The Centre for Sustainable Transportation

Le Centre pour un transport durable

THE ONTARIO TRILLIUM FOUNDATION
LA FONDATION TRILLIUM DE L'ONTARIO

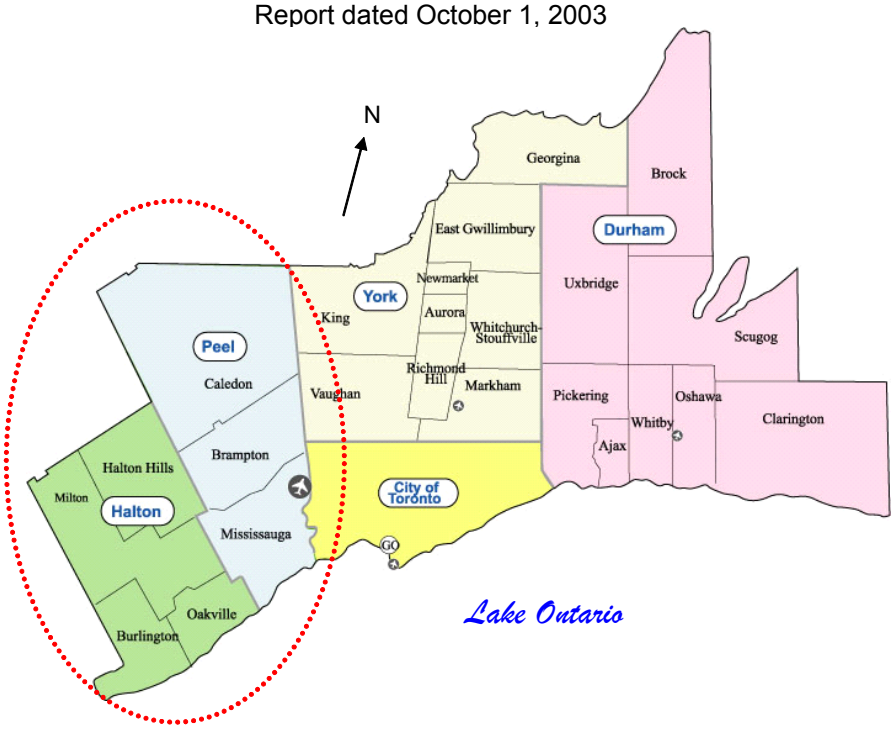
KIDS ON THE MOVE IN HALTON AND PEEL

Catherine O'Brien and Richard Gilbert

with

Béatrice Schmied and Al Cormier

Report dated October 1, 2003



Enquiries about the content of this document may be made to
Catherine O'Brien at imurray@renc.igs.net or 613 754 2559
or to Richard Gilbert at richardgilbert1@csi.com or 416 923 8839

For information about the Centre for Sustainable Transportation, contact
Al Cormier at transport@cstctd.org or 905 858 9242, or visit www.cstctd.org

This project has been financially supported by The Ontario Trillium Foundation. The Foundation is an agency of the Ontario Ministry of Culture. It receives annually $100 million of government funding generated through Ontario's charity casino initiative. The Foundation provides grants to eligible charitable and not-for-profit organizations in the arts, culture, sports, recreation, environment and social service sectors.

TABLE OF CONTENTS

SUMMARY

This is the report on 'Kids on the Move in Halton-Peel', a project of The Centre for Sustainable Transportation, funded by the Ontario Trillium Foundation, conducted over the period March-September 2003.

The project took its name from a remarkable European Union publication, *Kids on the Move*. This is a superbly executed manual for European local government officials, teachers, and others who want to create better ways of making children's mobility more environmentally sound, safer, healthier, more helpful, and more enriching.

One goal of our project has been to determine whether the *Kids on the Move* manual should be adapted for use in North America, and, if so, to figure out how to go about adapting it. We have concluded that it should not be adapted as such, but that several much shorter booklets on children and transportation should be produced, targeting specific audiences.

Our second and more important goal has been to use the consultations about *Kids on the Move* to identify actions that could be undertaken in Halton-Peel and elsewhere to improve children's mobility. To this end we consulted with almost 300 individuals, mostly in Halton and Peel, and encountered many indications as to challenges with respect to children and transportation, barriers to improvement, and ways of overcoming the barriers. These are summarized in this report.

The report identifies several matters that deserve further work. They include among others development of the booklets noted above and efforts to increase consideration of children's needs in land-use and transportation planning.

This report also includes an overview of recent work on the health impacts of transportation on children. Another feature of the report is a presentation of available data on children's travel in Halton and Peel Regions.

1. INTRODUCTION

The mandate of The Centre for Sustainable Transportation is to work to achieve the sustainable movement of people and goods in Canada through cooperative partnerships, relevant and timely research; communication and dissemination of balanced information; and the monitoring and supporting of related activities. Work on children's transportation is important to these ends for several reasons. Child-friendly transportation is usually more sustainable than other transportation. Children who travel sustainably may be more likely to do so when they are adults. Children are transportation's 'canaries'. They are more vulnerable to adverse impacts, e.g., air pollution, and thus provide warnings of heightened unsustainability. Last but not least, sustainability is about intergeneration equity, which implies equal consideration for all generations, living now and in the future.

What the Centre means by sustainable transportation is captured in the following definition:

> A sustainable transportation system is one that:
>
> - Allows the basic access needs of individuals to be met safely and in a manner consistent with human and ecosystem health, and with equity within and between generations.
> - Is affordable, operates efficiently, offers choice of transport mode, and supports a vibrant economy.
> - Limits emissions and waste within the planet's ability to absorb them, minimizes consumption of non-renewable resources, limits consumption of renewable resources to the sustainable yield level, reuses and recycles its components, and minimizes the use of land and the production of noise.

A slightly modified version of this definition has been adopted by the transport ministers of all 15 countries of the European Union,[1] and is in use by numerous governmental and non-governmental organizations, including the Liberal Party of Canada.[2]

2. CHILDREN'S MOBILITY ISSUES

> *We walk to school because...*
> *We can stop and say hello to a kitty or a pup and sing along with the birds*.
>
> Junior Kindergarten student, Maurice Cody Public School, Brampton, Walk to School Day 2000.

Every day in Halton and Peel children are making trips to school, sports activities, visiting friends, the park, the library and a host of other destinations. *How* they travel on those trips has significant health implications for them and for society. Furthermore, the travel modes that adults choose have short and long term health impacts on children, in addition to environmental impacts and economic consequences. The research literature on children and transportation helps us to see how the design of our neighbourhoods, the auto-dependency of our cities and towns, and increasing traffic and eroding levels of mutual trust have far reaching effects on children. They result in physical inactivity, over-weight and obesity, traffic-related injury, respiratory illness, stress, loss of independent mobility and range of play activities, and exposure to carcinogenic substances.

The news isn't all bad. Children themselves are enthusiastic supporters of strategies to encourage more physical activity and healthful lifestyles. Given a range of transportation choices, they vote for use of their feet or pedals. More than 6,000 Ontario elementary school children were surveyed about their preferred mode of transportation to school. Almost 75 per cent said they would prefer to walk or cycle on a regular basis.[3]

Beyond the health impacts discussed below there is another reason to raise the profile of children in transportation discussions and planning. They have been overlooked. The mobility needs of children are implicit in the definition of sustainable transportation, particularly with reference to equity within and between generations. If we move people and goods in a manner consistent with the definition, children's mobility needs and aspirations will be met with few negative impacts. However**,** in transportation reports and strategies touching on areas that will benefit children (e.g., the promotion of active transportation), five key points have been neglected:

- the extensive impact of traffic on children, beyond basic air quality discussions;
- children's aspirations regarding transportation choices;
- specific strategies that would benefit children and educate the general public regarding risks, sustainable transportation choices and building public support;
- opportunities to influence children's travel, particularly the trip to school;
- the need for sustainable transportation indicators regarding children.[4]

Table 1 on the next page summarizes many of the health impacts of transportation on children. Appendix A provides a more detailed discussion.

3. EUROPEAN *KIDS ON THE MOVE*

> *We need to rethink the city as seen through the eyes of children, from a height of one metre and ten centimetres,*
>
> Walter Veltroni, Mayor of Rome[5]

The European Commission's *Kids on the Move* is a document developed to assist local politicians, teachers, and parents with efforts to improve the mobility and health of Europe's 90 million children.[6] The manual covers four topics: Children and Young People in the Urban Environment; 2) What Can Be Done?; 3) Some Examples of Solutions; and 4) Resources.

Kids on the Move presents research evidence that children's health is at risk from current transportation practices in Europe. Children under 18 comprise just over 21 per cent of the population in the European Union. Between 15 and 20 per cent of journeys made involve children and young people. Journeys by children and adults that use unsustainable travel modes are affecting children's health through air pollution, noise pollution, traffic injury and fatalities, reduced physical activity, restricted opportunities for spontaneous play, and limited independent mobility. *Kids on the Move* discusses methods for reducing the volume of traffic in areas where children travel, making public transit more accessible and attractive for parents and children, opportunities for making walking

safer and more pleasant, improving cycling facilities and training, and temporary closure of some streets to create safe places to play. Examples of ongoing initiatives can be found in Appendix B.

Table 1. Summary of several health impacts of transport on children

- Traffic fatalities are the leading cause of injury death in Canada for children over the age of one year.[7]
- Less than half of Canadian children walk to school. (Most children who live within three kilometres of school do walk, but a sufficient number live farther from school to bring the average who walk down to less than half of all children.)[8]
- Two out of three Canadian children do not meet average physical activity guidelines to achieve optimum growth and development.[9]
- More than a quarter of Canadian children and youth are overweight.[10]
- Children who live near high-traffic areas (20,000 cars passing per day) may be six times more likely to develop childhood leukemia and other cancers[11]
- Smog has been linked to asthma as both a trigger and possible cause.[12]
- There appears to be no threshold for ozone levels that are safe, and children are particularly susceptible.[13]
- Children may be more vulnerable to airborne pollution because their airways are narrower than those of adults.[14]
- Children living in areas with poor air quality have been found to have reduced lung function growth that places them at risk for future respiratory illness.[15]
- Heavy traffic reduces the independent mobility of children and youth.[16]
- Opportunities and locations for spontaneous, non-structured play are severely restricted by traffic.[17]
- A study of children's exposure to diesel exhaust on school buses in the United States indicated that concentrations of $PM_{2.5}$ were often 5-10 times higher than average levels measured at fixed-site monitoring stations.[18]
- Low-level but chronic noise of moderate traffic can stress children and raise their blood pressure, heart rates and levels of stress hormones.[19]
- 25-30% of children who survive traffic accidents may suffer from post-traumatic stress disorder, unless treated. This may include depression, recurring nightmares, difficulty attending to school work, fear of cars.[20]
- "In-car benzene concentrations sometimes exceed concentrations in the roadside air by up to four fold. Carbon monoxide concentrations may be more than 10 times higher inside cars than at the side of the road. Elevated in-car pollution concentrations particularly endanger children, the elderly, and people with asthma and other respiratory conditions. They receive little attention. Nevertheless, in-car air pollution may pose one of the greatest modern threats to human health."[21]
- In Canada, approximately 30% of greenhouse gas emissions result from transportation. These emissions are contributing to global warming which will have long term impacts on children.[22]

4. AVAILABLE DATA ON TRAVEL BY CHILDREN AND YOUTH IN HALTON AND PEEL

Travel patterns of Halton and Peel residents are surveyed every five years by means of the Transportation Tomorrow Survey (TTS),[23] which covers most of south-central Ontario. There is essentially no other source of reliable information as to how people move around in this area.

TTS concerns weekday travel behaviour of persons aged 11 years and over during the school year. The first of the four surveys, conducted in 1986, provided some data on 6- to 10-year-olds. TTS data are gathered by telephone interviews, usually with a single household member about each trip made by each household member on the previous day. TTS attempts to capture all motorized and bicycle trips made during the 24 hours. Walking to and from work or school is also counted when the entire trip is by this mode. Other walking trips are not formally counted. Nor is the walking component of transit trips.

For collecting data about young people's travel, this process is limited in that adults were more likely to be interviewed,[24] and they may have less

Figure 1. Weekday travel by purpose and age in Halton and Peel, 2001

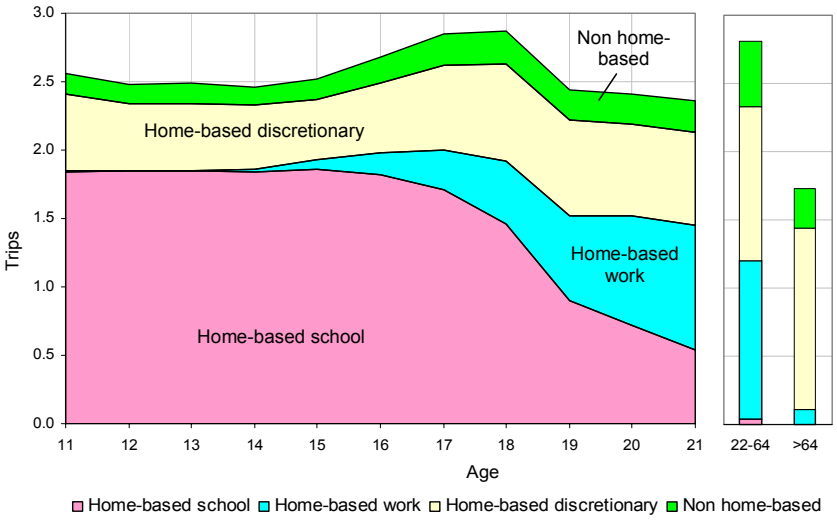
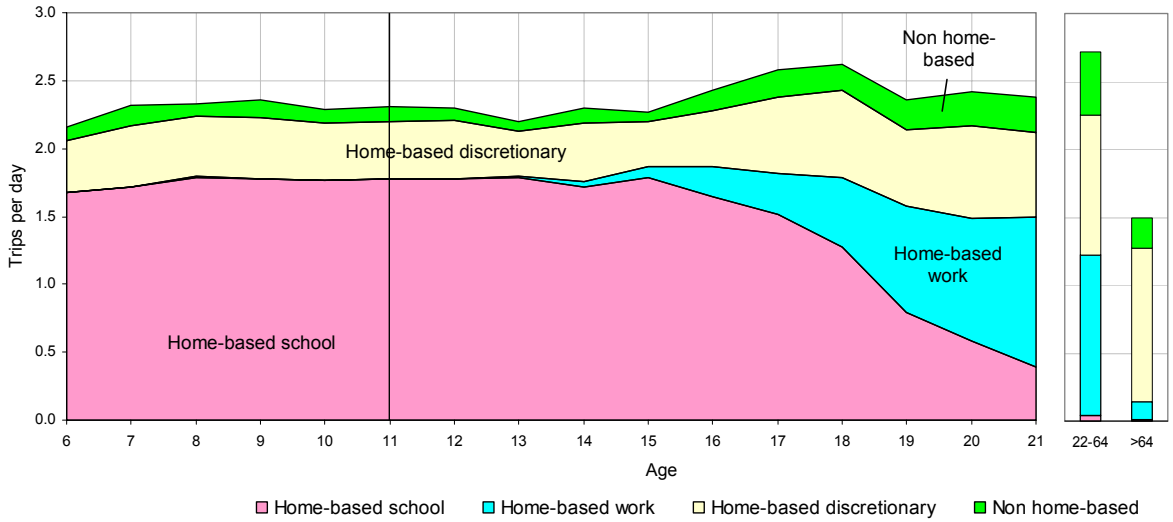


Figure 2. Weekday travel by purpose and age in Halton and Peel, 1986



than complete knowledge about the travel behaviour of younger members of the household, especially secretive teenagers.

Notwithstanding the limitations—including the major limitation that no information is collected about weekend travel—TTS is a well-administered survey whose results have considerable credibility. They form the basis for just about all planning for the movement of people in south-central Ontario.

Figure 1 presents data from the 2001 survey on the *purposes* of travel by persons resident in Halton and Peel, organized by age. School trips predominate until age 18, comprising well over half of the surveyed trips (i.e., trips on a schoolday).[25]

Figure 2 shows the same data for 1986. There are few differences between the two data sets, even though they were collected 15 years apart.

Data were collected for children aged 6-10 in the 1986 survey. Figure 2 shows that in terms of trip purpose the trip pattern of 7- to 10-year-olds was similar to that of 11- to 13-year-olds.

Figure 3. Weekday travel by mode and age in Halton and Peel, 2001

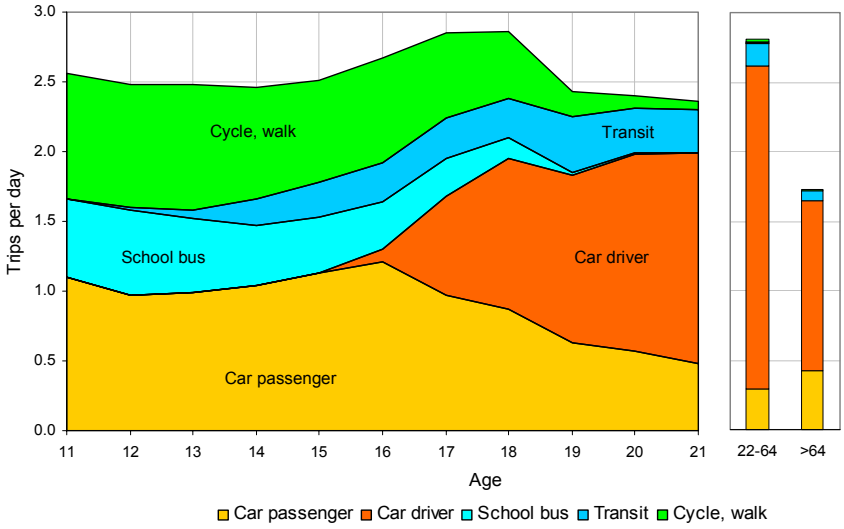
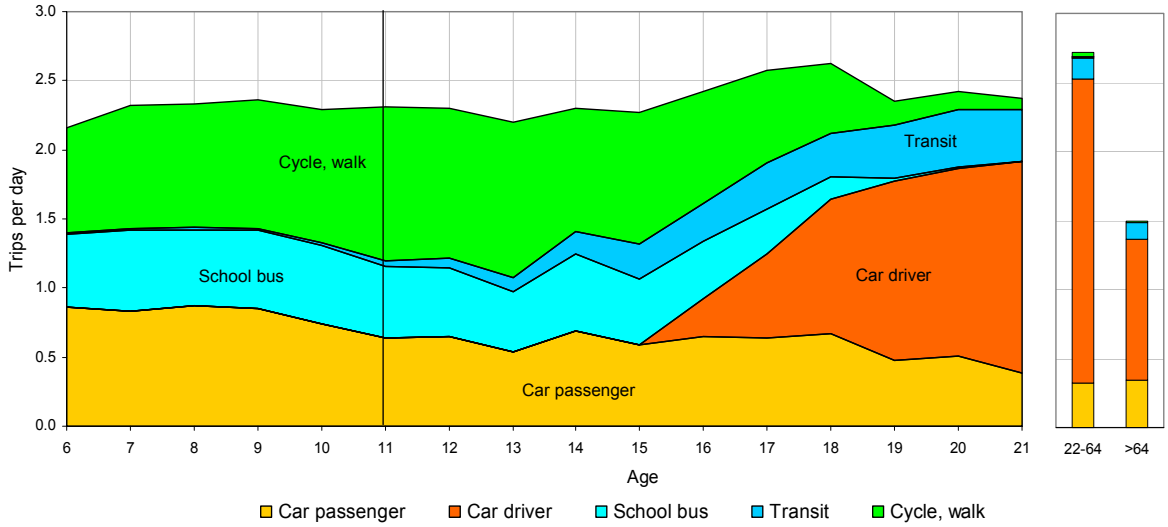


Figure 4. Weekday travel by mode and age in Halton and Peel, 1986



Overall, more trips per person were made in 2001, at all ages , e.g., 12-year-olds made 2.30 trips per day in 1986, but 2.48 trips per day in 2001. There were more of every type of trip in 2001, including school trips, which suggests that the increase may be an artifact of the survey method. However, there were disproportionately larger increases for 'home-based discretionary' trips (e.g., social visits and shopping), and for 'non-home-based trips' (e.g., going from school to a soccer game).

Figure 3 and Figure 4 present trip data for 2001 and 1986, but arranged by mode of transport rather than purpose of trip. In 1986, children under 11 did more of their travel by car than 11- to 13-year-olds, with the latter group doing relatively more walking and bicycling.

An evident difference between the two sets of survey results is that in 2001 young people of all assessed ages were doing more of their travelling by car. This was as a passenger until and including age 15 and then as a passenger or driver. For example, in 1986, 27 per cent of trips by 11- to 15-year-olds were by car; in 2001, 42 per cent of such trips were by car. There were correspondingly fewer walking and bicycling trips, and trips by transit or school bus. In 1986, 6- to 10-year-olds travelled more by car than 11- to 13-year-olds (see Figure 4), suggesting that in 2001 car travel by children of this age could have comprised even more than 42 per cent of all journeys.

Another result of comparing children's travel in the two years is the suggestion that children were starting to use transit later, roughly from age 10 in 1986 and from age 12 in 2001.

Of interest too is how the travel modes were distributed for each purpose, and vice versa. Table 2 concerns 11- to 14-year olds in Halton and Peel. It shows, for example, cycling or walking was the primary mode of 45 per cent of trips between home and school; 28 per cent of these trips were made by school bus; 23 per cent were made by car, and 3 per cent by transit. Table 2 also shows that these young people were most often a car passenger for home-based discretionary trips, e.g., social visits and shopping (47 per cent of car-passenger trips), followed closely by trips between home and school (41 per cent of car-passenger trips).This applied, of course, only to schooldays.

Table 2. Trip purposes and modes for 11- to 14-year olds, Halton and Peel, 2001

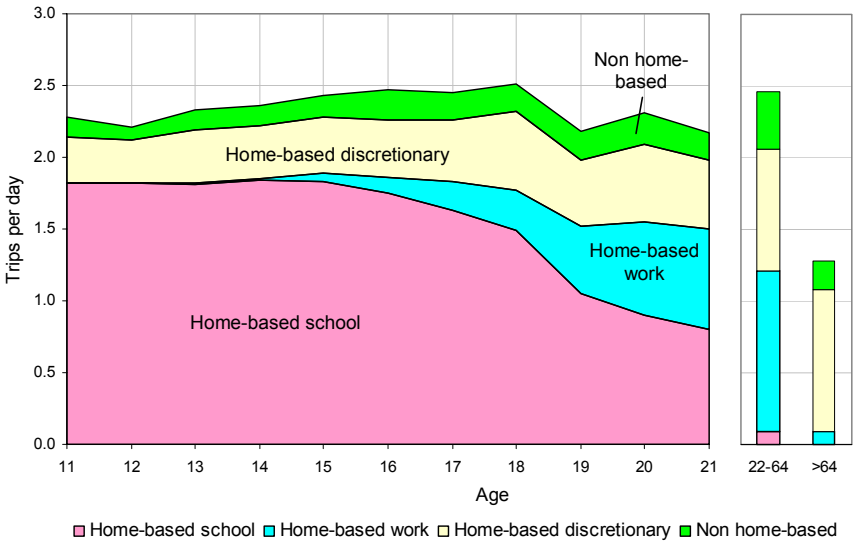
	Modes as a share of purpose					Purpose as a share of mode			
	Transit	Cycle, walk	Car pas-senger	School bus	Total	Transit	Cycle, walk	Car pas-senger	School bus
Home-based work	10%	34%	56%	0%	100%	1%	0%	0%	0%
Home-based school	3%	45%	23%	28%	100%	87%	97%	41%	98%
Home-based discretionary	1%	2%	96%	0%	100%	9%	1%	47%	0%
Non home-based	1%	12%	79%	7%	100%	3%	2%	11%	2%

Table 3. Trip purposes and modes for 15- to 18-year olds, Halton and Peel, 2001

	Modes as a share of purpose						Purpose as a share of mode				
	Transit	Cycle, walk	Car driver	Car pas-senger	School bus	Total	Transit	Cycle, walk	Car driver	Car pas-senger	School bus
Home-based work	11%	17%	30%	43%	0%	100%	9%	6%	16%	10%	0%
Home-based school	12%	34%	9%	29%	17%	100%	73%	90%	34%	47%	97%
Home-based discretionary	5%	2%	30%	62%	0%	100%	11%	2%	38%	34%	0%
Non home-based	9%	9%	27%	51%	4%	100%	7%	3%	12%	10%	3%
Total							100%	100%	100%	100%	100%

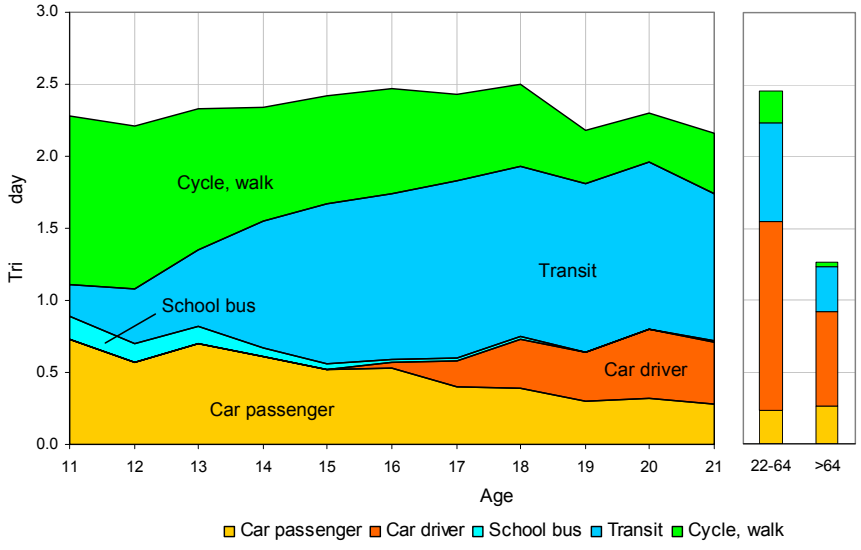
Table 3 concerns 15- to 18-year olds in Halton and Peel. It shows, for example, that cycling or walking was the primary mode of 34 per cent of trips between home and school; 38 per cent of these trips were made by car (passenger or driver), 17 per cent by school bus; and 12 per cent by transit. Table 3 also shows, for example, that almost all cycling and walking was to and from school, as it was for the 11- to 14-year-olds.

Figure 5. Weekday travel by purpose and age in the inner part of the City of Toronto, 2001



TTS data allow comparisons with other parts of the Greater Toronto Area (GTA). Figure 5 concerns trip purpose and corresponds to Figure 1, differing in that the data are from the part of the surveyed area that is the most different from Halton and Peel in terms of travel patterns. It is the inner part of the present City of Toronto, corresponding very roughly to the old City of Toronto, the former City of York, and the former Borough of East York (total population, 1.04 million, residential density 7,800 persons per square kilometre).[26] Fewer journeys were reported per resident each day in this area than in Halton and Peel (population 1.36 million, residential density 2,000 persons per urbanized square kilometre[27]), mostly because fewer discretionary and non-home-based trips were reported. (Some trips to inner-city corner stores in Toronto, for example, may not have been reported because they were so brief; whereas a comparable journey in Halton and Peel may have required a car ride.)

Figure 6. Weekday travel by mode and age in the inner part of the City of Toronto, 2001



Another evident difference concerns 16- to 21-year-olds. In Halton and Peel they made relatively more trips to work and fewer trips to school than their inner-city counterparts.

Notwithstanding these differences, the similarities between Figure 1 and Figure 5 are more striking.

Figure 6 concerns trip mode and corresponds to Figure 3. Here there are more striking differences between Halton and Peel, on the one hand (shown in Figure 3), and the inner part of the City of Toronto (shown in Figure 6). In the latter area, at all ages, there was much less use of cars and school buses, and much more use of transit. For example, at age 13 in 2001, the share of schoolday journeys by children living in the inner part of the City of Toronto made by car, school bus, and transit was 30, 5, and 23 per cent, respectively, whereas in Halton and Peel the equivalent shares were 40, 21, and 3 per cent. Moreover, in the inner city transit use appears to start at an earlier age. At age 11 in 2001, 10 per cent of journeys were made by transit, whereas at this age in Halton and Peel essential none of 11-year-old children were using transit.

Regarding walking and cycling, comparison of data from Halton and Peel and from inner Toronto shows that 11- 13-year-olds in the latter area are much more likely to make trips in this way, but there are no differences between the two areas in this respect for older young people.

The relative contributions of potential factors to the transport differences between Halton and Peel and the inner city are not known and deserve investigation. Such factors include urban form, transit availability, income, and cultural factors (e.g., adherence to a conserving way of living).

In summary, the following can be said from available data about the travel of children and youth in Halton and Peel:

- Until about age 18, travel on schooldays is dominated by the journey to and from school. Among 11- to 14-year-olds, just over half of these trips are made by school bus (28 per cent of the total) or by car (23 per cent of the total). The share of journeys by car is larger for older young people, and also likely larger among 6- to 10-year-olds.
- The share of journeys by car increased steeply between 1986 and 2001, for all purposes.
- The age at which children begin to use transit in Halton and Peel increased between 1986 (about 10 years) and 2001 (about 12 years).
- Compared with their counterparts in the inner part of the present City of Toronto, children and youth in Halton and Peel make more trips overall, many more trips by car and school bus, many fewer trips by transit, and, at least up to age 13, fewer trips cycling or walking.

Overall, the limited available data provide substance to what appear to be general impressions about travel by children and youth in Halton and Peel. The paucity of data about this significant feature of young people's lives is striking. A strong case could be made that there would be value in securing data on travel by 6- to 10-year-olds during the 2006 TTS survey, and this will be proposed to the survey managers. Ideally, data on non-schoolday trips would be gathered. This is unlikely to be done because of the focus of the TTS on weekday travel.

5. PROJECT OBJECTIVES AND PROCESS

The objectives of our work were these:

- Consult widely in Halton-Peel as to whether and how to adapt the *Kids on the Move* manual
- Use the consultations to raise awareness in Halton-Peel as to issues around children's mobility.
- Also use the consultations to help identify actions that could be taken to improve children's mobility.

Our effort was roughly equally divided among these three objectives.

We met with 274 people including local and regional land-use planners, transit managers, transportation planners, community service providers, school board planners, children's service providers, developers, student transportation managers, health care professionals, politicians, representatives of non-profit organizations, school principals, teachers, children, and youth. In addition we met with committees including the Regional Air Quality Working Group (Peel), Choices 4-Health (Halton), Burlington Bikeway Committee, Mayor's Youth Advisory Committee (Mississauga), Brampton Safe City Association, Mayor's Youth Advisory Committee (Burlington), and the Mississauga Traffic Safety Committee. A more complete list is provided in Appendix D.

Outside the two regions we also discussed the Kids on the Move project and document with 37 representatives of non-profit organizations, federal government departments (Transport, Health, Environment), and several provincial government departments.

In addition, we carried out a loosely structured assessment of the impact of our consultations by administering a short questionnaire to two groups of people. One group of 20 comprised a selection of people we had consulted with. The other group comprised the same number of persons in nearby Durham and York regions, each one matched carefully to a person in the first group. The questionnaire is attached as Appendix C. Respondents in Halton and Peel answered all five questions. Respondents in Durham and York answered only the first three questions.

6. PROJECT RESULTS

Adapting the *Kids on the Move* manual

Everyone we consulted with had a generally favourable impression of the European Commission's *Kids on the Move* manual. Most people who had the opportunity to read the document thoroughly agreed that the information in it is important and makes a compelling case for children. Many said the manual is too long and that an adaptation should be shorter. Several suggestions were made to tailor an adapted booklet or booklets to specific target audiences. The advice arose from the perspective that practitioners in many sectors do not see children's transportation as a specific focus of their work. Thus, the information might be most effective if targeted to specific sectors.

We concluded that an adaptation of the *Kids on the Move* manual should comprise five or six smaller booklets designed for specific target audiences. Possible targets could be municipal planners, school boards, parents, public health, politicians, and children.

Awareness raising

The project achieved its objective of raising awareness regarding children's health and transportation. Some people interviewed said they had never considered the specific needs of children in their work. Others said they had encountered much new information. Some, even if they were aware of many air quality considerations, did not know about the special susceptibility of children. The children and youth we met with learned from our presentations and discussions, and we learned from them. Children were already able to name some of the impacts of transportation on their health and we provided them with additional information. Teachers and students at schools already involved in an Active and Safe Routes to School program were more familiar with the impacts of transportation on children's health and appreciated the resources that are available through that program.

The consultations created a venue for respondents to voice their assumptions in two areas: (i) why should there be special consideration given to children's transportation, and (ii) if we focus on sustainable transportation for everyone, won't that automatically meet children's mobility needs? We were able to respond to these questions and make the case for a higher profile for children in land use and transportation planning.

Regarding the first point, a planner said that creating sidewalks for the entire population would serve children. Our discussion clarified the perspective that sidewalks will be used only if they lead to destinations that people want to reach. If sidewalks do not lead to destinations that children prefer to travel to, they are less likely to meet children's need for active transportation.

With respect to the second point, respondents acknowledged that there are barriers to children's mobility that are different from barriers that adults face, namely that children are not always given a choice of transportation mode, parental fears influence the mode taken, and children may very well be the key to changing parental behaviour.

Questionnaire results indicate that the consultations have led to some new program initiatives, new training for staff, invitations for us to speak at future meetings, and offers to collaborate in Phase 2 of this project. Generally speaking questionnaire respondents from Halton and Peel replied to Question 1 of the questionnaire (regarding health impacts), with considerable detail which reflected the nature of our discussions. It was evident that they understood the extensive nature of this issue. The majority of participants from Halton and Peel stated that they had shared the *Kids on the Move* manual with colleagues or used the information in their own presentations. For example, a school board planner shared the manual and discussion with his board's Health and Physical Education Curriculum consultant. Another respondent stated that she had brought the manual to day care centres. We know that the manual was shared within departments as well so that the information extended far beyond the individuals we met with.

At the time of writing, only nine completed questionnaires had been returned from the 20 matched respondents in Durham and York regions, thus precluding a proper comparison of the results. The responses received were considered and engaged. Unlike the responses of questionnaire respondents in Halton and Peel, those from Durham and York regions tended to focus on air quality and safety

issues only, also some mentioned exercise, obesity, and independent mobility. Thus, our preliminary conclusion is that there is considerable awareness of children's transportation issues in Durham and York, where we were not active, but that in general this awareness does not have the breadth of concern evidenced in Halton and Peel, where we were active.

Examples of activities and initiatives resulting from our consultation process are these:

- The application submitted by Greater Toronto Area municipalities to Transport Canada's Urban Transportation Showcase Program included a component directed at improving transportation for children in the region. (The results are not yet known.)
- The project received extensive discussion at a workshop organized by the SMOG committee of the Clean Air Partnership.
- An invitation was extended to make a presentation to Ontario Catholic School Board planners regarding children and transportation.
- The *Kids on the Move* manual was discussed with 37 representatives of non-governmental organizations, the federal government, several and provincial and territorial governments, and two American organizations.
- Discussions are under way to include collection of data on children ages 6-10 in the 2006 Transportation Tomorrow Survey, as was done in 1986 but not in subsequent surveys (see Section 4 above).

Actions that could be taken

Many actions were suggested throughout the course of our consultations. These suggestions usually followed from the identification of specific problems or barriers to change. The barriers and recommended actions are presented in Table 4 using the framework of three challenges: (i) increasing children's active transportation on the trip to school; (ii) increasing children's active transportation for non-school trips; and (iii) reducing adult use of the automobile.

Table 4. Challenges, barriers, and actions to overcome barriers

BARRIERS IDENTIFIED	*ACTIONS RECOMMENDED TO OVERCOME BARRIER*
Challenge 1: Increase children's active transportation for the trip to school	
Lack of sidewalks.	Construct sidewalks on safe routes to school.
Lack of bike paths on route to school.	Construct paths that lead to schools.
Traffic safety fears.	The Walking School Bus program helps children to learn safe behaviour and provides adult supervision for school trips. Create disincentives for car use. Educate drivers to respect cyclists and pedestrians. Educate cyclists.
Security fears related to not knowing neighbours, fear of abduction, transience of some neighbourhoods.	Implement Walking School Bus programs (Active and Safe Routes to School). Organize community development. Encourage more 'eyes on the street'. Pro-

	mote Neighbourhood Watch.
Lack of parental awareness regarding short- and long-term health impacts of driving their children rather than supporting active transportation.	Introduce curriculum material helping children understand links between transportation, physical activity, and health. They in turn may educate their parents. Introduce awareness strategies to inform general public. Introduce concepts early in life through early years programs and day care centres.
School funding formulas encourage construction and use of large schools that are more likely to have traffic congestion than smaller schools.	Education ministry, school board trustees and planners should work towards planning and transportation solutions that encourage active transportation.
Kiss 'N Ride facilities at school reduce congestion but encourage car use.	Provide disincentives for dropping children by car while maintaining safe school sites.
Educators may not see transportation to school as their responsibility.	School boards, principals and teachers should reinforce messages regarding active transportation.
Parents pressure school boards for more bussing so that their children will not have to walk or cycle to school.	Introduce education and public awareness programs that emphasize positive health outcomes from physical activity and reduced motorized transportation.
Challenge 2: Increase active transportation for children on non-school trips	
Lack of awareness across sectors regarding significance of links between land use planning, transportation, and children's health.	Develop child-friendly planning guidelines. Provide professional development and formal education at college and university levels reinforcing links between land use planning, transportation planning, children, and health.
Lack of sidewalks and bicycle paths to destinations where children like to travel.	Identify destinations frequented by children and create safe routes with sidewalk and bicycle paths; consider children's travel patterns in planning processes.
Neighbourhood design is not always conducive to walking and cycling (e.g., lack of sidewalks, indirect routes, traffic noise).	Give greater attention to infrastructure that supports physical activity when building new neighbourhoods and retrofitting old ones.
Recreation programs not located within easy walking and cycling distance.	When recreation facilities cannot be located within the community, consider and promote options for carpooling and transit.
Security fears.	Conduct public awareness campaigns regarding actual vs. perceived risk of abduction. Increase efforts to promote active transportation leading to more 'eyes on the street'. Support Neighbourhood Watch programs.
Traffic safety fears.	Design routes to children's preferred destinations that help keep them away from busy streets. Support traffic safety programs. Deploy infrastructure that increases congestion, slows down traffic, and discourages car use.

Lack of parental awareness regarding short- and long-term health impacts of motorized transportation and lack of physical activity.	Introduce public awareness and education programs (See Challenge 1).
Time pressures: Parents chain trips; children are registered for day care near work to avoid possible late fees if the parent is delayed in traffic on the way home.	Parents would benefit from flexibility in hours of work. Expand teleworking. Parents may need to reconsider the value of involving children in structured activities (present practice results in less unstructured time for the child and more time spent travelling by car).
Challenge 3: Reduce adult automobile use (and thus children's exposure in and outside vehicles)	
In many municipalities only 50 per cent of residents work near where they live.	Increase opportunities for higher 'live-work' ratios.
Transportation needs are complex and cannot be handled adequately by existing transit services.	Require dedicated, sustainable financing for expansion of transit
Adults do not consider the impact of their car use on their health or on children's health; mostly they think only of getting to their destinations on time.	Provide education and public awareness strategies regarding transportation and children. Introduce incentives and disincentives favouring sustainable transportation.
Highways and busy arterial roads bisect walking and cycling routes, causing them to be seen as unsafe or unpleasant.	Give higher priority to walking and cycling as a mode of transportation. Design routes that are safe and pleasant for pedestrians and cyclists.
Adults and youth feel they lack transportation options beyond the car.	Design new developments that are less auto-dependent.
Transit is not perceived as convenient if user is required to transfer more than once	Increase financial support for transit.

Respondents offered additional recommendations concerning education of specific sectors of the population and development planning. These are listed below.

With respect to education, it was felt that multiple exposures to information are required. There are many venues for raising public awareness as to the impact of transportation on children's health and the value to children and society of using active transportation.

Formal education and public awareness regarding children and transportation

- The key to marketing change is the school system
- Involve parent councils in efforts to increase children's active transportation
- Share the *Kids on the Move* manual with Early Years Centres
- Develop a fact sheet for planners
- Consider educating the early childhood educators
- Educate developers

- Educate planners through newsletters and presentations
- Develop an education package for nearby colleges and universities that provide training for early childhood educators and child care studies
- Couple safety strategies for seniors with safety for children
- Provide more carpooling promotion
- Use day care newsletters to provide information
- Present messages regarding children and transportation at Bramalea Shopping Centre events specifically (but also at all shopping malls in the two regions)
- Adapt bullet points from Table 1 (Summary of several health impacts of transport on children) to parent-friendly information
- Caledon's fall 'No Idling' campaign might be an opportunity to provide messages regarding children
- Carpooling is promoted at Mississauga's Web site, which could be used to provide other messages?
- The Lung Association has 'Clean Air Now' information about smog days and 'Lungs are for Life' that goes to schools; it could include more information about children and transportation
- The school injury prevention program provides an opportunity to present messages regarding transportation
- Breast cancer prevention programs—"walking is a good preventive measure against cancer"—could add words promoting parents walking with children
- A U.S. program, 'Risk Watch', is being adapted for Canadian use by the Halton Catholic District School Board; it could include messages regarding transportation
- A presentation on children and transportation could be made at the annual Traffic Safety Conference
- A presentation could be made to school superintendents and trustees

Land use planning and transportation planning to promote active transportation and reduce auto-dependency

- Bike/walk trails need to be developed for multiple modes
- Brampton's bike trails could be connected to those of Toronto (and other municipalities)
- People from many sectors could be brought together to discuss this topic: health, education, transportation planning, urban and regional planners, developers
- Bike trails should be identified in Official Plans
- There is need for a seamless GTA transit system
- There should be GTA transportation plan integrated with land-use planning
- Safer routes are needed for travel by roller blades
- Development plans should provide locations for early childhood education centres away from arterial roads
- Insert transportation information into discussions and planning concerning the social determinants of health

- Brampton is only 60-per-cent developed; there may be opportunities to influence the development to come
- Children should be considered in the transportation demand strategy that is part of Peel Region's emerging Official Plan
- Peel School Board is planning new schools over the next 10 years, which may provide many opportunities to influence school planners.

7. DISCUSSION AND LESSONS LEARNED

If you can make a difference in this region, you can make a difference anywhere.
Respondent, Kids on the Move in Halton and Peel

The regions of Halton and Peel have been designed around the automobile. The sentiment expressed above reflects the challenge of shifting from auto-dependency to more sustainable transportation. Our consultations revealed causes and barriers that are influencing children's transportation and that of adults. However, harmful trends need not continue. Viewing transportation through the lens of children's well-being offers both fresh perspectives and new opportunities to move towards healthier communities.

There are many programs and organizations in Halton and Peel that are mindful of transportation or children's health, or both. There is a culture of inter-sectoral collaboration around traffic safety, air quality, and healthy living. Mayor's Youth Advisory Committees are being consulted for youth perspectives and the Active and Safe Routes to School Program is growing in both regions. The following subsections indicate possibilities for extending or enhancing existing work.

Education

Education about the consequences of current transportation choices and the need for more effective measures in future development emerged as a key opportunity for change. Consultation results indicate that education is needed across the board. Municipal staff and politicians, developers, school board representatives, educators, parents, youth and particularly children were all seen as groups that would benefit from targeted information strategies. It was emphasized repeatedly that if children learned about transportation's link to health through their formal education, not only would their own behaviour be affected but also that of their parents. However, creating more choices for sustainable transportation is also the domain of many other stakeholders and we learned that each of these would benefit from targeted education programs.

Development planning that fosters children's health

Within both regions there are areas yet to be developed and areas that are being redeveloped. There are opportunities to consider the particular needs of children in land-use planning processes. However, no person within the development approval process is specifically responsible for ensuring that the needs of children are accommodated. The fire chief ensures, for example, that new devel-

opment meets requirements for access by emergency vehicles. No one reviews development plans to figure out how they will impact children's health by considering whether there are sidewalks and pedestrian/cycle paths that lead to destinations where children are likely to travel, thereby encouraging active transportation and possibly reducing motorized trips, and checking whether the road design will encourage or discourage active transportation.

We learned that several strategies could improve the situation for children. One is to train planning staff (or perhaps public health staff) to review development plans with children in mind. Where appropriate, such reviews could include consultation with children and youth. A complementary strategy would involve changing Ontario's *Planning Act* to require children's interests to be considered, and developing provincial child-friendly planning guidelines, similar to the existing transit-friendly guidelines. Health and planning officials suggested that such guidelines could have a significant impact on the shape of development to come.

Child-friendly planning guidelines could benefit other vulnerable sectors of the population including seniors and people who are physically challenged.

Leadership from school boards, principals and teachers is critical

Teachers and principals who observe parents driving their children one or two blocks to school expressed skepticism about the potential for parents to change their driving behaviour. However, schools where there has been a significant commitment to embrace the Active and Safe Routes to School program demonstrate that behaviour can change. Morton Way Public School in Brampton is an example. Four years ago, only about 40 per cent of the students walked to school. Once the Active and Safe Routes to School program was started, that trend began to shift and today a banner festoons the school wall proclaiming proudly, "Morton Way Walks!". On Walking Wednesdays, the participation of students from Grades 1-5 is 97-100 per cent. Students chart their progress and bulletin boards in the school's entrance display the results of their walking program and their involvement in the Active School program. The teacher who spearheads the program said that encouragement is key. Announcements remind students to walk and they receive prizes for doing so. The class with the highest participation level during Earth Week earned 15 minutes of extra recess.

Creating a culture of mutual support rather than a culture of fear

Fear was named by many participants as the motivation behind many transportation decisions regarding children. Security fears and safety fears predominated. Teachers and principals commented that parents not only feel the need to drive their children to school but then walk them to the front door to be certain that they enter the school in safety. In many neighbourhoods parents do not know their neighbours and thus would not trust them to accompany their children in a walking school bus program. In communities with active Neighbourhood Watch programs and schools involved with Active and Safe Routes to School, some fears could gradually be replaced with trust. However, participants reported that this takes time and a consistent approach.

Peer pressure was also named as a barrier. Parents who allow their children to walk in small groups to school or to cycle independently felt that other parents disapprove of their behaviour. The implication is that "bad parents" allow their children to walk and cycle. It is not only parents who feel peer pressure. One politician mentioned that she would love to recommend that her colleagues use public transit for a week but realized that this would be extremely unpopular amongst her peers.

Children know what kind of neighbourhood would permit them to access the places they regularly travel

We met with more than 100 students in grades 3, 4, 5, and 7. We asked them to describe the kind of neighbourhood they would like to live in. They named places they like to travel such as visiting friends, stores, the library, recreation centre, parks, movie theatres, and restaurants. Several mentioned a desire for open fields or open spaces for running. Our discussions began with a 20-minute exchange about the impact of transportation on their health. They readily appreciated the concepts and were able to suggest messages they could give their parents to encourage them to take fewer trips by car.

Youth and transportation

The youth we consulted recognize the problems of living in an auto-dependent community and feel there are few transportation choices for them. Those who are willing to deal with several transfers to reach their place of employment feel that the cost of transit is too high. Transit authorities are attempting to meet the travel needs of youth by consulting with Mayors' Youth Advisory Committees, increasing weekend service, and targeting high school students with information about transit. However, financial limitations allow for neither the frequency of service nor the hours of service that youth desire.

The physical inactivity of youth and rising levels of obesity make this sector of the population an important group to consider regarding active transportation.[28] Efforts to improve active transportation for children could be coupled with strategies to improve opportunities for youth. One respondent encouraged us to consider a stronger youth component in subsequent work related to Kids on the Move. The youth we met were enthusiastic about taking information back to their schools if education materials are developed.

Consistent financial support for sustainable transportation

Urban and regional planning that reinforces auto-dependency limits choices for more sustainable modes of transportation. Budgets may allow for the creation of a bicycle path but not be sufficient to maintain one. Some transit routes are running at capacity during peak times and could carry more commuters only if there were financial support to expand their service. Many respondents stressed the need for more and consistent financing for transit.

8. GOING FORWARD WITH KIDS ON THE MOVE IN HALTON AND PEEL

This exploration of the value of the European Commission document *Kids on the Move* and of children's transportation in Halton and Peel regions has provided much food for thought and many indications of work that could be done, indeed needs to be done. The following suggestions for actions by The Centre for Sustainable Transportation have been prompted by the foregoing:

- Create information booklets on transportation's impacts on children and on children's transportation for target audiences in at least six sectors: parents, educators, municipal staff, health professionals, politicians, and children.
- Investigate and promote opportunities to achieve more consideration of children's needs into the land-use and transportation planning processes and the municipal development review process.
- Collaborate with the GTA Urban Transportation Showcase consortium to help ensure that if the project proceeds it contains strong elements concerning children.
- Help ensure that data on travel by 6- to 10-year-olds are collected in the 2006 Transportation Tomorrow Survey. (Initial discussions on this matter have already been held with the survey managers.).
- Prepare provincial guidelines for child-friendly land-use development. (An initial approach has already been made to four Government of Ontario ministries.)
- Develop a proposal to examine transportation as a factor in children's overweight and obesity, in part by examining differences among parts of the Greater Toronto Area. (Initial discussions on this matter have been held with the Canadian Institutes for Health Research.)

Over the next few months we will be pursuing each of these items, building on the rich experience gained during our work on Kids on the Move in Halton and Peel.

ACKNOWLEDGEMENTS

We are deeply grateful to the Trillium Foundation, whose grant made this work possible. We are equally grateful to the hundreds of individuals who gave us their time and insights during the course of this work. The scope of our contacts is indicated in Appendix D. We very much hope that we will

be able to translate their interest in this topic into processes for improving things for children in Halton and Peel, and elsewhere. Awareness of the issues of transportation and children has been increased, but very much more needs to be done.

We are also especially grateful to Ho-Kwan Wong of the Planning and Transportation Services Department of the Region of Halton and Dr. David McKeown, Medical Officer of Health for the Region of Peel. These two members of the Board of Directors of the Centre provided valuable advice and assistance at several stages of the project. Another Director, Neal Irwin of the IBI Group, provided helpful comments on a draft of this report, as did staff of the Region of Peel's Public Health Department.

APPENDIX A: HEALTH IMPACTS OF TRANSPORTATION

Physical activity

Canadian authorities have described the current physical activity levels of children as "the physical inactivity epidemic".[29] Dr. Clair LeBlanc has summarized some data:

- 63 per cent of 5- 17-year-olds are not active enough for optimal growth;
- Adolescents are less active than children 2-12 years old (33 vs. 43 per cent);
- Girls are less active than boys: 30 vs. 50 per cent at 5-12 years and 25 vs. 40 per cent at 13-17 years;
- Girls engage in less intense physical activities than boys.[30]

The consequences for children's lack of physical activity are considerable.

- Two-thirds of children and youth are not active enough to lay a solid foundation for health and well-being.
- Only 10 per cent of Canadian youth are active enough to receive any heart-health benefits.
- Forty per cent of Canadian children have at least one risk factor for heart disease.
- One quarter of Canadian children are overweight and that proportion is increasing.
- The rate of obesity in children and youth has increased by 50% in the past 15 years.
- An obese preschooler has a 25-per-cent chance of becoming an obese adult. An obese teenager has a 75-per-cent chance of remaining obese for life.[31]

Lack of physical activity has been linked to the following health factors:

- Childhood obesity
- Type 2 diabetes
- Hypertension
- Osteoporosis
- Depression
- Smoking/alcohol/drugs
- Adolescent pregnancy

The economic cost of these health factors has been estimated for the Canadian population as a whole:

> "A 10% reduction in the prevalence of physical inactivity has the potential to reduce direct health care expenditures by $150 million per year. In the context of public health, an increase of physical activity has the greatest potential to effect a reduction in coronary artery disease."[32]

The Centers for Disease Control and Prevention in the United States have stated that one of the most important determinants of physical activity is a person's immediate environment, their neighbourhood. Children traveling in their neighbourhood using active forms of transportation such

as walking, cycling and roller-blading are benefiting from the activity as well as enjoying an independent mode of transportation. However, in Canada it is estimated that only 50 per cent of students walk to school on a regular basis. The percentage is higher in communities where there is a formal Active and Safe Routes to School program. Over the year, school trips represent only a quarter of children's travel. Paying attention to how they travel to their regular destinations is important for developing effective strategies for active transportation.

> "A systematic review of strategies that promote physical activity concluded that walking is the most important form of physical activity that should be encouraged to improve public health given that it is the activity most widely available."[33]

Air quality

Up to 16,000 Canadians die prematurely of smog-related problems every year.[34] In Ontario, smog costs more than one billion dollars a year in hospital admissions, emergency room visits and absenteeism.[35] A Netherlands study found that up to 30% of all cardiovascular deaths were related to particulate matter, SO_2, and NO_2.[36] Several studies have found that children who live near high traffic areas are at increased risk for adverse health impacts. Pearson and Wachtel noted that children who live near high-traffic areas (20,000 cars per day) may be six times more likely to develop childhood leukemia and other cancers.[37] The authors recommend further studies to confirm this finding. A 1996 Conference on Transportation, Air Quality and Human Health held in Toronto stated the following in its proceedings:

- There appears to be no threshold of safety for ozone levels, and children are particularly susceptible;
- Children may be more vulnerable to airborne pollution because their airways are narrower than those of adults;
- Children also have markedly increased needs for oxygen relative to their size.
- They breathe more rapidly and inhale more pollutant per kilogram of body weight than adults. In addition, they may spend more time engaged in vigorous outdoor activities.[38]

The Children's Health Study of the California Air Resources Board followed 5500 children since 1992 in 12 communities to determine the impact of air pollution on their development. The results to date are:

- Children living in communities with higher concentrations of nitrogen dioxide, particulate matter, and acid vapour have lungs that develop more slowly and are less able to move air through them. The retarded lung development may have permanent adverse effects in adulthood.
- Children who moved away from study communities had improved lung development if the new communities had lower particulate pollution, and had reduced lung development if the new communities had higher particulate pollution.
- Days with higher ozone concentrations resulted in significantly higher school absences due to respiratory illness.
- Children with asthma who are exposed to higher concentrations of particles are much more likely to develop bronchitis.[39]

> "Canada has one of the highest asthma rates in the world. Asthma affects about two million Canadians and a growing proportion of sufferers are children. Asthma is now the most common chronic disease in children, and the leading cause of hospital admissions."[40]

In-vehicle air quality

Research is emerging regarding children's exposure to in-vehicle air pollution though there are few data from Canada.

> "Children regularly transported by car can be exposed to high levels of pollution in the passenger compartment, which often exceed concentrations in the ambient air, where pollutants are diluted in a volume of air that is much greater and is refreshed much more quickly than in a car."[41]

> "A child riding inside of a diesel school bus may be exposed to as much as four times the level of diesel exhaust as a person riding in the car ahead of it. In U.S. federal law, these exposures are deemed to be a significant cancer risk for the exposed children. They pose as much as 46 times the cancer risk level considered significant."[42]

Many parents believe that transporting their children by car reduces their exposure to air pollution. Emerging research regarding both cars and school buses points in the opposite direction, especially during rush hour, or when following a particularly polluting vehicle.[43]

> "Public health officials frequently issue warnings when concentrations of pollutants in the air exceed healthful levels. The quality of the air inside vehicles can be much worse than that assessed at monitoring stations. In-car benzene concentrations can exceed concentrations in the roadside air by up to a factor of four. Carbon monoxide concentrations may be more than ten times higher inside cars than at the side of the road.

> "Elevated in-car pollution concentrations particularly endanger children, the elderly, and people with asthma and other respiratory conditions. It receives little attention. Nevertheless, in-car air pollution may pose a major threat to human health."[44]

Two studies in the United States have considered the exposure of children to diesel exhaust on school buses.[45] There are no Canadian studies of this subject so it is unclear whether Canadian students have similar exposures.

Many of the significant findings from the Environment and Human Health report are noted below:

- The time spent on buses by individual students varies between 20 minutes and several hours per day.
- Children's exposure to diesel exhaust from school buses constitutes an additional exposure beyond background levels of particulates.
- Diesel exhaust is classified as a probable human carcinogen by many government authorities (e.g. World Health Organization and U.S. Environmental Protection Agency);
- Diesel exhaust contains 40 hazardous air pollutants;
- Children may be especially susceptible to adverse respiratory effects following exposure to fine-diameter particulate matter (PM2.5) emitted from diesel engines. Nearly 94 per cent of

diesel particulates have diameters less than 2.5 micrometers. Smaller particles are able to penetrate children's narrower airways reaching deeply within the lung, where they are more likely to be retained;

- There is no known safe exposure to diesel exhaust for children, especially those with asthma or other chronic respiratory disease.
- Children in tested buses were found to have been exposed to airborne particulate concentrations that were sometimes 15 times higher than background levels of PM2.5.
- Particulate and black carbon levels vary within individual buses over time. The most important influences include: bus idling behaviour, queuing practices, bus ventilation via windows, and outdoor concentrations on bus routes.
- The intensity and type of traffic along bus routes significantly affects air quality on buses. Buses following diesel-powered vehicles, including other buses, have increased levels of carbon and particulate concentrations within passenger compartments.
- Idling buses tested had higher concentrations of particulates and carbon than moving buses (particularly with windows open).
- Queued idling buses recorded the highest levels of particulates and black carbon (accumulated exhaust may be retained in the bus during the ride, depending on ventilation).
- The length of bus route affects the extent of children's exposure.
- Natural gas buses studied emitted 60-98 per cent less carbon than diesel-powered buses.[46]

General child-health impacts

In addition to the health impacts discussed in previous sections, it is important to consider the frequency of traffic injuries and fatalities, and the potential psychological impact of traffic collisions.

> "Cars present a more lethal threat to our children than all the perpetrators of aggression put together. For every one victim of violence, three children are killed on the road. In OECD countries, 41 per cent of deaths of children under the age of 14 result from by road-traffic collisions."[47]

Traffic fatalities are the leading cause of injury-related death in Canada for children over one year of age.[48] This statistic is also true in Europe. The European Commission's report, *Kids on the Move*, links traffic speed with the severity of injury. There is evidence that the number of road accidents involving children is declining. This may be because fewer children are permitted on the road as pedestrians and cyclists.

Children's cognitive ability to understand traffic danger develops with maturity and may not be fully developed until nine or ten years of age.[49] Adults who accompany children while walking and cycling are able to teach the required skills through direct experience.

Post-traumatic stress disorder

There is a growing awareness that children who survive a traffic accident may experience post-traumatic stress disorder (PTSD). Studies in the United Kingdom,[50] Australia,[51] and the United

States[52] have found that 25-30 per cent of children involved in road traffic accidents displayed one or more of sleep disturbance, nightmares, separation anxiety, difficulties with concentration, intrusive thoughts, difficulties in talking to parents and friends, mood disturbance, deterioration in academic performance, specific fears, and accident-related play. The severity of the injury was not found to be a predictor of PTSD.

Noise

> "Noise affects children and young people. It is an established fact that exposure to chronic noise slows down the rate at which young children learn to read. Noise causes sleep disorders, and this is likely to affect school results. Noise in the classroom adversely affects concentration spans and oral communication."[53]

> "It has been estimated that 80 million citizens of the European Union are exposed in the home to levels of noise in excess of 65dB, i.e. a sound power level that is unacceptable and a potential health hazard."[54]

A Swedish survey in Hygge showed that noise is the second most important environmental problem reported by teachers and pupils. Excessive noise has also been linked to increased aggressive behaviour in predisposed individuals, and to reduced helping behaviour. There is evidence that it contributes to heart disease and hypertension.[55]

A study in Tyrol, Austria, investigated the effect of noise on children's blood pressure, cortisol levels and heart rate.[56] Children from noisier neighbourhoods (above 60dB) had "elevated resting systolic blood pressure and 8-h, overnight urinary cortisol". They demonstrated elevated heart rate reactivity when presented with the stress of a reading test at school. The same children also rated themselves higher than other children on perceived stress. Another study of kindergarten children found an association between traffic noise (>60dB), with elevated systolic and diastolic blood pressure and a higher incidence of children with blood pressure values above the 95th percentiles.[57]

Child development

Many factors influence child development making it difficult to isolate one influence from another. Transportation may well have profound impacts on children's health and development, and most parents may not be aware of such impacts.[58] Chauffeuring children to school, recreation, and leisure activities may occur with little thought about adverse effects including poor air quality, climate change, and the lack of children's independent mobility.

An adverse effect of reduction in children's independent mobility has been noted for some time,[59] but only in the last few years has there been work on how it may influence child development[60]. A Swiss study investigated the play patterns of children who live in neighbourhoods with varying degrees of traffic.[61] It showed that children who play outside and are not restricted to playgrounds only, have "a pool of experience that is clearly more diverse and rich".[62] For example, children living in a neighbourhood where traffic is a nuisance and a threat spend less time playing outside, and engage in a small range of play activities. Notable differences were in the amount of time spent in imaginative play, drawing with chalk, picking flowers, building dens, and riding a bicycle or tricycle. Children who live in neighbourhoods *not* dominated by traffic have a wider circle of friends, and so do their parents.

In Rome, a research team found that "children who are more independent play more often with their peers, both indoors and outdoors". Also, their mothers have more neighbourhood relations.[63] Research that has looked at the effect of sprawl on neighbourhood social ties found a strong relationship between automobile dominance in a neighbourhood and the level of social ties.[64] "An increase by one per cent in the proportion of individuals who drive to work is associated with a 71-per-cent decrease in the odds of a respondent having relatively more neighbourhood social ties."[65]

Summary of health impacts

The weight of research evidence tells us that we need to pay greater attention to the impact of transportation on children. Decisions regarding school sites, neighbourhood design, transit services, retail sites, recreation centres, and so on determine whether children are able to use active forms of transportation to their regular destinations safely. Auto-dependent neighbourhoods may also discourage contact among neighbours and contribute to a feeling that the community is not safe for children to travel alone or in groups. Raising the profile of children in the development planning process and education strategies regarding children and transportation could make significant contributions to creating healthier communities.

APPENDIX B: EXAMPLES OF INITIATIVES IN CANADA AND EUROPE

Canada

Active and Safe Routes to School
The National program of Active and Safe Routes to School (ASRTS) is coordinated at the national level by the organization Go for Green. Program delivery is carried out within the provinces by affiliated organizations. The two most active programs are run by Greenest City (based in Toronto) and the Way to Go! schools program in British Columbia. Both programs have made considerable strides towards educating students, teachers, parents, police, public health departments, and the media. They have effectively increased the number of students walking and cycling through a variety of approaches including International Walk to School Day, Walking Wednesdays, and neighbourhood walk-abouts, and through working with traffic engineers to recognize the specific needs of children's mobility.

Greenest City
ASRTS started in 1996 as a pilot project in three Toronto schools. It has grown steadily since that time to encompass the Province of Ontario. To date, Greenest City and its partners have worked with over 100 schools to implement safe walking programs. International Walk to School Day (IWALK), a related ASRTS annual event, began in Toronto in September, 1998, with over 50 schools participating; an estimated 14,500 students walked to school. At the time of writing, 750 Ontario schools were registered for the 2003 IWALK event.

Way to Go!
The *Way to Go!* program in British Columbia was initially tested as a pilot project to develop an elementary-school transportation-demand-management approach, a response to regional air quality issues. The program is designed to provide parent groups with the tools and information needed to introduce safe walking, cycling, and transit travel options for students making the journey to school.

Children's Bicycle Tour, Quebec
Vélo Québec has extended its traditional Montreal Island Tour event to include a Children's Tour. The Tour de l'Île des enfants is designed for children ages 6-12.

Peterborough Green-Up
Peterborough Green-Up has developed a project called 'Peterborough Gets A Move On'. Working with the municipality, Peterborough Green-Up offers a program to students in Grades 3, 4, and 5, who take a trip to a park or community centre on a city bus specially decorated for the event. The bus driver educates the students along the route about using public transit. At the destination, activities are organized to expend the students' understanding of climate change, traffic congestion, and the effects of various forms of transport. Students are then divided into four groups. During the return journey to the bus terminal, the groups are each assigned a task: (i) counting cars with one occupant; (ii) counting cars with more than one occupant; (iii) counting people walking; and (iv) counting people cycling. At the terminal, there is discussion about transit routes and safety.

Eco-Perth
Eco-Perth is based in Perth, Ontario, and has developed a project called 'First Class Across Canada'. Schools compete with each other for points to 'travel' across Canada, using a map resource available through Eco-Perth. Points are earned for environmentally friendly activities. The project is offered to students in Grade 4.

National Roundtable on Active School Communities
The links between physical activity and transportation receive increasing attention in Canada and elsewhere. New consortia are emerging that draw together participants from sectors with little previous concern about transportation. The National Roundtable on Active School Communities was held October 18-20, 2001, in Charlottetown, PEI. Participants represented three sectors (health, education, and recreation and sport), coming from every province and territory. The following operational definition was used to guide discussions at the Roundtable.

> "An active school community is one in which all citizens including teachers, students, parents, administrators and community leaders work together to create physical and social environments which support active, healthy lifestyles. [It] will support a number of initiatives that encourage physical activity. These may take place in the home, the school or the community-at-large."[66]

B.E.S.T. – Off Ramp
Off Ramp has been piloted in seven secondary level schools in British Columbia. B.E.S.T. learned that events focussed around Clean Air Day could influence a 20-40% reduction in car use for the day. However, they aspired to more sustained behaviour change and are now working with student groups who develop Off Ramp Clubs.

Europe

Assemblies for children and young people
In Italy, the National Congress of Children and Young People, organized in Bologna and attended by more than 300 participants, presented a resolution calling for, among other things, speed reductions in cities, cycling facilities and car-free pavements.

City of Graz, Austria, increases cycling
The City of Graz introduced widespread 30-kilometre-per-hour speed limits in 1992. By 1995 the number of cycle accidents decreased by 30 per cent and cycle use had increased by 6 per cent.

Italian city fits city to needs of children
Empoli, Italy, is developing a program called 'Changing the city to fit the needs of children'. Its main objective is to improve walking conditions for children through a network of safe walkways that span all the destinations that are popular with children.

Trial bicycle trailers, Odense, Denmark
The municipality of Odense teamed up with children's day care facilities to offer parents the temporary use of bicycle trailers to transport their children to the facilities. The aim was to encourage bicycle use and introduce parents to a bicycle trailer, in the hope they would later choose to purchase their own. Fifty day care facilities participated, involving 3,000 children and their parents over several months. This program occurred in a city which has made bicycling and bicycle safety a priority and therefore safe routes were already in place.

Replacing car-parking space with bicycle parking, Leicester, UK
A three Leicester schools there was a focus on bicycle transport through the provision of bicycle parking. The most successful school quickly witnessed an increase in the number of cyclists from zero to 10 per cent of pupils traveling by bike. This followed the installation of a large covered parking area for 52 bicycles in place of three parking spaces for cars.

Student proposal for staff parking fees to pay for active transport, UK
RAC Motor Services in the U.K. invited school children to draw up mobility projects for their schools. The winning pupils in Caithness, Scotland, recommended that teachers should have metered parking. The revenue generated would be used to provide bicycle sheds, shelters, signage, and benches for parents waiting at the school for children.

APPENDIX C: QUESTIONNAIRE

The Centre for Sustainable Transportation

Le Centre pour un transport durable

Kids on the Move Questionnaire

The following questions have been designed to assist the project team of *Kids on the Move in Halton and Peel* to assess the impact of our consultation process. Twenty participants from the regions of Halton and Peel are being asked to respond to the questions below. As well, 20 matched professionals from the regions of Durham and York, who were not consulted during this project, are being asked to complete the first three questions of the questionnaire.

1. Please list 4-6 significant ways that today's transportation could have an adverse affect on children's health and/or well being.

2. Please describe one or two activities that your department/school is currently engaged in (or will be engaged in) that will improve the situation for children with respect to transportation.

3. What would be the major other contribution that your sector could make to improve children's access to active transportation or to reduce the harmful impacts of motorized transportation on children?

The last two questions should be completed by Halton and Peel respondents only.

4. Have you shared the *Kids on the Move* documentation or content of our discussions with colleagues or friends? Please describe.

5. Have you begun to think about activities for the future arising out of the consultations carried out for the *Kids on the Move* project? If so, please describe these proposed activities?

Thank you for taking the time to complete this questionnaire.

You may e-mail your response to Catherine O'Brien; imurray@renc.igs.net
Faxes may be sent to (416) 923 6531

If you would like to receive further information about the project 'Kids on the Move in Halton and Peel' please contact Dr. Catherine O'Brien through the e-mail above or call 613-754-2559.

This project is financially supported by The Ontario Trillium Foundation. The Foundation is an agency of the Ontario Ministry of Culture. It receives annually $100 million of government funding generated through Ontario's charity casino initiative. The Foundation provides grants to eligible charitable and not-for-profit organizations in the arts, culture, sports, recreation, environment and social service sectors.

APPENDIX D: SCOPE OF CONTACTS

Listed below are the organizations and affiliations of individuals we contacted. Note that in the first three categories all contacts were face-to-face or, in rare instances, by telephone. In the 'Others contacted' category, several contacts comprised distribution of information only with no follow-up.

Within Halton Region:

Mayor and Councillor (local and regional)
Transportation planners (regional)
Public health officials (regional)
Children's services officials (regional)
Urban planners (local and regional)
Transit authority planner (local)
School Board planner (regional)
Choices 4 Health Committee
Burlington Bikeway Committee
Mayor's Youth Advisory Committee

Within Peel Region

Councillor (local and regional)
Transportation planners (regional)
Public health officials (regional)
Children's services officials (regional)
Urban planners (local and regional)
Transit authority planner (local)
Student transportation planner (regional)
Brampton Safe City Association
Caledon Countryside Alliance
Caledon Community Services
Mississauga Traffic Safety Council
Regional Air Quality Working Group
Developer
Mayor's Youth Advisory Committee

Children, their teachers and some parents

Grades 3, 4, 5, and 7

Others contacted

Go Transit
Pollution Probe
Greenest City
Black Creek Transportation Management Association
Peterborough Green-Up
Sierra Club
Clean Air Partnership
Go for Green
Ontario Healthy Communities
Ontario Ministry of Culture and Tourism
Health Canada
Transport Canada
Champions for Clean Air
Federation of Canadian Municipalities
Environment Canada
Government of Nunavut
Bike to Work (B.C.)
Active Living by Design (U.S.)
Community Services Dept. Moncton, N.B.
Canadian Urban Transit Association
Sport and Recreation, Alberta
Sport and Recreation, Nova Scotia
B.E.S.T. (B.C.)
Urban Development Institute
National Center for Bicycling and Walking (U.S.)

END NOTES

[1] See the minutes of the 2340th meeting of the European Council, available at the URL below.
http://corporate.skynet.be/sustainablefreight/trans-counci-conclusion-05-04-01.htm. Accessed September 18, 2003.

[2] See Page 15 of *Canada's Urban Strategy: A Blueprint for Action*, report of the Prime Minister's Caucus Task Force on Urban Issues, November 2002, available at the URL below.
http://www.liberal.parl.gc.ca/urb/BluePrint_English.pdf. Accessed September 17, 2003.

[3] O'Brien, C. (2001) *Ontario Walkability Study, Trip to School: Children's Experiences and Aspirations*, report. available at the URL below:
http://www.greenestcity.org/asrts/Walkability%20Study%20Report.pdf. Accessed September 22, 2003.

[4] A notable exception is the report *Kids on the Move*, detailed in Note 5.

[5] See Page 10 of European Commission, Directorate-General for the Environment (2002) *Kids on the Move*, Office for Official Publications of the European Communities, Luxembourg. This document is available at the URL below.
http://europa.eu.int/comm/environment/youth/air/kids_on_the_move_en.pdf. Accessed October 1, 2003

[6] See Note 5 for direction to the *Kids on the Move* document.

[7] Canadian Institute of Child Health (2000) *The Health of Canada's Children*, Third edition, Canadian Institute of Child Health, Ottawa.

[8] Go for Green (1998) *Nation Survey on Active Transportation: Summary Report*. Go for Green and Environics International, Ottawa. Available at the URL below:
http://www.goforgreen.ca/active_transportation/pdf/AT%20Survey.pdf. Accessed September 18, 2003.

[9] Vail, S. (2001) *The Physical Inactivity Epidemic: The Preventative Role of Active School Communities*. Discussion Paper Prepared for Delegates of the National Roundtable on Active School Communities, October 18-20. Available at the URL below.
http://www.yorku.ca/suevail/asc/ASCdiscusspap.doc. Accessed September 18, 2003.

[10] See the source detailed in Note 9.

[11] Pearson, R., Wachtel, H., Ebi, K. (2000) Distance-weighted traffic density in proximity to a home is a risk factor for leukemia and other childhood cancers, *Journal of the Air & Waste Management Association*, 50, pp. 175-180.

[12] California Air Resources Board (2002) *The Children's Health Study*, Fact Sheet, available at the URL below:
http://www.arb.ca.gov/research/chs/CHSfact.pdf. Accessed September 7, 2003.

[13] York Centre for Applied Sustainability and Pollution Probe (1996) Clearing the Air: Transportation, Air Quality and Human Health Conference. Toronto. Available at the URL below.
http://www.pollutionprobe.org/Publications/Air.htm. Accessed September 18, 2003.

[14] See the source detailed in Note 13.

[15] See the source detailed in Note 12.

[16] Tranter, P., Doyle, J. (1996). Reclaiming the residential street as play space, *International Play Journal*, 4, pp. 81-97.

[17] Hillman, M., Adams, J. (1992) Children's freedom and safety. *Children's Environments*, 9 (2), pp. 10-22.

[18] Wargo, J. (2002) Children's Exposure to Diesel Exhaust on School Buses, Environment and Human Health, report, Available at the URL below:
www.ehhi.org. Accessed September 8, 2003.

[19] Evans, G., Lercher, P., Meis, M., et al (2001) Community noise exposure and stress in children, *Journal of the Acoustical Society of America*, 109 (3), pp. 1023-1027.

[20] Stallard, P., Velleman, R., Baldwin, S. (1998) Prospective study of post-traumatic stress disorder in children involved in road traffic accidents *British Medical Journal,* 317, pp.1619-1623.

[21] This quotation is from International Centre for Technology Assessment (2000). *In-Car Air Pollution: The Hidden Threat to Automobile Drivers*. International Centre for Technology Assessment, Washington DC. Available at the URL below.
www.icta.org/projects/trans/incar.pdf. Accessed September 22, 2003.

[22] Canadian Institute of Child Health, *Climate Change and Your Child's Health*, Information Package, Available at the URL below:
www.cich.ca./Publications.html. Accessed September 7, 2003.

[23] Information about the Transportation Tomorrow Survey is available at the URL below. Each TTS survey involves a sample selected to be representative of each of the included municipalities.
http://www.jpint.utoronto.ca/index.html. Accessed August 25, 2003.

[24] In the 2001 survey, 11- to 15-year olds comprised 8.8% of the sample, but were the household respondents in only 0.6% of cases. 16- to 20-year-olds comprised 7.8% of the sample, but were household respondents in only 2.6% of cases. In the 1986 survey, the respective proportions of 6- to 10-, 11- to 15-, and 16- to 20-year-olds were 7.6%, 7.8%, and 7.8%.

[25] In Figure 1, Figure 2, and Figure 5, 'home-based school' and 'home-based work' mean trips between home and school or work; 'home-based discretionary' means trips between home and other destinations; 'non-home-based' means trips that do not have home as an origin or a destination.

[26] The inner part of the present City of Toronto is deemed to be Planning Districts 1-4 and 6, i.e., Planning District 1, which embraces the downtown area, and the four contiguous planning districts.

[27] This density estimate is based on the authors' estimate that close to 680 square kilometres of Halton and Peel were urbanized in 2001 (i.e., developed for roads, buildings, parking lots, neighbourhood parks, etc.). This corresponds to approximately 25% of Halton Region's total land area of 959 square kilometres and 35% of Peel Region's 1,225 square kilometres.

[28] See the source detailed in Note 9.

[29] Tremblay, M. (2001) *The Physical Inactivity Epidemic: Just the Facts, Inactivity, Obesity, Diabetes*. Presentation, National Roundtable on Active School Communities, Charlottetown, PEI, October 18-20. Available at the URL below:
http://www.yorku.ca/suevail/asc/tremblay.ppt. Accessed September 22, 2003.

[30] LeBlanc, C.(2001) *The Physical Inactivity Epidemic: Are Canadian Children at Risk?* Presentation, International Roundtable on Active School Communities, Charlottetown, PEI. Available at the URL below.
http://www.yorku.ca/suevail/asc/LeBlanc.ppt. Accessed September 22, 2003.

[31] See the source detailed in Note 9.

[32] Katzmarzyk, P., Gledhill, N., Shephard, R. (2000) The economic burden of physical inactivity in Canada, *Canadian Medical Association Journal*, 163(11), pp. 1435-40. A PowerPoint presentation on this topic is available at the URL below.
http://www.yorku.ca/suevail/asc/peterk.ppt. Accessed September 22, 2003.

[33] World Health Organization (2000) *Transport, environment and health*, WHO Regional Publications, European Series, No. 89, available at the URL below.
http://www.euro.who.int/transport/publications/20021008_1. Accessed September 18, 2003.

[34] Government of Canada (1998), *Submission, US EPA Proposal on Transboundary Air Pollution*, available at the URL below:
http://www.ec.gc.ca/air/EPA_Comment/index_e.html#health. Accessed September 18, 2003.

[35] Ontario Medical Association (2002), *The Illness Cost of Air Pollution Study: A Summary of Findings*. Toronto: Ontario Medical Association, available at the URL below.
http://www.oma.org/phealth/icap.htm. Accessed September 18, 2003.

[36] Hoek, G., Brunekreef, B., Fischer, P., et al (2001) The association between air pollution and heart failure, arrhythmia, embolism, thrombosis, and other cardiovascular causes of death in a time series study, *Epidemiology*, 12(3), pp. 355-7.

[37] See the source detailed in Note 11.

[38] See the source detailed in Note 13.

[39] See the source detailed in Note 12.

[40] See the source detailed in Note 35.

[41] See the source detailed in Note 5.

[42] Solomon, G., Campbell, T., Rudeman Fener, G., et al (2001) No Breathing in the Aisles, Diesel Exhaust Inside School Buses, report from the National Resources Defense Council, p.1. Available at the URL below:
www.nrdc.org/publications/default.asp. Accessed September 7, 2003.

[43] California Air Resources Board (1998) *Measuring Concentrations of Selected Air Pollutants Inside California Vehicles*, available at the URL below:
www.arb.ca.gov/research/abstracts/95-339.htm. Accessed September 22, 2003.

[44] The quotation is from Page 5 of the source detailed in Note 21.

[45] See the sources detailed in Notes 18 and 42.

[46] The *Environment and Human Health* report is detailed in Note 18.

[47] The quotation is from Page 25 of the source detailed in Note 5.

[48] See the source detailed in Note 7.

[49] Hunt, C. (1998) *Active/Safe Routes to School*, Canadian Institute of Child Health and Go for Green, booklet, available at the URL below.
http://www.cich.ca/PDFFiles/ActiveSafeRouteENG.pdf. Accessed September 19, 2003.

[50] See the source detailed in Note 20.

[51] McDermott, B., Cvitanovich, A. (2000) Posttraumatic stress disorder and emotional problems in children following motor vehicle accidents: an extended case series*, Australia New Zealand Journal of Psychiatry*, 34(3), pp. 446-52.

[52] Vries, A., Kasam-Adams, N., Sherman-Slate, E., et al. (1999). Looking beyond the physical injury: posttraumatic stress disorder in children and parents after pediatric traffic injury. *Pediatrics*, Vol. 104, No. 6, Dec., pp. 1293-1299.

[53] The quotation is from Page 19 of the source detailed in Note 5.

[54] The quotation is from Page 19 of the source detailed in Note 5.

[55] See the source detailed in Note 33.

[56] Evans, G., Lercher, P., Meis, M., et al (2001) Community noise exposure and stress in children, *Journal of the Acoustical Society of America*, 109 (3), pp. 1023-1027.

[57] Regecova, V., Kellerova, E. (1995) Effects of urban noise pollution on blood pressure and heart rate in preschool children, *Journal of Hypertension*, 13(4), pp. 405-12.

[58] O'Brien, C. (2001) Children: A critical link for changing driving behaviour, *National Center for Bicycling and Walking Forum*, 52, pp. 4-11, available at the URL below:
http://ncbwforum.infopop.cc/6/ubb.x?a=tpc&s=943603&f=34060193&m=986609541. Accessed September 7, 2003.

[59] Hillman, M., Adams, J. (1992) Children's freedom and safety. *Children's Environments*, 9 (2), pp. 10-22.

[60] Prezza, M., Pilloni, S., Morabito, C. (2001) The influence of psychosocial and environmental factors on children's independent mobility and relationship to peer frequentation, *Journal of Community & Applied Social Psychology*, 11, pp. 435-50.

[61] See the source detailed in Note 5.

[62] The quotation is from Page 18 of the source detailed in Note 5

[63] See the source detailed in Note 60.

[64] Freeman, L. (2001) The effects of sprawl on neighborhood ties, *Journal of the American Planning Association*, 67(1), pp. 69-77.

[65] See the source detailed in Note 64.

[66] The proceedings of the National Roundtable on Active School Communities are available at the URL below.
http://www.yorku.ca/suevail/asc/. Accessed September 29, 2003.