

# TOPO



SUMMARIES BY THE NUTRITION • PHYSICAL ACTIVITY • WEIGHT TEAM

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## In this issue

### The neighbourhood

### The school

### The childcare setting

And answers to these questions

- What opportunities provided by the built environment promote physical activity by young people?
- What characteristics of the built environment promote a physically active lifestyle among young people?
- What interventions addressing the built environment have been already implemented in Québec and elsewhere in the world?

## What is TOPO?

The *TOPO* collection is produced by the multidisciplinary team on nutrition, physical activity, and weight-related problems prevention (*Nutrition, activité physique et prévention des problèmes reliés au poids* or NAPP)<sup>1</sup> at the Institut national de santé publique du Québec (INSPQ). The collection disseminates knowledge to inform the choices of practitioners and decision makers in the prevention of weight-related problems. Each issue addresses a theme and combines a critical analysis of the relevant scientific literature with observations or illustrations that can assist in applying this knowledge in the Québec context. The *TOPO* collection may be found at <http://www.inspq.qc.ca/topo>.

<sup>1</sup> The NAPP team is mandated to develop expertise on the issue of weight to support and assist the public health network's efforts in this field. The NAPP team is part of the Habitudes de vie et lutte au tabagisme unit, in the Direction du développement des individus et des communautés of the INSPQ.

## Built Environment and Physical Activity Among Young People

Numerous health benefits for young people are associated with regular physical activity. These benefits include better weight control, cardiovascular health, and school performance.<sup>(2)</sup> Young people have lots of opportunities to be physically active in their daily lives. Participating in organized sports activities, physical education classes in school, active transportation to and from school, and active outdoor play are good examples.



Photo: Sherbrooke University

The built environment of cities and villages is a determinant of physical activity.

What incites young people to be on the move and seize opportunities to be physically active? Physical activity is affected by individual, socio-cultural, environmental, and political factors. As indicated in the largest circle in Hume's model (Figure 1 on the following page), the built environment in various settings frequented by young people, i.e. their neighbourhood, school, or childcare setting, is an important determinant of physical activity.

### A few definitions

**Promising action:** Action consistent with current scientific knowledge on weight-related problems, but whose effectiveness has not been shown yet.

**Built environment:**<sup>(1)</sup> Includes our homes, schools, workplaces, parks, business centres, and roads. It extends overhead in the form of hydro lines, underfoot in the form of landfill sites and subway cars, and from one end of the country to the other in the form of highways.

Composed of all the buildings, spaces, and products that have been created or modified by people, it undeniably has an impact on our health and quality of life.

**Active play:** Fun, informal activity, less structured and less competitive than team sports, organized sports, or physical education classes.

**Traditional urban form:** A traditional urban form can be defined as a location with significant residential density, mixed land use (residential, commercial, civil...), and interconnected streets.

**Active transportation:** Any type of human-powered transportation: walking, cycling, rollerblading, skateboarding, etc.

## Place of residence

Young people's place of residence provides them with numerous opportunities to be physically active during their leisure time and travels. It provides the potential for active outdoor play while being a place to socialize with other children and be in touch with nature. Spending lots of time outdoors has been positively associated with physical activity among children.<sup>(5,6)</sup> Active play is a way for younger children (who are often less involved in structured activities) to attain the levels of physical activity required and to do so in a financially affordable manner.

The built environment of the neighbourhood can promote physical activity during young people's travels. School is a daily destination, and engaging in active transportation to get there is a practical, low-cost method to be on the move. According to recent studies, young people travelling to school on foot or by bike engage in more moderate to vigorous physical activity per day than other children.<sup>(7)</sup>

### CHARACTERISTICS OF THE BUILT ENVIRONMENT IN NEIGHBOURHOODS ASSOCIATED WITH PHYSICAL ACTIVITY

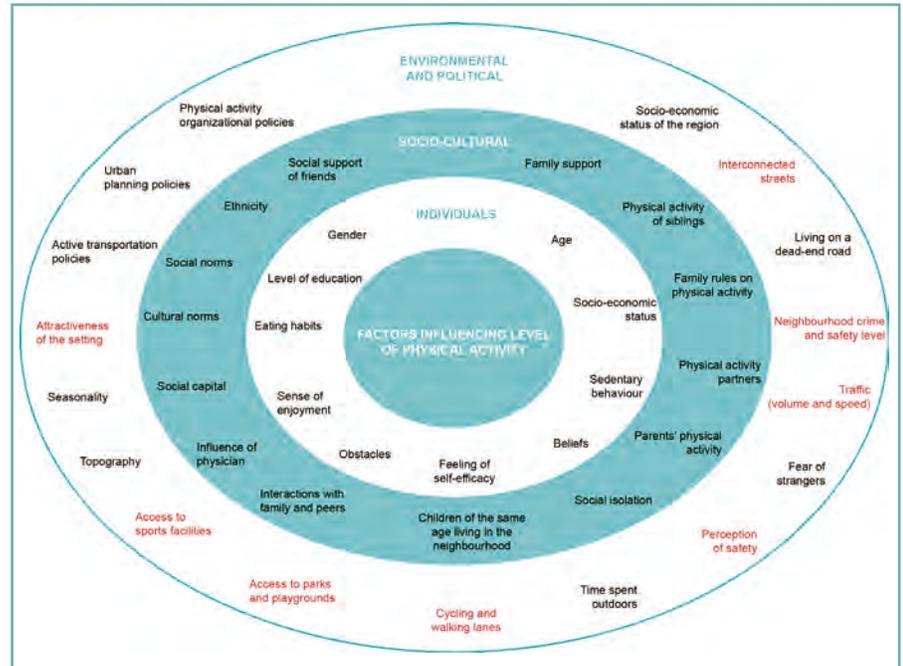
#### The number and accessibility of recreational and sports facilities

A definite way to encourage young people to spend more time in the fresh air and to be physically active outdoors is to provide them with suitable locations to do so. Some scientific studies have demonstrated an association between the number and accessibility of recreational and sports facilities (parks, playgrounds, pools, arenas, sports centres...) on one hand, and the prevalence of obesity and physical activity among young people on the other. An association has also been observed between the proximity of the place of residence to recreational and sports infrastructure (parks, playgrounds, pools, arenas, sports centres...) and physical activity among young people (Table 1).

#### FOR MORE INFORMATION

Bergeron, P. and Reyburn, S. (2010). *L'impact de l'environnement bâti sur l'activité physique, l'alimentation et le poids*. Montréal, Québec. Institut national de santé publique du Québec.

Figure 1 Main determinants of physical activity among young people



Source: Hume's model, adapted from Davison and Birch.<sup>(4)</sup>

#### The possibility of using non-motorized transportation

Certain characteristics of the built environment can have a positive impact on the adoption of active transportation by young people. The proximity of the place of residence to various destinations (school, recreational and sports facilities, stores...) has been identified as the factor having the greatest impact on engaging in active transportation. This proximity depends on the urban form, which can be traditional or suburban in style.

Finally, the presence of non-motorized transportation infrastructure also seems to be an important factor influencing the adoption of active transportation by young people (Table 1).

#### TO BE SUFFICIENTLY ACTIVE...

Canadian public health authorities recommend that young people 5 to 17 years of age engage in 60 minutes of moderate to vigorous physical activity per day. Ideally, these sessions should include vigorous activities at least three days per week and muscle- and bone-strengthening activities also three days per week.

A physical activity volume below 60 minutes per day can lead to certain health benefits for physically inactive young people.

- Moderate intensity activities: Walking briskly, cycling (15 km/h), skateboarding.
- Vigorous activities: Basketball, cycling (20 km/h), ice hockey.

**Table 1 Characteristics of the built environment in neighbourhoods positively associated with physical activity or body weight among young people**

Characteristics of the built environment	Statistically significant associations
Number of recreational and sports facilities	<ul style="list-style-type: none"> <li>Associated with a reduction in excess weight among adolescents<sup>(8)</sup></li> </ul>
Accessibility of recreational and sports facilities	<ul style="list-style-type: none"> <li>Associated with greater physical activity by children and adolescents<sup>(9)</sup></li> </ul>
Proximity of place of residence to various destinations (school, recreational and sports infrastructure, stores, etc.)	<ul style="list-style-type: none"> <li>Associated with greater engagement in active transportation by children and adolescents<sup>(9, 10, 11)</sup></li> </ul>
Presence of non-motorized transportation infrastructure (sidewalks, bike paths, hiking trails)	<ul style="list-style-type: none"> <li>Associated with greater engagement in active transportation by children and adolescents in the case of sidewalks and hiking trails,<sup>(9,11)</sup> but not in the case of bike paths<sup>(9,12)</sup></li> </ul>
More walkable neighbourhood (mixed land use, density, interconnected streets) and high number of intersections	<ul style="list-style-type: none"> <li>Associated with lower probability of being overweight or obese in girls of preschool age<sup>(13)</sup></li> <li>Associated with more walking by adolescents<sup>(14)</sup></li> </ul>
Improvement in the quality of recreational infrastructure (green spaces, playgrounds, lighting, etc.)	<ul style="list-style-type: none"> <li>Associated with greater use <sup>(16)</sup></li> <li>Associated with a rise in moderate to vigorous physical activity by visitors<sup>(16)</sup></li> </ul>

**Traffic safety in the neighbourhood**

Safety refers to various realities, in particular, road traffic, risk of injury, and criminality. Safety remains a major concern among parents and is one of the reasons most often cited for limiting outdoor play and the mobility of children who are unaccompanied. A number of elements in the built environment of neighbourhoods can have an impact on the safety of children during play and their travels.

It would seem logical that on school routes, traffic calming measures and safer intersections, adequate lighting, and street maintenance would promote active transportation. Conversely, routes perceived as dangerous (lots of vehicle traffic, speed, several road arteries to cross) could discourage engagement in active transportation, to get to both school and other usual destinations. However, research data do not currently allow us to confirm the consistency of these associations.

**INTERVENTIONS TO MODIFY THE BUILT ENVIRONMENT IN NEIGHBOURHOODS**

**In the United States**

In 2005, the *California Safe Routes to School* project received significant government grants to modify the environment to make the routes taken by school children safe. The renovations undertaken consisted of building sidewalks and bike paths, and installing traffic lights and pedestrian crossings on certain school routes to encourage the active transportation of students to school. Once the changes were made, surveys were conducted among the parents of children from 10 schools, and there was a significant improvement in the active transportation habits of the children who took a modified route.<sup>(15)</sup>

In 2006, two parks located in San Francisco in the United States were renovated (ground cover, lighting, fencing, landscaping, benches, soccer nets, walking trail...), and four times more visitors frequented them. Increases in physical activity (of moderate to vigorous intensity) among visitors were noted.<sup>(16)</sup>



The presence of non-motorized transportation infrastructure appears to be an important factor influencing the adoption of active transportation among young people.

## Built environment and neighbourhood

### THREE PROMISING ACTIONS

The neighbourhood provides young people with numerous opportunities to be physically active, during both their leisure time and travels.

- By providing access to numerous sports and recreation infrastructure (parks, playgrounds, pools...), the built environment stimulates active play outdoors, an important source of physical activity among the younger set. Active play outdoors has the advantage of being fairly inexpensive, not being based on competition, and encouraging contact with nature and socialization with other children.
- When there is close geographical proximity between place of residence, school, stores, and sports facilities among others, the built environment promotes active transportation among young people. Traveling on foot or by bike, to school in particular, is an important source of physical activity for children and adolescents.
- By providing non-motorized transportation infrastructure (sidewalks, bike paths), adequate lighting on streets and in parks, good park maintenance, appropriate equipment on playgrounds, as well as traffic calming measures and safer intersections, the neighbourhood built environment can constitute an attractive, safe setting that promotes physical activity among young people.

#### FOR MORE INFORMATION

Robitaille, É. (2009). *Indicateurs géographiques de l'environnement bâti et de l'environnement des services influant sur l'activité physique, l'alimentation et le poids corporel*. Montréal, Québec. Institut national de santé publique du Québec.

### In Québec

Interventions are being undertaken in Québec as well. As an example, we cite the municipality of Ville-Marie in Abitibi-Témiscamingue. Several years ago, residents expressed the need for a bike path to make cycling safer. A 4-km trail within town limits was proposed by a work committee. The town promptly invested the funds needed to build it, and the immediate popularity of this bike path confirmed the necessity of this intervention.

In Sherbrooke, the Lac-des-Nations promenade is a multipurpose path, nearly 3.5 km long, encircling the lake and serving as a pedestrian and bike trail, enhanced by attractive landscaping. In winter, the entire path is groomed and lit, and a 1.5 km skating path is created. The lighting provides a feeling of safety that promotes accessibility, even in the evening.

Guides have been published to support active transportation interventions. In fact, a guide entitled *Redécouvrir le chemin de l'école* has just been produced by the Ministère des Transports and will certainly encourage schools, school boards, and municipalities to improve built environments to support and promote active transportation among Québec's school children. This guide complements one previously produced by Vélo-Québec, which supports school communities wanting to promote active transportation among school children by implementing the *On the Move to School* project. About 85 Québec schools, of which nearly half are on the Island of Montréal, are now participating in the program.

**Table 2 Characteristics of the built environment in neighbourhoods inconsistently associated with physical activity or body weight among young people**

Characteristics of the built environment	Inconsistent associations
Road safety in the neighbourhood (number of streets to cross, traffic, lighting, etc.)	<ul style="list-style-type: none"> <li>• Inconsistently associated with engagement in active transportation by children<sup>(10,12)</sup></li> <li>• Inconsistently associated with physical activity by children<sup>(9)</sup></li> </ul>

## The school

Schools offer young people numerous opportunities to be physically active, during both physical education classes and breaks as well while traveling there and back. Given their educational mission, school environments are the perfect places to introduce young people to the benefits of physical activity. Schools provide students with time for physical activity, qualified personnel, infrastructure, and equipment. Young people are in contact with their peers, an important source of motivation for physical activity, especially among adolescents.<sup>(17)</sup> Although suitably designed indoor stairs and gymnasiums promote physical activity, researchers have recently devoted their attention to schoolyard design.

### CHARACTERISTICS OF THE BUILT ENVIRONMENT IN SCHOOL SETTING ASSOCIATED WITH PHYSICAL ACTIVITY

#### A schoolyard

In Canada, children spend an average of 110 minutes per day in the schoolyard, i.e. 25% of their school day.<sup>(18)</sup> Considering the fact that children go to school roughly 200 days per year, there is no doubt that the schoolyard is a key milieu for intervention. The vast majority of Canadian schools have paved yards. This permits a very limited variety of physical activity, mostly based on team sports and resulting in vigorous physical activity. However, this type of activity does not correspond with the interests and abilities of all children and would limit their physical activity.<sup>(18)</sup> A schoolyard capable of accommodating a larger range of physical activities would foster a physically active lifestyle. In fact, a well-designed, safe, green schoolyard could lead to physical activity both during class time (physical education classes and breaks) and afterwards.

It would seem that young people are more physically active in a green schoolyard. This type of design has the potential to promote diverse types of physical activity (of differing intensities) and play. Such diversity could better meet the interests and abilities of children of all ages.<sup>(8)</sup>

A Norwegian study by Fjortoft<sup>(19)</sup> sought to measure the impact of playing in a natural environment on the motor development of children five to seven years of age. This study concluded that when children could play in a natural setting, a statistically significant increase was observed in their motor skills, balance, and coordination, in comparison to a control group playing in a conventional playground<sup>(19)</sup> (Table 3).

#### A well-designed schoolyard equipped with play equipment

Children of school age are more likely to be active during breaks when they have access to lots of sports equipment (balls, etc.) and permanent structures (basketball nets and play modules). This impact is even more significant when adult monitors are present.<sup>(20)</sup>

A study by Ridgers et al.<sup>(21)</sup> sought to assess the long-term impact of an environmental intervention on the level of physical activity of elementary school children during breaks. The schoolyard was marked (divided into three zones: one for sports, one for multiple uses, and one for quiet play), permanent equipment (soccer and basketball nets, fences) and sports equipment (balls, skipping ropes...) were added. The results showed increases in moderate to vigorous activities of about 4% and in vigorous activities of over 2%, up to six months after the intervention.

Other recent studies involving the simple addition of markings and play equipment have also produced encouraging results regarding physical activity at school (Table 3).

#### Schoolyards accessible on weekends and in summer

Studies also show that providing access to schoolyards outside class hours is a way to increase the physical activity of young people in the neighbourhood, particularly in urban settings where not everyone has access to a backyard. A well-designed schoolyard could therefore be beneficial to all young people in the neighbourhood<sup>(22)</sup> (Table 3).



A well-designed schoolyard equipped with game equipment would be associated with higher levels of physical activity among elementary school children.

## Built environment and school

### THREE PROMISING ACTIONS

Schools offer young people numerous opportunities to be physically active during physical education classes and breaks as well when traveling there and back.

- By providing access to a number of sports infrastructure (gymnasium, schoolyard, pool, and others), the built environment promotes physical activity during physical education classes, both indoors and out.
- By providing access to a safe, attractive schoolyard that reflects current tastes, a school's built environment promotes physical activity in the school setting. In fact, a schoolyard could promote physical activity among young people if it is well-designed with appropriate playground markings, the addition of permanent equipment (play modules, basketball nets, fencing...), a variety of appropriate equipment (balls, hula hoops, skipping ropes...), and the presence of green zones, for example.
- By providing a schoolyard accessible on weekends and in summer, the built environment could promote physical activity among young people throughout the neighbourhood.

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**Table 3 Characteristics of the built environment in school setting positively associated with physical activity**

Characteristics of the built environment	Statistically significant associations
A green schoolyard	<ul style="list-style-type: none"> <li>• Associated with greater physical activity and more varied play by elementary school children<sup>(1,8)</sup></li> <li>• Associated with greater motor skills in elementary school children<sup>(1,9)</sup></li> </ul>
A well-designed schoolyard equipped with play equipment	<ul style="list-style-type: none"> <li>• Associated with higher levels of physical activity by elementary school children<sup>(21, 25)</sup></li> </ul>
A schoolyard accessible on weekends and in summer	<ul style="list-style-type: none"> <li>• Associated with greater physical activity by elementary school children<sup>(22)</sup></li> <li>• Associated with less frequent engagement in sedentary activities (television, video games, DVDs) by elementary school children<sup>(22)</sup></li> </ul>

### INTERVENTIONS TO MODIFY A SCHOOL'S BUILT ENVIRONMENT

#### In Canada

Knowledge on the impact that schoolyard design could have on physical activity is still very limited. However, in recent years, certain movements to redesign green spaces have emerged. This is true of **Evergreen**, a national charitable organization founded in 1991. It supports and encourages the creation of healthier Canadian cities through community-based naturalization projects in schoolyards, public green spaces, and homes. Evergreen finances "green" schoolyard projects that feature a variety of natural and built elements like shelters, gardens, trees, flowers, and ponds. The organization also seeks to promote various types of physical activity and is gradually being established in schoolyards in Québec and elsewhere in Canada.

*Tree Canada's Greening Canada's School Grounds* program is a grassroots initiative giving schools throughout the country the tools needed to improve their grounds. It provides funding for projects to "green" school grounds; promotes the establishment of partnerships among communities to lessen project costs; provides models and funding strategies; and offers information and long-term grounds management strategies. In 2009, Tree Canada projects will "green" Carrefour de Gatineau high school and the Normanville pavilion of Saint-Ambroise school in Montréal, among others.

#### In Québec

The guide, *Ma cour : un monde de plaisir !* (available in French only), was recently developed through the government's Kino-Québec program to provide training and to support elementary schools wanting to redesign schoolyards to encourage play. This guide was created after a pilot project to remodel schoolyards was carried out in 2008 in 30 French-language elementary schools in Montréal. For example, Saint-Isaac-Jogues school, which participated in the pilot project, took the initiative to create an attractive design in its schoolyard.

## The childcare setting

Childcare settings provide preschool-aged children with numerous opportunities to be physically active, during their periods of active play and supervised activities indoors and out. Most preschool-aged children in Québec attend a childcare facility. Such a setting could thus be an important vehicle to promote physical activity at a young age. A childcare setting's built environment, such as its indoor play rooms and outdoor yard, could be pleasant places for the children to feel at ease to be on the move.

### CHARACTERISTICS OF A CHILDCARE SETTING'S BUILT ENVIRONMENT ASSOCIATED WITH PHYSICAL ACTIVITY

There are few studies on factors associated with physical activity among younger children. However, it may be recalled that the time allocated for active play outdoors is associated with an increase in physical activity among children.<sup>(5,6)</sup> The type of physical activity younger children engage in differs from that of older children and primarily consists of active play. Physical activity among very young children is characterized by brief, intense periods of activity, interspersed with periods of rest. In childcare settings, the outdoor yard is the study site favoured by researchers.

#### A well-designed yard equipped with play equipment

A study by Hannon et al.<sup>(25)</sup> sought to assess whether new, assorted playground equipment appealing to children (like tunnels to crawl in, obstacles, goals, targets, balls, and hula hoops) designed as a course increased the intensity of physical activity.

The results show a significant reduction in sedentary behaviour and a considerable increase in light, moderate, and vigorous physical activity among both boys and girls.

#### A green yard

The only available study on the impact of a green yard on preschool-aged children concludes that access to a spacious outdoor yard with trees, shrubs, and uneven terrain significantly increases physical activity<sup>(26)</sup> (Table 4).



A green play yard is one of the characteristics of a young person's built environment that could have an impact on his/her physical activity.

### A supportive environment

In childcare settings in which a number of steps have been taken to make the environment more conducive to physical activity (examples: allocating time for preschoolers to be active, installing portable play equipment and/or permanent equipment, eliminating televisions, and providing physical activity training), children engage in more physical activity of moderate to vigorous intensity, spend less time engaging in sedentary activities, and are more physically active than in daycare settings where the environment is less supportive.<sup>(27)</sup>

Dowda et al.<sup>(28)</sup> have shown that an environment conducive to physical activity enabled preschool-aged children to accumulate more than 60 minutes of moderate to vigorous physical activity per day while children in a less supportive environment accumulated less than 60 minutes (Table 4).

**Table 4 Characteristics of the built environment in childcare setting positively associated with physical activity among preschoolers**

Characteristics of the built environment	Statistically significant associations
Well-designed play yard equipped with play equipment	<ul style="list-style-type: none"> <li>Associated with higher levels of physical activity by preschool-aged children<sup>(25)</sup></li> </ul>
A green yard	<ul style="list-style-type: none"> <li>Associated with more steps per minute by children 4 to 6 years of age<sup>(26)</sup></li> </ul>
A supportive environment Examples: Allocating time for preschoolers to be active, installing portable play equipment and/or permanent equipment, eliminating televisions, and providing physical activity training	<ul style="list-style-type: none"> <li>Associated with a higher level of physical activity by preschool-aged children<sup>(27)</sup></li> <li>Associated with more physical activity by preschool-aged children<sup>(28)</sup></li> </ul>

## Built environment and childcare setting

### THREE PROMISING ACTIONS

Childcare settings offer preschool-aged children numerous opportunities to be physically active, during their periods of active play and supervised activities indoors and out.

- Designing a safe, well-equipped outdoor yard is a promising environmental intervention to support physical activity in childcare settings. In fact, a well-designed yard, equipped with play modules, swings, slides, and appropriate play equipment (balls, tricycles, hula hoops...) could support physical activity among preschool-aged children.
- Creating a green yard appears to be a promising environmental intervention to support physical activity in childcare settings.
- By providing an environment conducive to physical activity (examples: allocating time for preschoolers to be active, installing portable play equipment and/or permanent equipment, eliminating televisions, and providing physical activity training), childcare settings could promote the adoption of an active lifestyle.



Photo: CPE Premier Pas

The fitness trail at the CPE Premier Pas in La Tuque could be an intervention conducive to physical activity among preschool-aged children.

## INTERVENTIONS TO MODIFY A CHILDCARE SETTING'S BUILT ENVIRONMENT

### In the United States

The impact of the built environment on the physical activity of very young children is difficult to measure at the current time. However, a number of childcare settings have not waited for results before taking action. In the state of North Carolina, the goal of the *Pre-K* program is to prepare children for school success through high-quality educational experiences at a young age. It obtains funding, provides follow-up and assessments to help childcare settings provide high-quality services, and offers information resources to professionals. Among these resources, **Outdoor Learning Environments** seeks to provide information on the benefits and learning opportunities that outdoor natural resources offer very young children as well as on ways to design play yards (<http://www.earlylearning.nc.gov/OLE/OLEhome.asp>).

### In Québec

Initiatives are also being implemented here. The Centre de la petite enfance (CPE) Premier Pas early childhood centre in La Tuque has broken new ground with its new fitness trail. Inaugurated in September 2009, its leaders describe it as:

*(Translation) A commitment to encourage physical activity among younger children from a very early age. This helps enhance their self-esteem, improve their physical and psychological well-being, expand their physical skills, counteract boredom, and offer positive leisure activities.*

(<http://www.cpepremierpas.com/index.php/sitecpe/actualites-cpe-art/inauguration-officielle-de-notre-site-culturel-et-de-la-piste-dhebertisme/>).

## Conclusion

In conclusion, it is important to remember that several characteristics related to the built environment are associated with physical activity. Although a cause-and-effect relationship has not always been established, it has been shown that the built environment plays a supportive role in physical activity. There is still insufficient evidence to be able to formulate specific recommendations on the modifications to be made to the built environment. On the other hand, it appears obvious that the development of communities conducive to active transportation, the design of schoolyards, and the greening of outdoor play yards in childcare settings are desired interventions.

We cannot insist enough on the need to conduct additional evaluative studies on interventions to the built environment to enhance our knowledge. For example, in Québec, several municipalities are renovating parks and green spaces, and it could be very interesting to study the impact of these improvements on the use of these sites, as well as on young people's physical activity and weight. Such evaluative studies should also be conducted in residential neighbourhoods, school milieus, and childcare settings.

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