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Report prepared by:

INTRODUCTION

Childhood obesity is a critical public health issue in Canada. Nearly one-third of Canadian children are either overweight or obese [Statistics Canada, 2012]. The increased prevalence of childhood obesity has been linked to the concurrent rise of many physical health problems normally associated with adults, including Type 2 diabetes, hypertension, heart disease, and pulmonary diseases, as well as behavioural problems, negative self-esteem, anxiety, and depression [Biddle et al., 2017; CDC, 2017; Chinn & Rona, 2001; Miles, 2007; Statistics Canada, 2016; Tremblay, Katzmarzyk & Willms, 2002; Tremblay & Willms, 2000; Tremblay & Willms, 2003; Williams, Wake, Hesketh, Maher, & Waters, 2017].

The bulk of previous research on childhood obesity, physical activity, and nutrition is completed in large cities. However, children in rural and remote areas are particularly vulnerable when geographically isolated from health-promoting opportunities. The present study, Spatial Temporal Environment and Activity Monitoring (STEAM), focuses on students in rural areas in Northwestern Ontario (NWO). These findings will fill a critical ‘geographical void’ in a growing body of literature. The lack of research on rural children exists despite the fact that obesity rates are highest in Canada’s smaller cities and rural areas (Navaneelan & Janz, 2015).

In order to explore these issues a novel study methodology was used during the fall and winter of 2016. Our methodology incorporates quantitative analyses using Geographic Information Systems (GIS) to understand the distribution of opportunities for positive and negative health behaviours in local environments. More direct measures included observation and assessment of a sample of children ages 8-14 using self-report surveys, global positioning systems (GPS), accelerometers, diet & activity diaries, and focus groups. These methods will allow for interpretations of physical activity levels, dietary habits and other health behaviours across time and space.

Demographic information about the region as reported by surveyed children

<table>
<thead>
<tr>
<th>Sex</th>
<th>Grade</th>
<th>Region</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>4</td>
<td>29</td>
</tr>
<tr>
<td>Female</td>
<td>5</td>
<td>25</td>
</tr>
<tr>
<td>Female</td>
<td>6</td>
<td>29</td>
</tr>
<tr>
<td>Female</td>
<td>7</td>
<td>34</td>
</tr>
<tr>
<td>Male</td>
<td>8</td>
<td>18</td>
</tr>
</tbody>
</table>

NOTE: Quotations throughout report are taken from regional focus groups. Some details in quotes have been changed to keep students anonymous.
PHYSICAL ACTIVITY

Physical activity is any bodily movement that results in energy expenditure. This can include walking to school, participating in physical education classes, playing organized sports, or simply playing low organization games with friends. The Canadian Society of Exercise Physiology (2012), recommends that children in Canada accumulate 60 minutes of Moderate to Vigorous Physical Activity (MVPA) on a daily basis. Currently, only 9% of Canadian children are meeting the recommendation (Canadian Society of Exercise Physiology, 2012).

The physical activity break down in the region is:

**Fall**

<table>
<thead>
<tr>
<th></th>
<th>Region</th>
</tr>
</thead>
<tbody>
<tr>
<td>School Day MVPA</td>
<td>36±17</td>
</tr>
<tr>
<td>Outside of School MVPA</td>
<td>40±26</td>
</tr>
<tr>
<td>Weekend MVPA</td>
<td>83±80</td>
</tr>
</tbody>
</table>

*It is possible that the weekend MVPA is higher than expected because of two schools participating in the annual Hike for Health; but this could mean that community based activities can have positive influence on children’s MVPA.*

**Winter**

<table>
<thead>
<tr>
<th></th>
<th>Region</th>
</tr>
</thead>
<tbody>
<tr>
<td>School Day MVPA</td>
<td>28±15</td>
</tr>
<tr>
<td>Outside of School MVPA</td>
<td>22±14</td>
</tr>
<tr>
<td>Weekend MVPA</td>
<td>32±24</td>
</tr>
</tbody>
</table>

Presented in Mean Minutes ± Standard Deviation
The following charts report the frequency of and barriers to activities as reported by children.

### Activities students reported completing 3x or more per week:

<table>
<thead>
<tr>
<th>Activity</th>
<th>% of students engaging in activity 3x per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Running Games</td>
<td>46%</td>
</tr>
<tr>
<td>Martial Arts</td>
<td>2%</td>
</tr>
<tr>
<td>Swimming</td>
<td>16%</td>
</tr>
<tr>
<td>Walking</td>
<td>73%</td>
</tr>
<tr>
<td>Ice Skating/Rollerblading</td>
<td>17%</td>
</tr>
<tr>
<td>Skateboarding</td>
<td>9%</td>
</tr>
<tr>
<td>Hockey</td>
<td>25%</td>
</tr>
<tr>
<td>Baseball</td>
<td>23%</td>
</tr>
<tr>
<td>Dancing</td>
<td>17%</td>
</tr>
<tr>
<td>Biking</td>
<td>47%</td>
</tr>
<tr>
<td>Basketball</td>
<td>15%</td>
</tr>
<tr>
<td>Football</td>
<td>8%</td>
</tr>
<tr>
<td>Soccer</td>
<td>9%</td>
</tr>
</tbody>
</table>

"My idea is to make more sports in Nipigon because the only real sport there is hockey, maybe they can make a football, better soccer, better baseball."

"Cause there is an adult baseball league, but no kids baseball league."
### Barriers to activity in the neighbourhood

- **It is too far or takes too much time to get there:** 31%
- **There are no, or not enough equipment or activities I like:** 33%
- **There is not enough room for the activities I like to do:** 20%
- **There are no other kids to play with there:** 42%
- **There are no adults there to supervise:** 16%
- **I have nobody to go there with:** 36%
- **I get bullied or teased when I go there:** 9%
- **It feels unsafe because of crime (example: strangers, gangs, drugs):** 15%
- **There is too many people/it feels too crowded:** 15%
- **There is too much garbage/graffiti:** 7%

**% of students who agree:**
- At Regional Level
Parents & Physical Activity

Research has shown that parents can have an influence on the physical activity level of their children. Parents who participate and support physical activity with their children have more active children. Support can include things such as parent-child co-activity, encouragement, praise, and transportation to activities. (ParticipACTION, 2015) In Ontario, 80% of parents are physically active with their child, 86% encourage their child to walk or bike to destinations that are reasonably close, and 97% encourage their child to be physically active outdoors (ParticipACTION, 2015). Although we did not use those exact questions we did use similar questions. The answers are broken down in the following charts. One chart is reported by students and one chart is reported by parents.

- My parent(s) take part in lots of physical activities with me
  - 58%
- My parent(s) encourage me to be physically active
  - 83%

- In general, I take part in lots of physical activities
  - 74%
- I take part in lots of physical activities with my child
  - 58%
- I encourage my child to be physically active
  - 96%
- I pay for my child to take part in physical activities
  - 86%

% who agree:
- At Regional Level
ACTIVE TRANSPORTATION

Active transportation is any form of self propelled movement to get from one place to another and can include walking, biking, or scooting. Based on reported measures, 25% of 5 to 17 year olds in Canada typically use active modes of transportation (e.g., walk, bike), 58% primarily use inactive modes (e.g., car, bus), and 17% use a combination of active and inactive modes to get to and from school [subsample of 2014-2015 Physical Activity Monitor [PAM], CFLRI] (ParticipACTION, 2015). The following charts report on how students get to and from school:

*The values in these graphs add up to >100% because students were allowed to select more than one option when responding to the survey.

“I walk like after school ...because in the morning it’s too cold [to walk]”

“I would go for walks but there is nowhere to go”
If students had the choice to travel to school by any mode, they would choose:

If parents had the choice for their child to travel to school by any mode, they would choose:
Biggest barriers to active transportation as reported yes or sometimes by students

- It is too far or takes too much time: 34%
- There are not enough sidewalks: 26%
- There are not enough bike paths/lanes: 21%
- The route is boring: 23%
- It feels unsafe due to traffic on the route: 26%
- There are too many busy streets to cross: 17%
- I get too hot and sweaty: 21%
- I get too cold: 34%
- It is not fun to walk: 31%
- I have too much stuff to carry: 29%
- There is nowhere to safely leave a bike at school: 16%
- It feels unsafe because of crime (example: strangers, gangs, drugs): 21%
- I might get bullied or teased along the way: 8%
- It is easier for someone to drive me there: 52%

% of students who agree:
- At Regional Level
SCREEN TIME

Screen time is considered activities that are done in front of a screen and require very little movement or energy expenditure. These activities can include watching TV, playing on a computer, or playing video games. Recently, in Canada, guidelines have recommended that Canadian children should accumulate less than 2 hours of recreational screen time per day [Canadian Society of Exercise Physiology, 2012]. Currently, only 24% of 5 to 11-year-olds meet these guidelines [2012-13 CHMS, Statistics Canada].

**Student’s Screen Time Hours per day on a Typical School Day**

*This suggests that about 60% of the students in the region are spending too much time on screens during the school week.*

50% of students in the region have a TV in their bedroom

62% of students in the region have a TV or Tablet

50% of parents in the region reported having rules for screen time
Canada’s Food Guide recommends that children get 6-8 servings of fruits and/or vegetables per day. On average about 50% of teens aged 12-17 in Canada are eating at least 5 fruit and/or vegetables per day (Statistics Canada, 2016).

**The daily fruit and vegetable intake in the region is:**

![Graph showing daily fruit and vegetable intake]

*This suggests that almost 75% of the students in the region are not getting the recommended amount of fruits and or vegetables per day.*

“Uh my mom has a garden so I can eat, like, healthier out of her garden”

“I go to the garden because my mother asks me to go get kale and other stuff ... I be like ‘hey mom, I done’ and then she asks where the food and I say in my tummy”

“Sometimes in the summer and close to fall there is this apple tree I walk by sometimes I get an apple.”
Another nutritional concern is the intake of sugar sweetened beverages (SSB). In the U.S., 6 in 10 youth (63%) drank a sugar-sweetened beverage on a given day. On average, U.S. youth consume 143 calories from SSBs per day. These high levels of SSB consumption are concerning as they have been associated with weight gain/obesity, type 2 diabetes, heart disease, kidney diseases, non-alcoholic liver disease, tooth decay and cavities [CDC, 2017].

<table>
<thead>
<tr>
<th>Students reporting they frequently or always consumed the following:</th>
<th>% of students</th>
</tr>
</thead>
<tbody>
<tr>
<td>100% Fruit Juice</td>
<td>At Regional Level</td>
</tr>
<tr>
<td>23%</td>
<td></td>
</tr>
<tr>
<td>Fruit-Flavored Drink (like Fruitopia, Gatorade, Snapple)</td>
<td></td>
</tr>
<tr>
<td>29%</td>
<td></td>
</tr>
<tr>
<td>Milk</td>
<td></td>
</tr>
<tr>
<td>64%</td>
<td></td>
</tr>
<tr>
<td>Chocolate bars or other candies</td>
<td></td>
</tr>
<tr>
<td>21%</td>
<td></td>
</tr>
<tr>
<td>Diet or Sugar Free Pop</td>
<td></td>
</tr>
<tr>
<td>5%</td>
<td></td>
</tr>
<tr>
<td>Sweetened breakfast cereal (like Fruit Loops, Frosted Flakes)</td>
<td></td>
</tr>
<tr>
<td>29%</td>
<td></td>
</tr>
<tr>
<td>Regular Pop with Sugar</td>
<td></td>
</tr>
<tr>
<td>18%</td>
<td></td>
</tr>
<tr>
<td>Unsweetened Breakfast Cereal (like Cheerios, Rice Krispies)</td>
<td></td>
</tr>
<tr>
<td>27%</td>
<td></td>
</tr>
<tr>
<td>Potato or Corn Chips</td>
<td></td>
</tr>
<tr>
<td>22%</td>
<td></td>
</tr>
<tr>
<td>Cakes, brownies, cookies</td>
<td></td>
</tr>
<tr>
<td>13%</td>
<td></td>
</tr>
<tr>
<td>Vitamins</td>
<td></td>
</tr>
<tr>
<td>24%</td>
<td></td>
</tr>
</tbody>
</table>

“Well, like, some of my friends everyday they, like want to go to the store and get, like, junk food and stuff like that.”

“Definitely ... the convenient store [name removed] [influences what I eat], because it’s, the place has a lot of chocolate and candy and it’s really, really cheap.”
The built environment refers to the man-made surroundings that provide the setting for human activity, ranging in scale from buildings to parks. This can include things like the number of parks, street connectivity, or the access to recreation facilities that a child has [Handy, Boarnet, Ewing, & Killingsworth, 2002]. Certain built environment features have shown an association with higher levels of physical activity. For example, a study from London ON, found that children with greater access to parks around the home had significantly higher average daily MVPA during non-school hours [Mitchell, Clark, & Gilliland, 2016]. One of the major barriers to children’s physical activity is parents concern about safety. Research has found that parents who feel their neighborhood is safe results in children who are more active. The following charts describe children’s perceptions of their neighbourhoods:

**Streets in the neighbourhood**

- There are enough sidewalks on the street in my neighbourhood: 41%
- There are bicycle lanes or trails in or near my neighbourhood that are easy to get to: 47%
- There are lots of trees along the streets in my neighbourhood: 79%
- There are walking trails in or near my neighbourhood that are easy to get to: 74%
- I know a lot of people in my neighbourhood: 87%

**% of students who agree:**

- At Regional Level
Neighbourhood Safety

- There is so much traffic along the streets near my home that it is difficult or unpleasant to walk \(20\%\)
- There is so much traffic along the streets near my home that it is difficult to ride my bike or play on the street \(10\%\)
- I am worried about being or walking by myself in my neighbourhood because I am afraid of being taken or hurt by a stranger \(16\%\)
- It feels unsafe to walk with friends or siblings around my neighbourhood during the day \(5\%\)
- It feels unsafe to walk by myself in my neighbourhood during the day \(16\%\)
- Most drivers go too fast while driving in our neighbourhood \(35\%\)
- My parents or guardians are afraid that I will be taken or hurt by a stranger if I am out walking alone in my neighbourhood \(26\%\)
- There is a lot of crime in my neighbourhood \(5\%\)

% of students who agree:
- At Regional Level

The Schoolyard and Recess

- “Something for older kids because at recess we are all just standing around, but like the swings are the only things that I use but like after they’re taken down it’s just like we are standing there waiting for snow to come.”
- “We have pretty much not very many options to do in winter because we can’t throw snowballs, can’t slide on ice and I can see why but maybe more wintery activities.”
- “They used to have, uh, they used to have bins—they still have the bins—but they would have things like, soccer balls and stuff like that but they don’t have anything now, like I think they only have, like, jump rope and, like, a pylon, like why do we need a pylon?”
HEALTH RELATED QUALITY OF LIFE

Health related quality of life (HRQOL) is a common measure to assess distinct aspects of well-being, including physical, emotional, social, and school functioning. The Pediatric Quality of Life Inventory tool was used to assess these health outcomes. HRQOL can be an effective measurement in determining how different aspects of a child’s environment can influence these scores. The following charts report on the four individual measures of HRQOL as well as other summary scores as averages out of 100:

Summary Scores

78
Total QOL Summary Score
Region: 78.0

Average
Female: 79
Average
Male: 77

For more information on the methods of HRQOL measurement, please visit: http://www.pedsqol.org/
Physical Health Score

Total Score: 84
Female: 84
Male: 85

Emotional Health Score

Total Score: 72
Female: 70
Male: 74

Psychosocial Health Score

Total Score: 75
Female: 76
Male: 73

Social Health Score

Total Score: 78
Female: 80
Male: 75

School Health Score

Total Score: 74
Female: 78
Male: 68

Summary Scores averages of 100

At Regional Level
The way children perceive nature today is much different compared to generations past, and therefore it is important to update our understanding of children’s definitions and feelings towards nature (Aaron & Witt, 2011). Children interpret and experience their environments in fundamentally different ways than adults, making research on adults not applicable to child populations. Remembering that children think about the world very differently from adults is important in developing a child centred approach to exploring the connection between nature and children.

Over the past two decades, there has been growing concern over students’ lack of interaction with nature. It is widely believed that connecting children with nature can, to some degree, improve aspects of their physical health, mental well-being, and cognitive and social development (Amoly et al., 2014; Balseviciene et al., 2014; Collado & Staats, 2016; Faber Taylor & Kuo, 2006; Hartig, Mitchell, De Vries, & Frumkin, 2014; Kim, Lee, & Sohn, 2016; Taylor, Kuo, & Sullivan, 2001; Thompson Coon et al., 2011; Tucker et al., 2009; Wells, 2000).

The theme of nature was used to explore student’s perceptions and definitions of nature and their own natural environments at home and school. The hope is for this information to demonstrate the importance students place on nature and where they see the benefits of nature. This will provide policy makers and practitioners with the necessary information to support strategies and programs that facilitate student’s interaction with nature.

Below are some of the questions that were asked during the focus groups.
What comes to mind when you think of nature?

The most common response from students was describing some type of natural element, such as trees, grass, or bushes. Animals were also a very common response, in particular bears. The bush was a very common response among all participants, boys and girls.

“*Name* thinks of trees and forests and bushes and animals roaming around”

Activities including playing outside, climbing, and exploring were common responses; as well as more structured activities such as hunting and fishing.

“I usually think of, like, hunting and other outdoor activities like that”

“Exploring through paths”

Outside and specific locations or scenarios were also used to describe nature. Responses describing a certain place were commonly associated with a memory the student had.

“Beautiful place where you can hunt and fish and lots of good sites and smells”

Finally, students used feelings to define and describe nature. The large majority of responses were described in a positive manor. However, some students expressed negative feelings such as being scared or a dislike for nature.

“Everyone is so positive but I’m sitting over here like bears”

Is a plant in a classroom nature?

A large body of literature supports that views of nature in or from a classroom can be beneficial to students social and cognitive development. Understanding whether students perceive a plant in a classroom as nature is important in supporting this literature.

56% of students considered a living plant in the classroom nature; while 35% said no and 9.3% were unsure (results were similar between boys and girls). Most students who answered yes were confident in their responses, where as those who said no were somewhat apprehensive with their response.

Yes: “Because it still has the roots and it has the soil that has it outside and the dirt and all of the other things that make a plant grow and it has—you can put water on it like the trees outside with the rain”

Yes: “Because it is still a living thing. Like, it is kind of like if you have humans and you put them in the bush, they’re still humans”

No: “It’s only one plant, how’s that nature? Nature is an environment, it’s a whole, community, that’s one plant”
Where do you find nature at school? What do you use it for?

Students were able to easily describe nature that they find in and around their home environments, often including descriptions of elements outside their home property to include their neighbourhood.

Students descriptions of nature at school however, for the most part, did not identify the presence of nature on school property. Students explained how it is past the school property limit. However, when describing what they use these natural spaces for students did describe activities on school property, such as playing football or hanging out with friends. Some students also described using nature at school for learning opportunities, such as a science project or classroom activity.

“The bush right behind the boundary”

“Boundary there I said it kind of limits of what we can do with nature”

“Football, or like, soccer”

“I do like everything. I play tag in there, I play hide and go seek in there.”

“Normally not allowed [to use nature at school]”

“I’d say like a science project or something”

How does nature make you feel?

Students expressed a variety of feelings associated with nature, most often positive. Feelings associated with feeling better, calm, relaxed, thankful, and peaceful were common in females. Happy was the most common response from all students, 22 responses included this feeling. Nature also made students feel free, adventurous, and wild.

“Nature makes people happy, that’s what it sort of means”

“Sometimes emotional. Because usually when you are sad you run somewhere”

“Ah I feel really kind of adventurous, really happy and how kind of lucky I am I have that spot”

“Name thinks it relieves stress. Its nice to get out of town and have, and be able to quit worrying about stuff”

The season also changed the way some students associated feelings with nature.

“I kind of feel better but, like, it kind of depends on, like, what the environments like, so like-seeing the snow, like, its super cold I wont be focused on, like, normal nature stuff that I would be on, like, mostly I’ll just be focusing about like, how free-, how cold it is outside and how I am freezing to death ......... in the winter its just the whole time I’m just sitting outside not even thinking about how nice it is and just thinking about how freezing I am. So I prefer summer better”
Some responses were associated with negative feelings, such as feeling scared, nervous, or unsafe. These feelings were never associated with people, students felt this way towards nature due to the presence of animals, inclement weather, and being alone.

“Sometimes it makes me feel nervous if I’m like going through a trail to get to someone’s house like sometimes it makes me feel nervous. Especially if it’s a bit later in the day”

“I feel happy because I like being outside and I also feel nervous because of scary animals and storms and stuff”

**What are the benefits of nature?**

Students had no trouble understanding what was meant by benefit of nature. The most popular response was benefits related to physical health, such as breathing, fresh air, getting exercise, sleep, and medicine.

"It’s good because you get fresh air, and you get to be active."

Another important topic that came up was nature’s ability to take students away from electronics; however, this was only mentioned by three students.

“Uh, it gets you away from electronics”

Some students did identify mental health benefits associated with being in nature, including nature’s ability to make you feel relaxed, good about yourself, and calm.

“It makes kids feel good about themselves and happy”

“It’s really relaxing and it’s nice to have somewhere to get away from the town or city that you live in, to get away from all the people who are bugging you”

Students also discussed how nature can provide them with resources, such as water and food.

“It makes a lot, it provides us like a lot of things. And lets us use wood and it also gives us food”

Very few students thought that there was no benefits to nature.

“I don’t think its any difference then your house because when you go up to go get the channel changed or you’re still walking with the remote, and when you’re outside your still walking too”

The purpose of exploring students’ perceptions and definitions of nature is to provide policy makers, parents, teachers, school boards, and others, information that can help to promote and facilitate children’s daily contact with nature. These focus groups have the potential to influence how adults place importance on children’s interaction with nature as well as help to inform the design of outdoor programming and spaces for youth.
STEAM 2016
THANK YOU FOR YOUR SUPPORT

We, the researchers at the Human Environments Analysis Laboratory would like to offer our sincere thanks to all of our friends in Nipigon, Red Rock, and Dorion, Ontario. It is because of the support for this project from the students, teachers, principals, administrative staff, and families, that we were able to complete this valuable work. Thank you for welcoming us into your communities, and demonstrating true Canadian hospitality.

Your students join over 850 children in Ontario who have participated in the STEAM project. This research allows us to understand how the physical environment (both natural and human-made elements) impacts health behaviours among elementary-school children. Our goal was to map how the environments are actually experienced and used by your students, to determine if these environments have an effect on children’s overall well-being. In doing so, we have aimed to provide research based evidence for your school communities to create local environments that contribute positively to children’s health and quality of life. We hope this report will allow your school to take action on the issues that are most important to your community.

This report was prepared by Brenton Button, Leah Taylor and Suzanne Tillmann under the supervision of Dr. Jason Gilliland of the Human Environments Analysis Laboratory (HEAL) at Western University. We also wish to thank HEAL field assistants Ali Goodbaum, Kate Schieman and Cara McGuire.
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