TITLE:

"THEY INSTALLED A SPEED BUMP": CHILDREN'S PERCEPTIONS OF TRAFFIC-CALMING MEASURES
AROUND ELEMENTARY SCHOOLS

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ABSTRACT:

Growing scientific literature evaluates the impact of traffic-calming devices in terms of mobility
behavior and safety, but little is known about their perceived impact from the point of view of children.
Our study asks children about their perceptions of different traffic-calming measures around their
schools. It draws on data gathered through eight focus groups, followed by walking tours with Grade 6
children (11-12 years old) (n=65, 27 boys, 38 girls) from elementary schools in different urban contexts
in Quebec, Canada. Qualitative analysis of the discussions shows that a) vehicle speed is the main
perceived threat for participant children; b) children are confident about the effectiveness of self-
enforcing traffic-calming devices that reshape the street geometry; and c) they are skeptical about the
effectiveness of "informative" measures such as signs and lines (marked pavement). Our findings inform
public policy for a more effective promotion of walking and cycling among children.

1. Introduction

In light of the decline in active school transportation in North America over the last five decades (Rothman et al., 2018), the promotion of walking/cycling to school has resulted in different strategies aimed at improving the safety of child pedestrians. In fact, it was this aim that gave rise to the expression Safe Routes to School (SRTS), used for the first time in Denmark four decades ago (Jensen, 2008). The expression reappeared in the late 1990s in the U.S. and other Anglo-Saxon countries, referring to local programs promoting active modes of transportation such as walking and cycling through awareness, education, and transformation of the existing urban environment (National Center for Safe Routes to School - NCSRTS, 2016).

In the province of Quebec, where active transportation to school has decreased by 50% in the last 30 years (Québec en Forme, 2012), Vélo Québec (a non-profit organization) has been promoting walking and cycling since 2005 through the program On the Move in the Community (OTMITC). Much like the SRTS-type initiatives, OTMITC aims to increase the number of children who walk or bicycle to school. The program intends to achieve this objective by reducing parent vehicle use near schools, providing schools with fun and educational activities related to mobility and encouraging municipalities to develop public domain infrastructures that foster active transportation. In many cases, after a mobility evaluation and plan, municipalities implement traffic-calming measures on the road network surrounding the school (Vélo Québec, 2017).

The benefits of active transportation are well documented. For instance, walking or cycling to get to and from school gives children extensive knowledge of their living environment (Fusco et al., 2012;

Hörschelmann & van Blerk, 2012; Mitchell et al., 2007), fostering exploration, play and social contact, and providing children with a sense of comfort and safety outside the home and school (European Commission, 2002; Romero, 2015; Ross, 2007). In their extensive literature review, Waygood et al. (2017) found consistent research results pointing to the significant benefits of active travel and independent mobility on different dimensions of children's well-being, whereas traffic appears to be a source of negative impacts. The scientific literature emphasizes the impact of traffic-calming measures on road safety (Ewing & Dumbaugh, 2009; Retting et al., 2003), especially with regard to child pedestrians (Jones et al., 2005; Roberts et al., 1994; Tester et al., 2004). At the same time, we know very little about how pedestrian children, the main beneficiaries of these measures, actually perceive them. From the viewpoint of elementary schoolchildren, what is the impact of traffic-calming measures around their schools? How are these measures perceived in relation to their role in promoting active and safe travel? This paper provides answers to these questions, drawing on discussions with children from schools in different urban areas of the province of Quebec, Canada.

1.1. Traffic-calming measures: The importance of children's perceptions

Mobility behavior, and, specifically, active travel to school, is determined by a variety of factors, including the spatial characteristics of the environment (for reviews, see: Mitra, 2013; Lu et al., 2014; Pont et al., 2009; Rothman et al., 2014; Wong et al., 2011). Given the importance of these spatial characteristics, strategies to promote walking and bicycling often include a transformation of the pedestrian environment. In fact, recent studies have shown a significant and positive association between the implementation of traffic-calming measures and the use of active modes of transportation, particularly for children traveling to and from school (Larouche et al., 2014; Nicholson et al., 2014; Rothman et al., 2015).

Although street configuration and other characteristics of the built environment affect daily mobility (Cervero & Kockelman, 1997; Ikeda et al., 2018), there are nonetheless other factors, such as perceptions—and especially parents' perceptions—to consider as well (Depeau, 2008; Napier et al. 2011; Timperio, 2004). Parental perceptions and fears related to the walking environment and their children's abilities are particularly influential when it comes to the mode of transportation chosen for traveling to and from school (Buliung et al. 2015; Chillon et al., 2014; Faulkner et al. 2010; Oluyomi et al., 2014). According to McMillan (2005), the decision is determined by mediating factors (such as the real and perceived safety of the neighborhood and the household's mobility options) and moderating factors (such as sociocultural norms, parental attitudes and sociodemographic characteristics). Perceptions about travel time and distance also prove to be influential, parents looking for easy and convenient ways for completing multi-activity trip chains (Faulkner et al. 2010).

That said, children's perceptions are also important mobility determinants (Fusco et al. 2012; Napier et al., 2011; Timperio, 2004). Data generated through surveys show that children are sensitive not only to problems related to the built environment, but also to the safety aspects of the social environment—for example, the presence of threatening individuals, risk of assault, etc. (Banerjee et al., 2014; Fusco et al. 2013). Furthermore, children's attitudes and perceptions may have an influence on those of the adults: Mitra's conceptual framework (2013) acknowledges transportation behaviour as an outcome of multilevel influences and negotiation among household members. Dunton et al. (2012) and Napier et al. (2011) highlighted a similarity between children's and parents' views about traffic and neighborhood characteristics (such as aesthetic qualities and obstacles to walking), but the literature points to differences between their views, not in terms of the source of concern but rather in terms of the intensity of concern:

a study by Timperio (2004) showed that children (especially the 10–12-year-old age group) had a tendency to worry less than their parents. Concerns on the part of children and parents are barriers to active transportation (Dupont et al. 2006), and thus, it is important to consider them in order to implement more effective mobility strategies.

Understanding children's perceptions of their walking environment is essential to effectively target interventions that encourage active transportation. Furthermore, children have the right to give their opinion (and to be listened off seriously) on matters that affect them, as stated in the Convention of the rights of the child (article 12). To our knowledge, children's perceptions concerning traffic-calming measures have received little attention, yet these measures directly affect their environment and their mobility, with potential outcomes in terms of health and wellbeing.

2. Methods

Our methodological approach consisted of three stages: first, the selection of a participant sample in primary schools in Quebec; second, data collection using focus groups and walking tours in eight different schools; and finally, qualitative analysis of the discussions with the children.

2.1. Selected elementary schools and participating children

We targeted children from public schools around which traffic-calming measures had been implemented as part of the OTMITC program. The schools were selected in several stages. First, we selected the regions and then, within those regions, the municipalities with the most schools participating in the program:

Gatineau, Laval, Longueuil, Montreal, Quebec City and Saint-Julie, for a total of 124 public schools. Afterwards, we characterized a one-kilometer buffer zone around each school, using average block perimeter, land-use ratios (residential, industrial, commercial, vacant), number and area ratio of parks, number of traffic lights, length of the bicycle paths, length of arterial and collector roads, type of road on which the school is located and number of school crossing guards. Using SPSS, we conducted an Agglomerative Hierarchical Clustering (AHC), which resulted in a typology that includes five types of urban settings (see Table 1). The classification process is described in details elsewhere (D'Amours Ouellet, 2016). We initially approached 18 schools. Only eight schools from the five different settings agreed to participate, the majority of them serving areas with low socioeconomic status. Seven of these public schools ranked between the 8th and the 10th decile of the most disadvantaged, based on the low-income threshold index.

We asked participating schools to put together a group of 6th graders (11–12 years old) who had been attending the same school for several years, to allow us to gather testimonies from children who were very familiar with the school and its surroundings and potentially aware of the recent implementation of traffic-calming measures. We asked the administrators to target a wide range of participants who also used different modes of transportation to travel to and from school. Given this approach, our participants do not necessarily represent the point of view of all students and there may be some bias. Our qualitative analysis, presented in the next section, takes this bias into account. A total of 65 children took part in our discussions, for an average of eight children per focus group. A week before the meeting, the children received a letter addressed to both them and their parents, explaining the project and the terms and conditions of participation, along with a consent form to be signed by one parent and the child. This

approach had been previously approved by research ethics committees. Table 1 shows the participating children and schools by urban setting.

Table 1. Participating children and schools by urban setting

[Table 1 near here]

2.2. Focus groups and walking tours around schools

Focus groups and walking tours were used as complementary activities to get children to share their knowledge and perceptions of the traffic-calming measures around their schools.The focus groups were held in the schools, generally in the library or an empty classroom, during lunch breaks. The meetings were hosted by a researcher or research assistant (urban planning graduate student) accompanied by a second research assistant. The meetings were also attended by a school representative, whose role was limited to observing the activity. It is worth noting that these activities were held mainly in the winter (January to March 2014 and 2015) due to the availability of school administrators, which led to interesting insights about the presence of snow on the ground and other seasonal issues, as discussed below.

The group discussions were held in French, recorded (audio) and structured using a guide that included five themes: 1) presentation – we introduced ourselves, explained the activity and then invited each of the participants to introduce themselves in return (i.e., name, age, number of years they had attended the school); 2) travel habits – we presented a map and aerial photo of the neighborhood (1:2000, covering approximately two square kilometers), color-printed on A1 paper (594x841mm), with the school in the center of each image, and asked the participants to show where their homes were located, indicate their

usual route to school and provide us with some details about their travel routine (e.g., schedule, mode of transportation, people accompanying them, etc.); 3) recent interventions – participants were asked to show on the map or aerial photo areas where recent traffic-calming measures had been implemented and describe them; after the first round of comments on the topic, pictures illustrating different measures (e.g., widening of sidewalks, signs, marked pavement, etc.) were shown to the participants, who were asked whether any of these measures were located along their path to and from school (see example of picture in Figure 1); 4) perceptions of risk and traffic-calming – at this stage, we asked the participants to show any particular portion of their home-school route where they had encountered issues with traffic, any areas where pedestrian, cyclist and motorist cohabitation were difficult, as well as areas where they experienced the fewest problems in this regard; if participants were unable to do so spontaneously, we asked them to share their opinions on the impact that the recently implemented traffic-calming measures might have on such issues; 5) lastly, we asked the children to share any additional information they wanted.

Figure 1. Picture illustrating examples of traffic-calming measures: curb extension, signs and marked pavement

[Figure 1 near here]

Image source: Google 2017

Following each focus group, we conducted a walking tour, inspired by the itinerary method (Miaux et al., 2010; Thibaud, 2008). We asked each group of children to take a short walk with us (10-15 minutes) on the streets adjacent to the school (starting with the one where the children's entrance was located). During the walk, the children showed us the environmental features mentioned during the focus group. In some cases, the direct observation of traffic-calming measures elicited new comments (Figure 2). These

discussions were recorded and, although short, they proved to be complementary, offering relevant insights.

Figure 2. Example of a walking tour with children near a school in Montréal

[Figure 2 near here]

2.3. Analysis

The discussion recordings were fully transcribed, and the transcripts were analyzed qualitatively, using the conceptualizing categories method (Paillé & Mucchielli, 2003). In keeping with the grounded theory approach (Glaser & Strauss, 1967), this inductive analysis method includes four main stages: 1) familiarization with the material by reading and annotating the transcripts several times; 2) thematic analysis of the transcripts, during which the different themes addressed during the discussions are identified and coded; 3) categorization, which further pursues the thematic analysis "by explaining events or phenomena, making them intelligible or giving them an existential, critical or philosophical dimension" (Mayer et al., 2000, p. 174); 4) the final stage consists of establishing relationships between the themes and categories identified in order to generate a general interpretation of the participants' discourse.

The following section reports on the children's experience of walking and cycling and their perceptions about the traffic-calming measures. These perceptions are structured around four key ideas: concerns (about vehicle speed, road cohabitation and vandalism); awareness (of traffic-calming measures); skepticism (about signs and road marking); and confidence (about road and intersection geometry

transformations). These ideas are developed and illustrated with quotes (translated from French) from our discussions with the children.

3. Results

3.1. Participants' experience of walking or bicycling to school

First of all, it is worth mentioning that the majority of participants generally walk to and from school. This is not surprising considering the type of schools they attend—public, neighborhood schools with no specific educational profiles. The children also claimed, however, that they used a variety of other modes of transportation for other daily trips, especially in the summer: bicycling, skateboarding and rollerblading were mentioned. Interestingly, playgrounds, when located next to or near the schools, serve as part of the home-school route and are often considered a shortcut by participants.

> *"I walk through the park to pick up my little brother." (1-SLG)*
>
> *"I always walk on the sidewalk and I also go through the park." (3-SV)*

Needless to say, such shortcuts are less accessible during the winter when snow covers the paths running through many of these areas: this was also noted by children as a seasonal barrier to walking to school.

Although most of the participants claimed that they walked to and from school on a regular basis, some also stated that their parents drove them to school sporadically. They explained this as a result of weather conditions or especially if they were running late. Participants who stated they were regularly driven were rare and the reason provided to justify this mode of transportation was the length of the route. This was especially true for children who live in two different homes because their parents have shared custody.

"[I] walk to school, but in the winter, if it's cold, we take the car." (5-DR)

"I always walk to school, except my mom sometimes drives me in, but it's really rare, only if it's like 8:08!" (4-NDF)

"My parents are separated so I have two different homes. My first home is here, in front of the school, and my second home is in [city district, 10 km away from school]. When I'm at my Mom's, I walk and when I'm at my Dad's, we take the car." (5-DR)

3.2. Concerns of child pedestrians and cyclists

3.2.1. Speed as a major concern

The speed of vehicular traffic clearly stands out as the main threat perceived by the participants, in all the discussion groups, regardless of the type of urban environment. Illegal parking, especially by trucks on street corners, is another threat for pedestrian children, but was mentioned only by the participants in Type-4 schools (functionally mixed settings, with sizeable city blocks, vacant lots and parks). This problem is worse during the winter when snow accumulation completely transforms the streets' geometry, making the edges of the sidewalk harder to distinguish. Some of the participants from schools in old central districts (Type-1) mentioned more significant problems with cohabitation around bus stops, given the large numbers of pedestrians on the sidewalks and vehicular traffic (buses) next to the sidewalk. The testimonies gathered speak for themselves on some of these issues:

"When I cross here [indicating an intersection along the school route], it's dangerous because the cars on Sherbrooke are going 80 km/h and they drive like crazy!" (1-SLG)

"I don't know how to say it… I don't really feel safe because lots of the cars go really fast." (4-NDF)

"There is a street with a daycare and different stores, and tons of big trucks are there, so we can't really go through. We have to walk in the street to cross. The sidewalk is never free. There was a truck there at lunch today. It was pretty big and took up the entire sidewalk." (4-SC)

3.2.2. Issues related to cycling

Some of the participants stated that they sometimes make their way to school by bicycle, especially at the beginning and end of the school year when the weather is mild. One common issue brought up by these children was related to space sharing with other road users. There was an issue of cohabitation with both pedestrians—when the children were bicycling on the sidewalks—and vehicles—when the children were bicycling on the road.

"I sometimes have to ride my bike on the sidewalk because I don't feel safe with the cars passing me in the street." (1-SF)

"Sometimes there are too many people on the sidewalks because they are so narrow, so the pedestrians get off and walk on the bike path, but it's really annoying." (2-SP)

Children were also concerned about theft and vandalism. Despite the existence and use of bicycle racks at the schools, the participants mentioned that they were worried about what might happen to their bicycles during school hours, when they couldn't see them.

"I used to like taking my bike to school sometimes at the start or the end of the school year. Now, I don't like doing that so much since [my friend] had his bike stolen and [another friend] went home for lunch one time and when she came back, all she found was her bike lock." (4-NDF)

Vandalism often surfaced in the form of damage done to parked bicycles. Some of the participants complained about their peers handling parked (and locked) bicycles without permission.

3.3. Awareness of traffic-calming measures

The participants in all the discussion groups spontaneously and easily named several traffic-calming measures on the route between their homes and the school: pedestrianization of the streets, road signs, road markings, speed bumps, etc. When we showed the participants images illustrating the traffic-calming measures, they continued to mention recent interventions that had taken place, generally near their school. Showing these images and naming the various measures made the discussion easier and more specific:

"Cars could park there before, but now it's closed off." (1-SLG, referring to street pedestrianization)

"There are yellow lines for pedestrians to show them where they can get across safely." (3-NDV)

"I can't remember which street exactly, but they put up a sign somewhere, a sort of triangle to let pedestrians go by." (4-SC)

"Not long ago, they installed a speed bump in front of the school." (5-DR)

"I noticed, well… that there are flower containers protecting the pedestrians. Cars can't get up on the sidewalk." (4-NDF)

That said, although the children identified and even appreciated these measures, they did not claim to have changed their route after they were introduced. The children seemed to have adopted a particular route in their first years of attendance at the school and had not changed it since that time. In fact, during the discussions, the participants projected a certain level of confidence when it came to their well-known routes—routes they had been taking for years and in which the new measures were appreciated but deemed mostly useful for younger children just starting school.

> *"We've known each other since daycare and our mothers went that way, so we go the same way now." (1-SF)*

> *"They've brought the sidewalks closer together here so that it's safer when little kids cross." (1-SLG)*

> *"I think it's useful because if there were no signs, well… they wouldn't be able to see the little kindergarten kids." (2-SP)*

3.4. Shared skepticism about signs and road marking

As mentioned earlier, the speed of vehicular traffic was brought up as a serious issue for the participants in our discussion groups. Several traffic-calming measures have been introduced to help counter this, but as far as the participants were concerned, these measures are not all equally effective. In fact, we noticed a shared skepticism among the participants, in all the discussion groups, about signage and road markings. According to the participants, far from placing a direct constraint on traffic, these measures only seemed to serve as a source of information, at times unsuccessful and with no effect on their road safety.

> *"Signs are great but they don't necessarily have any real effect and drivers don't get punished for not following them." (1-SF)*

"There is a yellow [line on the road] where cars should stop… but they don't do it." (4-NDF)

"[The pedestrian painted sign is] right there on the road, but people don't even see it; they just drive right over it." (2-SP)

"There are kids on the sign… but there are tons of them in the street too!" (2-SP)

As far as the road markings are concerned, the children felt that both accumulated snow and erosion caused by traffic and snow removal made them less visible, a result that was closely related to the season of the data collection (winter in Quebec requires the use of salt and sand to improve traction). They also felt that the road markings were hidden by vehicles when there was heavy traffic on the road at the same time as them—in other words, in the morning when children are arriving at school and at the end of the day when they are leaving. The participants also felt that even when signs were not affected by fading, visibility could still be an issue, depending on where the signs were located (isolated, hidden, etc.). Some of the children recommended a combination of measures that could be used to deal with this problem:

[concerning the road markings] "I think they are useful all year round when they are on major roads that are always cleared of snow […] If they are on smaller streets that are not always ploughed, it's not too useful." (1-SLG)

"Because they are painted and cars keep passing over them, they tend to fade over time." (2-SP)

"Sometimes there are cars in front of them, so when you start your crossing, you can't really see them." (5-DR)

"They would need to add signs above the pedestrian crossings to let drivers know that children are crossing there." (4-NDF)

3.5. Confidence in intersection and road geometry changes

Although the participants in all our discussion groups were skeptical about *"informational"* measures (such as road signs), approaches that change street configuration instilled a great deal of confidence. The children in our study felt that methods such as narrowing lanes and installing speed bumps resulted in major constraints that were obvious and therefore difficult for drivers to ignore. In addition, interventions that change lane geometry were considered to improve visibility and separate vehicular traffic from pedestrians and cyclists.

> *[concerning the installation of traffic bollards in the middle of the road] "[…] drivers don't want to damage their cars, and they'll see it because it's right in the middle of the road." (4-NDF)*
>
> *"Well, speed bumps are useful because cars have to slow down; otherwise they will run right into them." (5-DR)*
>
> *[concerning the narrowing of the street] "Because it's narrower, drivers are more careful to avoid weaving left and right. When the street is wider, it doesn't matter if they swerve a little." (4-NDF)*
>
> *[concerning curb extensions] "Yes, you can get closer to the road, and drivers can see you more easily than when the sidewalk is straight. Plus, you can see the cars better too." (1-SLG)*
>
> *[concerning the separation of traffic] "I would install posts to protect the sidewalks, like the ones you see on bike paths." (1-SF)*

Although street reconfiguration instilled confidence, the fact remains that, for the participants, the effectiveness of these traffic-calming measures is not assured, insofar as they are not consistently present in the territory and their effect is limited. The children complained that most of these measures were located next to the school, covering a very limited part of their daily route. The concentration of traffic-

calming measures mostly, if not only, around schools clearly surfaced as a challenge in several discussion groups. It was mentioned for both its positive effects—forcing vehicles to slow down near schools—and its negative effects—providing no improvement to roads further along the school route, closer to the children's homes.

> *"[…] close to… where I live, in my area, lots of people drive really fast, so I would add a few more speed signs because there really aren't a lot." (2-SP)*

> *"Sometimes, I think it's stupid because one street has everything and the next one has nothing." (4-SC)*

4. Discussion

Our discussions with children proved quite enriching and clearly demonstrated that they have an in-depth knowledge of their everyday environment, as previously noted by authors such as Roger Hart (1979). Our participants had detailed knowledge not only of their school surroundings, but also of the neighborhood and its recent transformations. They pointed to a number of issues related to active travel, including street-sharing conflicts. This knowledge highlights the importance of including children in urban planning and design processes (Bishop and Corkery 2017).

While most of the participating children walked to school, some of them said they used their bicycles occasionally, especially in early fall and late spring. Although many of them like cycling to school, it seems harder to integrate this mode of transportation into their daily routine. Traffic speed and volume are perceived barriers, as stated in many studies among youngsters and adults (Ahlport et al., 2008; Fries, et al., 2012; Stewart et al., 2012; Zhou et al., 2010). The scarcity of bicycle paths and other infrastructures

dedicated exclusively to cyclists around our participants' schools may partly explain this perception among our participants. Safety concerns are also well-known barriers for cycling (Trapp et al., 2011). Interestingly, children are concerned not only with the risk of theft but also with the risk of other children damaging the bicycles while they are parked and locked. The installation of bicycle racks in supervised places might help to avoid this issue.

The emphasis that the children placed on the speed of motor vehicles is in line with the importance it is granted in the scientific literature on road safety. In fact, many studies confirm that the speed of motor vehicles is a determining factor in the risk of road collisions involving child pedestrians (Jamshidi et al., 2017; Liu & Yang, 2003; Mueller et al., 1990; Roberts et al., 1995; Stevenson, 1997; Wazana et al., 1997) as well as the severity of injuries (Ewing & Dumbaugh, 2009). In these studies, a speed of 40 km/h was established as the threshold at which the risk and severity of injuries increases considerably. Certain authors advocate a maximum speed of 30 km/h as a measure for reducing the occurrence of head injuries among child pedestrians involved in road accidents (Liu & Yang, 2003). The other major risk factor—traffic volume—was not often mentioned by the children in our discussion groups, despite its importance in road safety research on child pedestrian and cyclist injuries (Bennet & Yiannakoulias, 2015; Ewing & Dumbaugh, 2009; Roberts et al., 1995; Stevenson, 1997; Yu, 2015). This can partially be explained by the fact that most of the schools in our study were located on streets with low traffic volume. In addition to this, the children in our study were always able to deliberately avoid major corridors with high traffic volumes, thereby reducing their exposure to this kind of environment. Finally, we should add that when the children mentioned speed as a major issue, they may also potentially have been referring to volume at the same time, since the distinction between these two concepts is sometimes blurred in common language.

Overall, our participants seem to place a great deal of trust in "hard" measures that physically transform street geometry, compared with signs and road painting. "Hard" transformations include the narrowing of lanes, horizontal and vertical deflections and restricted access (Ewing, 1999) and are also known to be the most effective at reducing collisions (compared to other built environment changes) (Ewing, 1999; Retting et al., 2003; Rothman et al., 2015) and lowering speeds (Gonzalo-Orden et al. 2016). The children demonstrated particular trust in the "self-enforcing" nature of these measures—in other words, the fact that they require no outside surveillance to work (Bellefleur & Gagnon, 2011). On the other hand, the children also pointed out one of the limitations of these measures, which stem from their isolated nature—the fact that they are concentrated near schools. As a result, they often cover a very limited portion of the children's home-school route. Concentrating measures in these locations can be justified by the number of children and amount of traffic near schools, especially at the start and end of the school day, but, at the same time, rather than reducing real or perceived road insecurity, this approach may simply transfer the risk to other neighborhoods that lack traffic-calming measures (Bellefleur & Gagnon, 2011). It is therefore promising to consider implementing traffic-calming measures throughout broader urban sectors (rather than only in school zones), forming complete and safe street networks, an argument that was also put forward by the children when walking around their schools.

5. Conclusion

Through discussion groups with children attending primary schools in different types of urban environments, this study identified a series of perceptions regarding recently implemented traffic-calming measures. Without a doubt, the participating children were well aware of their environment and able to express their perception of risk and their level of confidence about their school's surroundings. Based on

the testimonies provided by the children in our discussion groups and walking tours, we have concluded that vehicle speed continues to be perceived as the main threat, that children seem to trust measures that transform street geometry and that children are sensitive to the concentration of traffic-calming measures near their schools.

Like any other study based on a non-representative sample of participants, our study has several limitations. Although we did sample the schools in different urban environments, we depended on schools' officials to select the children to participate in our research; many of the children declared they walk to school on a regular basis. Studies measuring perceptions with a larger and representative population would be useful. More extensive studies allowing for the comparison of the perspectives of different stakeholders (children, parents, residents, etc.) would also be useful to highlight the possible correlations and differences between these particular groups. It is also important to allow children to have a say in evaluating their environment and designing the transformations they want; some authors even consider this a prerequisite to the success of school travel planning (Mammen et al., 2015). As part of the New Urban Agenda, put forward in 2016 by UN-Habitat state members, considering children's views in urban planning processes is part of a more sustainable way of shaping our communities. The participation of children is undoubtedly useful for urban planning, for children and for their community.

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