded for measurement consistency.

2.2.4. Socio-demographic characteristics

Lastly, parents/ caregivers and children/youth self-reported socio-demographic characteristics in the survey. Adults reported parental age, family structure (two-parent; single parent or separated), number of children in the household (multiple children; one child), household income before tax (lower than \$50,000; \$50,000 to \$100,000; more than \$100,000) and ethnic/racial background. Ethnic/racial background was explored as a binary variable (Black, Indigenous and people of colour-BIPOC; White European descent). Children and youth self-reported their age (later groups into youth (12–15 years); child (9–11 years)), while their parent/caregiver reported gender (girl; boy; two-spirit; other).

After removing blank responses, the final sample for multivariate analysis included 800 children and youth.

2.3. Statistical analysis

To identify statistical patterns in self-reported changes in 12 SWB conditions among Canadian children and youth, a Latent Class Analysis (LCA) was conducted. LCA is a measurement model where individuals (i. e., survey respondents) can be classified into mutually exclusive and exhaustive “types”, known as latent classes, based on the pattern of responses to a set of categorical questions/ variables (Lazarsfeld & Henry, 1968; Nash & Mitra, 2019). The number of classes was determined by comparing the Akaike Information Criterion (AIC) and the Bayesian Information Criterion (BIC), combined with a subjective evaluation of meaningful results.

Next, we estimated a binomial logistic regression model to examine the correlates of low pandemic-time SWB (more specifically, of one latent class membership). The model included seven socio-demographic variables (responding parent’s age, family structure, multiple children in household, household income, and child/youth’s race, age and gender), five social and physical environmental variables (impact of income change, having a friend to share feeling, having an adult family member to share feeling, access to places/ spaces to play/exercise, and size of municipality), and four variables relating to healthy movement behaviours (physical activity, screen time, sleep duration, and sleep quality). Because of the binary dependent variable, any observed statistical association relating to the outcome group also implies an exact inverse association with the “reference” group (i.e., membership to the other group). Statistical significance is reported at $\alpha = 0.05$.

3. Results

The sample characteristics are summarized in Table 1. BIPOC families (36.9%, compared to the Canadian average of 27.2% in 2016) are over-represented in our sample. Noticeably, the majority of these children and youth self-reported a decline in healthy movements during the COVID-19 pandemic, with 56.3% reporting that they spent less time being physically active, and by contrast, 84.7% reporting that they spent more time on screen, compared to before the pandemic.

With regard to pandemic-time SWB, both negative and positive changes in valence (i.e., pleasantness) and arousal (i.e., activation) were reported (Fig. 1). The top three self-reported changes are- feeling more bored (unpleasant and low activation), feeling calmer (pleasant and low activation), and feeling more worried (unpleasant and high activation).

The LCA grouped all children and youth into two statistically distinct latent classes (AIC = 8,806.6; BIC = 8,923.7; dF = 775). Alternative 3- and 4-class solutions failed to reach maximum likelihood and also did

Table 1
Sample Characteristics (n = 800).

Variable	%
<i>Responding parent’s age</i>	
Less than 35 years	12.1
35 to 44 years	46.1
45 years or more	41.8
<i>Family structure</i>	
Single or separated parents	22.3
Two parents	77.7
<i>Multi-child household</i>	
One child	49.1
More than one child	50.9
<i>Household income*</i>	
Less than 50,000 CAD	17.1
50,000 to 100,000 CAD	35.1
More than 100,000 CAD	47.8
<i>Child’s ethnicity</i>	
White European Descent	63.1
BIPOC	36.9
<i>Child’s age</i>	
Child (9 to 11 years)	39.4
Youth (12 to 15 years)	60.6
<i>Child’s gender</i>	
Boy	47.1
Girl, two-spirit, or other	52.9
<i>Physical activity during pandemic</i>	
Less than before	56.5
Same as before	23.8
More than before	19.7
<i>Screen time during pandemic</i>	
Less than before	2.9
Same as before	12.4
More than before	84.7
<i>Sleep during pandemic</i>	
Less than before	9.6
Same as before	35.4
More than before	55.0
<i>Sleep quality during pandemic</i>	
Better than before	32.6
Same as before	53.0
Worse than before	14.4

Note: * Before tax income. In 2017, the Canadian median household income was \$93,300 (CMHC, 2019).

not produce meaningful results. The two latent classes can be clearly distinguished by a pandemic-time self-reported decline in the valence-related feelings or emotions (i.e., pleasant or unpleasant emotions) (Table 2 and Fig. 2).

Class 1 (*Low Pandemic-time SWB*) included 49.4% of children and youth, and 63.3% of them were likely to feel more bored during the pandemic, while 51.5% were likely to feel more worried. By contrast, only 1.7% were likely to feel more excited and 2.2% were likely to feel happier compared to the pre-pandemic period.

Class 2 (*High Pandemic-time SWB*) included 50.6% of children and youth, 56% of whom were likely to feel calmer and 52.1% felt happier during the pandemic. In contrast, only 0.7% would feel more alone or unsupported while 2.5% would feel sadder compared to the pre-pandemic period. Compared to Class 1, children and youth in Class 2 reported greater changes in various well-being indicators overall (Table 2 and Fig. 2).

The logistic regression results show that the socio-demographic characteristics and size of the municipality were not associated with pandemic-time SWB (Table 3). By contrast, not maintaining healthy movement behaviours was strongly correlated with pandemic-time SWB levels. Children and youth who were less physically active (OR = 1.54) or spent more time on digital screens (OR = 3.19) during the pandemic compared to pre-pandemic time, were more likely to belong to Class 1 (demonstrating low pandemic-time SWB). Sleep duration did not have a statistical association with SWB, but sleep quality was an important correlate of pandemic-time SWB.

Having a friend to share feelings with reduced the likelihood of

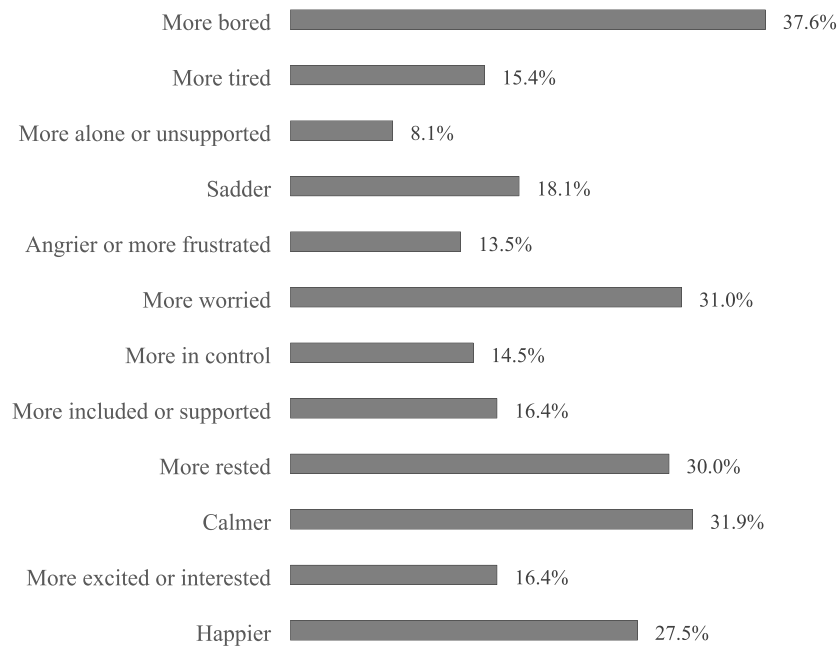


Fig. 1. Percentage of Canadian children and youth with self-reported subjective well-being indicators.

Table 2
Probability of reporting various feelings, by latent classes.

Subjective wellbeing (SWB) dimensions	Variables	Class 1: Low Pandemic-time SWB (49.4% of sample)%	Class 2: High Pandemic-time SWB(50.6% of sample)%
Pleasant + High activation	Happier	2.2	52.1
	More excited or interested	1.7	30.7
Pleasant + Low activation	Calmer	7.1	56.0
	More rested	18.2	41.5
	More included or supported	3.9	28.5
Unpleasant + High activation	More in control	2.8	25.7
	More worried	51.5	11.1
Unpleasant + Low activation	Angrier or more frustrated	23.2	4.0
	Sadder	34.1	2.5
	More alone or unsupported	15.8	0.7
	More tired	23.4	7.5
	More bored	63.3	12.6

belonging to Class 1 who reported low SWB (Table 3). However, having an adult family member for the same purpose did not have any statistical effect. Access to outdoor and indoor places/spaces for physical activity and play was also important. Enough outdoor and indoor places reduced the odds of Class 1 membership (implying higher odds of belonging to Class 2 who reported higher levels of SWB during the pandemic). Access to enough indoor space (but no outdoor space) also had a similar statistical association (Table 3).

4. Discussion

We identified patterns in self-reported changes in emotions during the COVID-19 pandemic among Canadian children and youth, and found that nearly half of our sample (49.4%) reported changes that could contribute to lower levels of SWB. Our findings indicate that some movement behaviours and social and physical environmental conditions

that are associated with better pandemic-time SWB outcomes, such as maintaining physical activity levels or having access to indoor and outdoor space, are within the short-term control of people and influence of policy makers. The creation of an enabling environment that fosters SWB is beneficial for children and youths' healthy development, in addition to reducing the risks of mental illness or distress during the pandemic. For some children and youth, the ongoing pandemic and related restrictions on outdoor gathering and mobility may have weakened their social safety net, making them more vulnerable to the risk of exploitation, abuse and related risks to their mental health (Quebec National Institute for Excellence in Health and Social Services, 2020). In the context of a world-wide decline in mental health conditions during the ongoing pandemic (Duan et al., 2020; Racine et al., 2020), insights into pandemic-time SWB can inform public health policies in important ways.

Our analysis indicates that a child/youth's age, gender, household socio-demographic characteristics or size of the municipality may not explain their pandemic-time SWB. We also did not find any evidence of economic or racial inequality in how self-reported SWB might have been impacted during the pandemic, although we acknowledged that specific low-income or ethnic communities may have been disproportionately impacted, and that our national exploration may have underestimated those nuance differences. Some low-income or rural households may not have the same access to internet, limiting their participation in the survey. Unlike in previous research where pandemic-time economic stress was strongly associated with children's mental health or SWB (Gassman-Pines et al., 2020; Racine et al., 2020), our analysis did not find such correlation. This may speak to the Canadian context where the federal government gave additional income to families who lost income due to the pandemic and increased monthly child benefit amounts.

Having a friend to discuss their feelings was important in preventing the likelihood of low pandemic-time SWB, clearly more so than being able to share feelings with a household adult. Previous research highlighted the significance of social relationships for children's life satisfaction (Park, 2004). When children wish to speak with friends about important topics, the majority prefer to do this in person, with contact by telephone coming in second, and texting only being the preferred method for under 15% of children aged 10 and 11 (Waygood et al., n.d.).

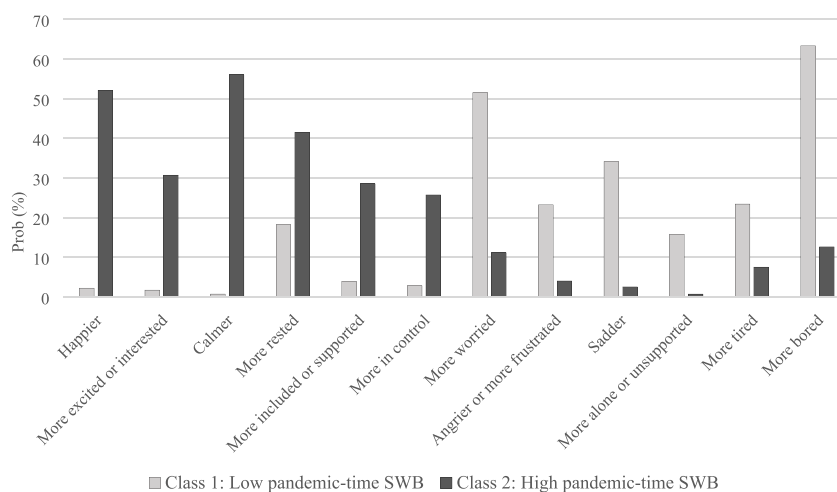


Fig. 2. Summary of emotions or feelings during COVID-19 pandemic, grouped by latent classes.

During the pandemic-related restrictions, some children may have been able to maintain communication with close friends in their neighbourhoods while in some other environments (e.g., apartment neighbourhoods, which are also often low-income communities), maintaining such relationships may have been a challenge. Those without reliable internet access may also have been more adversely impacted by pandemic conditions.

However, despite high levels of contraction risk during the second wave of the pandemic in fall 2020, schools, playgrounds, parks and selected recreational activities largely remained open, allowing more opportunities for face-to-face interaction. Conceivably, access to places for socializing and the opportunity to be physically active may lead to improved SWB among children and youth. As new data emerges, a comparison of SWB outcomes between spring (first wave) and fall (second wave) will provide important insights relating to potential benefits, in comparison to health risks, of restricted access to children's everyday destinations.

As mentioned above, children and youths' healthy movement behaviours were associated with better SWB outcomes during the pandemic. The results are not surprising, as previous research has identified strong correlations between physical activity and children's quality of life (Wu et al., 2017). The link between children and adolescents' sedentary behavior (in particular screen time) and poor mental health is also well-documented (Carson et al., 2016; Hoare et al., 2016; Suchert et al., 2015).

Recent Canadian research has reported a significant decrease in healthy movement behaviours among Canadian children and youth during the COVID-19 pandemic (Moore et al., 2020), and the results from our study suggest that this decrease should be a major concern potentially affecting children's mental health and wellbeing. To mitigate this health risk, the importance of access to outdoor spaces such as parks and playgrounds has been previously noted (Mitra et al., 2020). In our study, access to outdoor spaces to play or exercise (in addition to access to quality indoor spaces) was significantly associated with better pandemic-time SWB. These findings reemphasize the need for considering potential benefits of access to schools, parks, playgrounds and other shared outdoor spaces for children and youths' physical and mental health, when formulating public health policies around physical distancing. Marginal, low-income and socially disadvantaged neighbourhoods may particularly benefit, as access to outdoor spaces and spaces to gather may provide the vital social safety net for many children and youth living in these communities. In the longer term, the provision of quality open spaces should be an important consideration in the planning and design of healthy, resilient and equitable communities.

The generalizability of results is limited by the data. First, the sample (i.e., participants in the survey) is representative of Canadian provincial distribution of population and income, but the details of the people who declined to participate was not available, and as a result, any potential response bias remains unknown. Second, the online survey reported emotional changes based on recall questions, instead of longitudinally tracking the emotional state of children and youth. It is difficult to conclusively determine the presence or the magnitude of recall bias in self-reported SWB indicators; some research suggests that people over- or underestimate their past emotions, others find the self-reports to be accurate (Ottenstein and Lischetzke, 2020). However, the respondents are likely good judges of whether they feel better or worse relating to their emotional state during the pandemic, which is what we examined. We also acknowledge that some responses may be less reliable than others. For example, children tend to over-report boredom, which some of them may not perceive as an "unpleasant" feeling as hypothesized in the theorization used in this paper. Third, while our SWB measure is theoretically robust, and the survey questions relating to SWB were built upon established psychological construction of emotions (Russell, 1980, 2003), the broader scope of the online survey prevented us from using a validated SWB instrument. Lastly, the absence of detailed location data was a barrier to conduct neighbourhood-level analysis. Despite these limitations, the paper begins to provide novel insights in the absence of research focusing on children and youth's pandemic-time SWB, and future research can build on this study to advance our understanding of this topic.

5. Conclusions

This study explores children and youths' SWB during the COVID-19 pandemic and also provides novel insights into the social and environmental correlates of low SWB (compared to pre-pandemic time). The results indicate that at the height of the wave one of the ongoing pandemic (spring 2020), many children and youth were bored and worried. At the same time, many self-reported that they felt calmer and more rested. Nearly half of surveyed children and youth self-reported patterns in changes in their emotional state that may contribute to low levels of SWB. Having access to friends, indoor and outdoor spaces/ places to play and exercise, and healthy movement behaviours during the pandemic were correlated with improved SWB outcomes.

The results emphasize the importance of access to community spaces (which may include school, parks or playgrounds) to maintain good mental health, and may inform public health policy focusing on physical distancing during the ongoing COVID-19 pandemic and future health

Table 3

Correlates of Low Pandemic-time SWB (i.e., Membership to Class 1): Results from Binomial Logistic Regression (n = 800).

	OR	95% CI	p
<i>Socio-demographic characteristics</i>			
Parent age: 35 to 44 years (ref: less than 35 years)	1.17	0.70–1.95	0.549
Parent age: 45 years or more (ref: less than 35 years)	1.09	0.65–1.86	0.730
Family structure: two parents (ref: single or separated)	0.78	0.52–1.10	0.149
More than one child in household (ref: one child)	1.23	0.89–1.70	0.205
Household income: less than \$50,000 (ref: \$50,000 to \$100,000)	1.09	0.69–1.72	0.710
Household income: more than \$100,000 (ref: \$50,000 to \$100,000)	1.04	0.74–1.46	0.822
Child's ethnicity: BIPOC (ref: White European descent)	0.81	0.58–1.11	0.192
Child's age: 12 to 15 years (ref: 9 to 11 years)	1.06	0.77–1.47	0.728
Child's gender: girl or other (ref: boy)	1.11	0.81–1.51	0.504
<i>Social and Physical Environment</i>			
Income change had a little impact on meeting household needs (ref: no change in income or no impact)	0.75	0.53–1.06	0.103
Income change had major impact on meeting household needs (ref: no change in income or no impact)	0.94	0.60–1.48	0.787
Have a friend to share feeling (ref: no)	0.65	0.45–0.94	0.023
Have an adult family member to share feeling (ref: no)	1.06	0.60–1.86	0.840
Enough places/spaces to play/exercise: both outdoor and indoor (re: no outdoor or indoor places)	0.46	0.27–0.77	0.004
Enough places/spaces to play/exercise: outdoor but not indoor (re: no outdoor or indoor places)	0.68	0.33–1.41	0.303
Enough places/spaces to play/exercise: indoor but not outdoor (re: no outdoor or indoor places)	0.47	0.24–0.90	0.024
Medium size municipality (ref: small municipality)	1.14	0.72–1.82	0.571
Large municipality (ref: small municipality)	1.06	0.73–1.55	0.755
<i>Healthy Movement Behaviours</i>			
More physical activity during pandemic (ref: same as before)	0.76	0.47–1.23	0.262
Less physical activity during pandemic (ref: same as before)	1.54	1.05–2.28	0.028
More screen time during pandemic (ref: same as before)	3.19	1.86–5.66	<0.001
Less screen time during pandemic (ref: same as before)	0.94	0.27–2.88	0.922
More sleep during pandemic (ref: same as before)	1.09	0.77–1.56	0.614
Less sleep during pandemic (ref: same as before)	1.24	0.70–2.23	0.461
Better sleep quality during pandemic (ref: same as before)	0.69	0.43–1.10	0.121
Worse sleep quality during pandemic (ref: same as before)	1.55	1.10–2.20	0.013
Intercept	0.61	0.23–1.59	0.313

NOTE: Null deviance: 1108.3 (df = 799); Residual deviance: 1002.7 (df = 773); AIC: 1056.9

Coefficients in **bold** are significant at $\alpha = 0.05$.

emergencies, but more generally to mental and physical health promotion strategies and planning for healthy communities.

CRedit authorship contribution statement

Raktim Mitra: Conceptualization, Methodology, Formal analysis, Writing - review & editing. **E. Owen D. Waygood:** Conceptualization, Writing - review & editing. **Josh Fullan:** Data curation, Writing - review & editing.

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.

Acknowledgement

This study was funded by a Ryerson University Faculty of Community Services (FCS) Seed Grant.

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