Parents' Perception of Neighbourhood Environment as a Determinant of Screen Time, Physical Activity and Active Transport

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ABSTRACT

Objective: To study the importance of parents' perception of neighbourhood environment for health behaviours such as screen time, physical activity, and active transport in a Canadian context.

Methods: As part of the REAL Kids Alberta project, 3,421 grade five students from 148 randomly selected schools in Alberta and their parents were surveyed in the spring of 2008. Physical activity was assessed by self-report using an adapted version of the Physical Activity Questionnaire for Older Children (PAQ-C). Screen time and active transport (walking and biking) was assessed by parent proxy reports. Parents were also surveyed on their perception of their neighbourhoods. These responses were reduced to three components (satisfaction/services, safety, sidewalks/parks) through principal component analysis. Subsequent multilevel logistic regression analyses were conducted to quantify the associations of these principal neighbourhood components with screen time, physical activity, and active transport.

Results: Children residing in neighbourhoods with good satisfaction/services and sidewalks/parks were significantly more likely to engage in 2 hours or less of screen time and to be physically active. Children in neighbourhoods with good sidewalks/parks were also more likely to engage in active transport to and from school. However, perceived neighbourhood safety had little impact on activity.

Conclusion: The findings suggest physical activity and active transport may be increased and sedentary behaviours reduced through 1) increasing access to parks, playgrounds, and play spaces, 2) increasing access to sports and recreation programs, and 3) provision of sidewalks such that children and youth can walk or bike to school.

Key words: Obesity; childhood obesity; neighbourhood environment; screen time; physical activity; active transport; public health

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

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Based on the 2004 Canadian Community Health Survey, 26% of children in Canada and 22% of children in Alberta between the ages of 2 and 17 are overweight or obese.[1] These rates are alarming primarily because of the health implications (e.g., type 2 diabetes, high blood pressure, etc.) that arise due to the deposition of excess adiposity.[2] Various health behaviours have been linked to childhood obesity,[3,4] which has stimulated research on the determinants of these health behaviours. However, a better understanding of the determinants of health behaviours such as physical activity, active transport (walking and biking), and being sedentary will allow for targeted public health actions.

Recent research examining neighbourhood factors such as safety, crime, traffic, walkability, and access to parks, playgrounds and recreational facilities as potential determinants of these health behaviours[5-16] reports mixed results. For example, some studies found that higher neighbourhood safety, good accessibility to facilities and sidewalks, lower traffic, as well as lower crime rates were significantly associated with increased physical activity, increased active transport, or decreased screen time in children.[5-9,11,13-17] In contrast, other studies did not find significant associations between characteristics of the neighbourhood environment and health behaviours.[5-7,10,12-14] For example, Romero et al. found that perceptions of more neighbourhood hazards such as presence of crime, gangs, traffic was associated with increased levels of physical activity.[12]

Of the few studies involving parents' perception of neighbourhood characteristics,[5-7,13-16] the majority found associations between neighbourhood environment and physical activity of children. Two Canadian studies showed that children are more active if parents perceive good access to recreation facilities in their neighbourhood.[15,18] Parents' perception of neighbourhood characteristics may be particularly relevant to studies among children as parents usually decide whether their child is allowed to play outside, walk or bike to school, use neighbourhood recreational facilities, and watch TV.[7,13,14] Where the majority of studies to date pertaining to parents' perceptions of neighbourhoods focused on children's physical activity levels, more research is needed to guide public health action and specifically identify activity behaviours. By increasing this understanding, more appropriate and effective preventive programs can be designed to promote activity and to combat the childhood obesity epidemic.[19] Therefore, the purpose of this study was to examine whether parents' perceptions of neighbourhood environments were associated with screen time, physical activity and active transport among grade five Canadian children. Our hypotheses were that positive perceptions would be associated with

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Conflict of Interest: None to declare.

Table 1. Neighbourhood Perceptions, Eigenvalues (EV), and Factor Loadings from the Principal Component (PC) Analysis of Parents Participating in the REAL Kids Alberta Survey

	Agree with Statement (%)	PC 1: Satisfaction/ Services (EV 2.09)	PC 2: Safety (EV 1.68)	PC 3: Sidewalks/ Parks (EV 1.35)
I like where I live.	(95%)	0.55	-0.04	-0.21
It is safe for children to play outside during the day.	(93%)	0.39	-0.31	-0.16
In my neighbourhood there are good parks, playgrounds, and/or places to play.	(85%)	0.17	-0.17	0.51
In my neighbourhood there are sidewalks on most of the streets.	(84%)	-0.05	0.02	0.79
Traffic makes my neighbourhood an unsafe place for my child.	(33%)	0.09	0.67	-0.09
Crime makes my neighbourhood an unsafe place for my child.	(21%)	-0.04	0.62	0.05
My grade five child has good access to sports and recreation.	(90%)	0.52	0.09	0.11
I have good access to stores to purchase fresh fruits and vegetables.	(95%)	0.49	0.18	0.16

increased physical activity and active transport, and decreased sedentary behaviour among children.

METHODS

Study design

Data for the current study comes from the Raising healthy Eating and Active Living Kids in Alberta (REAL Kids Alberta) study, a large population-based survey on health, nutrition, physical activity, and lifestyle factors among grade five students and their parents in the province of Alberta. The study employed a one-stage stratified random sampling design and the sampling frame included 90% of all elementary schools in Alberta.[20] Schools were stratified into three geographies: 1) urban: Calgary and Edmonton; 2) towns: other municipalities with more than 40,000 residents; and 3) municipalities with less than 40,000 residents. Schools were then randomly selected within each of these strata to achieve a balanced number of students in each stratum. Of the 184 invited schools, 148 (80.4%) participated in the study and of the 5,594 eligible students in those 148 schools, 3,421 (61.2%) students and their parents participated. The analyses in the present study are restricted to those 3,028 subjects (88.5%) with complete information on screen time, physical activity, active transport and each of the questions on neighbourhood perception completed by their parents.

The study consisted of students and parents responding to questionnaires that are available at the projects' website: www.REALKidsAlberta.ca. The parents completed a questionnaire at home that included questions on socio-demographic factors, parents' perceptions of their neighbourhood, parental physical activity, and the frequency of their child's physical and sedentary activities. The students completed questionnaires at school that assessed physical activity, diet and self-efficacy for physical activity and healthy eating.[21] Research assistants administered the student questionnaires and measured students' height and weight using calibrated stadiometers and scales.

Outcomes

Screen Time

The students' screen time was assessed by proxy reports completed by a parent. Computer/playing video games and watching TV outside of school hours were assessed separately. Response options for both questions were measured on a 4-item scale (less than 1 hour a day, 1-2 hours a day, 3-4 hours a day, 5 or more hours a day). These were validated questions taken from the National Longitudinal Survey of Children and Youth (NLSCY).[22] Responses for both questions were recoded into the estimated actual number of hours by taking the midpoint of the responses (i.e., 0.5, 1.5, 3.5, or 5.5 hours, respectively), and both numbers were added up. The resulting number was then dichotomized as "high" if a child had a reported screen time of more than 2 hours, or as "normal" if the reported screen time was 2 hours or less, based on recommendations from the Canadian and American Pediatric Associations.[23,24]

Table 2. Socio-demographic Characteristics of 3,028 Grade 5 Students Participating in the REAL Kids Alberta Survey

Characteristic	%
Female gender	52
Parental education	
Secondary or less	26
College	40
University	34
Household income	
<$50,000	23
$50,001-$75,000	17
75,001-$100,000	22
>$100,000	38
Screen time ≤2 hours/day	59
Physically active	27
Uses active transport to/from school	39

Physical Activity

Parents and students responded to activity questions on: a) travel to and from school; b) time spent to get to and from school; c) frequency of child's activities outside of school hours; d) activities at morning and lunch recess in the past seven days; and e) frequency of involvement in sports and physical activities in the past seven days. These questions, totalling 29 items, were for the most part adopted from the Physical Activity Questionnaire for Children (PAQ-C) which has previously been validated and demonstrated high reliability.[25,26] The 29 items were the basis of a composite score ranging from 1 to 6. Participants with a score exceeding 3 were classified as 'physically active'.[27]

Active Transport

The student's mode of transport to and from school was assessed by parent proxy report. Parents were asked, "Please indicate how your grade five child usually travels to and from school?" Five response options for both to and from school were given including: school bus, city bus, walks/bikes, driven, or other. Transport was categorized as "active" if the child walked or biked to and from school.

Perceptions of Neighbourhood Environment

The main exposure of interest was parental perception of their neighbourhood. Parents were asked 8 questions (see Table 1) about various aspects of the area they live in. Response options for all items were measured on a 4-item scale including "strongly disagree", "disagree", "agree" and "strongly agree". A validation study has demonstrated excellent item correlation for each of these questions.[28] Furthermore, parental reporting of neighbourhood characteristics has shown to be a reliable approach.[29]

Table 3. Associations (Odds ratios [OR] and 95% confidence intervals [95% CI]) of Parental Neighbourhood Perceptions with Their Child's Screen Time, Physical Activity, and Use of Active Transport

	Screen Time ≤2 Hrs OR (95% CI)	Physically Active OR (95% CI)	Uses Active Transport OR (95% CI)
Satisfaction/services			
Low	1.00	1.00	1.00
Middle	1.41 (1.18-1.67)	1.29 (1.02-1.64)	0.97 (0.75-1.24)
High	2.04 (1.71-2.45)	1.72 (1.32-2.24)	0.97 (0.76-1.24)
Safety			
Low	1.00	1.00	1.00
Middle	1.24 (1.02-1.50)	0.90 (0.70-1.17)	1.02 (0.82-1.28)
High	1.15 (0.92-1.44)	0.80 (0.60-1.08)	0.88 (0.68-1.14)
Sidewalks/parks			
Low	1.00	1.00	1.00
Middle	1.22 (0.99-1.51)	1.13 (0.86-1.48)	1.37 (1.04-1.79)
High	1.35 (1.07-1.71)	1.45 (1.12-1.89)	1.50 (1.07-2.10)

Note: Odds ratios are adjusted for gender, geographic region, household income, and parental education.

Household Income

Household income was collapsed from a 7-level to a 4-level categorical variable: $50,000 or less, $50,001-$75,000, $75,001-$100,000, or more than $100,000.

Parental Education

Highest educational attainment was collapsed from a 6-level to a 3-level categorical variable: secondary school or less, college, or university.

Statistical analysis

Principal Components Analysis with varimax rotation was employed for item reduction of the 8 neighbourhood perception questions. Three components with an eigenvalue >1 were identified (Table 1): satisfaction/services (strongest loadings from Q1, Q7, and Q8); safety (strongest loadings from Q2, Q5 and Q6); sidewalks/parks (strongest loadings from Q3 and Q4). The scores for each component were calculated and divided into tertiles. The three components explained 64% of the total variance.

A series of weighted logistic random effects models with "school" as the random factor was used to assess the relationship between the principal neighbourhood components and screen time, physical activity, and transport to/from school, respectively. Based on existing knowledge of confounders, regression models were adjusted for gender, geographic region, income, and education. The regression models were also weighted so that estimates apply to the population of grade five students of Alberta. The study, including data collection and parental informed consent forms, was approved by the Health Research Ethics Board of the University of Alberta.

RESULTS

Fifty-nine percent of grade five students in Alberta engaged in 2 hours or less of screen time a day, 27% of the grade five students was classified as physically active, and 39% used active transport to and from school (Table 2).

In the fully adjusted regression models, children living in neighbourhoods with high perceived satisfaction/services were significantly more likely to engage in 2 hours or less of screen time and be physically active compared to those in low perceived satisfaction/services neighbourhoods (Table 3). Children from neighbourhoods with high perceived sidewalks/parks were significantly more likely to engage in 2 hours or less of screen time, be physically active, and engage in active transport compared to those from low perceived sidewalks/parks neighbourhoods. Perceived neighbourhood safety had little or no impact on children's screen time, physical activity, and active transport (Table 3).

DISCUSSION

We examined whether parents' perceptions of neighbourhood environment were associated with their children's screen time, physical activity and school transport behaviours in a large sample of grade five children in Alberta. We observed that high satisfaction/services and good sidewalks/parks in one's neighbourhood were associated with less screen time and more physical activity. Neighbourhoods with good sidewalks/parks were also associated with increased active transport to and from school. These Canadian observations are consistent with the international literature. For instance, two reviews on the influence of physical environments on children's health behaviour found positive associations between children's physical activity and each of: access and availability of recreation facilities, spending on public recreational infrastructure, and transport infrastructure.[7,13] For example, Jago et al., in one of the few studies to examine both physical activity and sedentary behaviour, found that good sidewalks characteristics were negatively associated with minutes of sedentary behaviour and positively associated with minutes of light-intensity physical activity.[8] As well, Mota et al. reported that perceived aesthetics of a neighbourhood was related to increased physical activity.[9] Perceived aesthetics may be related to perceived satisfaction with one's neighbourhood.

We observed no substantial associations between neighbourhood safety and children's physical activity, screen time, or active transport behaviours. These findings are also consistent with the literature.[7,10,12,14] For example, Motl et al. found that neighbourhood safety did not have cross-sectional or longitudinal effects on youth's physical activity.[10] Similarly, the two reviews on the influence of environment on children's physical activity both concluded that the evidence does not strongly support the relationship between neighbourhood safety and physical activity.[8,15] However, one review does conclude that crime and area deprivation is negatively associated with children's participation in physical activity.[13] Few studies have examined the relationship between neighbourhood safety and screen time, although Burdette et al. found an inverse relationship between mother's perceptions of neighbourhood safety and TV viewing.[5] Therefore more research is needed on the topic of neighbourhood safety, specifically the impact on children's sedentary behaviours. As well, future research should consider examining specific aspects of safety and its impact on physical activity and sedentary behaviour.[7]

Strengths of our study include the large representative sample of grade five students and the use of validated measures and of principle component analyses to characterize neighbourhood factors. Limitations relate to proxy report which is subjective and prone to error, although we previously demonstrated that for this age group, parental proxy report is superior to child self-reports.[30] Furthermore, self- and proxy-report measures are more convenient and cost-efficient for large population-based surveys. An additional limitation is that we studied active transport without consideration of distance travelled. Finally, the cross-sectional design prevents the inference of causality among our observations.

The current findings are important to public health in Canada as they originate from a Canadian context. The findings suggest physical activity and active transport may be increased, and sedentary behaviours may be reduced through: a) increasing access to parks, playgrounds, and play spaces for children's physical activity in all neighbourhoods; b) increasing access to sports and recreation programs for children and their families in all communities; and c) when designing new neighbourhoods or maintaining and upgrading existing ones, consideration should be given to sidewalks such that children and youth can walk or bike to school. We advocate that such public health investments are evaluated on their effectiveness to build a broader evidence base for public health programs and to justify further investments.

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RÉSUMÉ

Objectif : Étudier l'importance de la perception parentale de l'environnement du quartier pour des comportements liés à la santé (le temps d'écran, l'activité physique, les transports actifs) dans un contexte canadien.

Méthode : Dans le cadre du projet REAL Kids Alberta, nous avons sondé 3 421 élèves de 5e année de 148 écoles de l'Alberta sélectionnées au hasard, ainsi que leurs parents, au printemps 2008. Le niveau d'activité physique a été auto-évalué par les sujets à l'aide d'une version modifiée du questionnaire PAQ-C (Physical Activity Questionnaire for Older Children). Le temps d'écran et les transports actifs (marche et bicyclette) ont été évalués par procuration par les parents. Nous avons également demandé aux parents quelle était leur perception de leur quartier. Ces réponses ont été réduites à trois composantes (satisfaction/services, sécurité, trottoirs/parcs) au moyen d'une analyse en composantes principales. Des analyses de régression logistique multiniveaux subséquentes ont été menées pour chiffrer les associations entre ces composantes principales du quartier et le temps d'écran, l'activité physique et les transports actifs.

Résultats : Les enfants qui vivaient dans les quartiers bien cotés pour la satisfaction/les services et les trottoirs/les parcs étaient significativement plus susceptibles de limiter leur temps d'écran à deux heures ou moins et d'être actifs. Les enfants des quartiers ayant de bons trottoirs/parcs étaient aussi plus susceptibles de faire l'aller-retour à l'école en marchant ou à bicyclette. Cependant, la perception de la sécurité du quartier avait peu d'incidence sur le niveau d'activité.

Conclusion : Ces résultats laissent entendre que l'on pourrait augmenter l'activité physique et les transports actifs et réduire les comportements sédentaires : 1) en facilitant l'accès aux parcs, aux terrains de jeu et aux aires de jeu, 2) en facilitant l'accès aux programmes de sports et de loisirs et 3) en construisant des trottoirs pour que les enfants et les adolescents puissent se rendre à l'école en marchant ou à bicyclette.

Mots clés : obésité; obésité de l'enfance; environnement du quartier; temps d'écran; exercice physique; transports actifs; santé publique