



# Teen travel in the Greater Toronto Area: A descriptive analysis of trends from 1986 to 2006 and the policy implications

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## ABSTRACT

This paper extends research on urban form and travel behavior beyond adult travel by examining teen travelers aged 13–19 in the Greater Toronto Area. Data from the Transportation Tomorrow Survey (TTS) survey are used to study four main research questions: (1) How has teen mode choice changed from 1986 to 2006? (2) How do these choices vary as teens transition from the 13–15 age group to being of driving age (16–19)? (3) How do these choices vary across the different urban and suburban regions of the GTA? (4) What are some of the differences between teen travel and adult travel? Results show that in general, active transportation has decreased, while auto-passenger mode shares have increased across the region. The younger group walks more and the older group takes transit more for both school and discretionary travel. Jurisdictions with better transit supply and orientation have higher transit mode shares for school trips, but discretionary trips have very low transit mode shares. Walk mode shares for both school and discretionary travel are similar across all jurisdictions, regardless of whether they are urban or suburban. In contrast to adult travel in the GTA, built form characteristics and transit supply do not appear to have a direct relationship with teen mode choice. Urban form appears to exert an indirect influence on teen travel.

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## 1. Introduction

Urban researchers and practitioners generally agree that current land development patterns are problematic. The discussion is focused on altering current growth regimes to yield genuine changes in the way people travel. Over the past several decades, various policies based on transportation–land-use interactions have been developed and enacted to address problems of auto-ownership and use. Some policies have been more effective than others. Badoe and Miller (2000) review literature on empirical studies of these interactions and identify significant discrepancies in findings. Some studies show that urban densities, traditional neighborhood design and land-use mix have a strong impact on auto-ownership and use, while others find the impact to be marginal at best. Even when empirical evidence suggests that auto-dependence is lower in traditional style neighborhoods, it provides little insight as to whether altering non-traditional style urban form will actually lead to a genuine change in travel patterns (Handy, 1996).

The lack of clarity in the findings has been linked to several key issues in the recent literature. These include: the difficulty of

translating built form elements into their meaning for the kinds of choices available to residents; and incorporating attitudes and preferences into models in order to address the idea of self-selection (Kitamura et al., 1997; Bagley and Mokhtarian, 2002; Krizek, 2003; Schwanen and Mokhtarian, 2005). Both involve going beyond the work-trip to assess discretionary travel choices.

### 1.1. Why study teen travel?

The research presented in this paper is motivated by the issues identified above. Rather than focusing on the automobile dependence of adult travelers, the work explores the urban mobility of an understudied demographic: teenagers. Teens do not have the same needs, demand patterns or freedom of choice as working adults. What are the key decision-making factors that impact their travel patterns? To what extent does urban design influence their mode choice? Is built form a direct influence, or does it indirectly influence travel choices by informing variables such as real and perceived neighborhood safety, parental attitudes, household transportation options, etc.?

Focusing on teens extends the research beyond the work-trip emphasis, while avoiding the methodological issue of self-selection. Teens do not choose where they live and generally, are still developing attitudes and preferences toward travel. As a mobility impaired group, they are a prime transit user market and more

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likely to use active modes if given the opportunity. When children enter their teenaged years they are no longer entirely bound to a supervising adult's schedule, habits and preferences and as a result, begin to make independent travel decisions. In what ways does this independence change his or her mobility patterns, if at all? Understanding more about the way this group travels, even if this understanding cannot be generalized to encompass the behavior of the entire demographic, may provide insight into how policy can better respond to overall mobility needs.

## 1.2. Current research on teenagers and transportation

There is a limited body of research exploring the specific transportation needs of teens, and a slightly larger body of research focused child travel in general, primarily the trip to school. A general lack of access to independent means of travel has been identified, causing teens to rely on adults for much of their travel. A study by McDonald (2006), using data from the 2001 National Household Travel Survey (NHTS), shows that in general, youth travel is automobile dominated with nearly 75% of trips being made in private vehicles. This focus on the automobile has major health and environmental implications, but also represents a constraint on the caregivers of teens without a driver's license. In fact, children have been included as a variable in transportation studies to determine the extent of their influence and constraint on the scheduling of activities and trips (Bhat, 1998; Damm and Lerman, 1981). The findings also have equity implications; children are five times more likely to travel with their mothers as with their fathers (McDonald, 2006). Several other studies have also shown that women bear most of the responsibility for chauffeuring children and make more trips to serve passengers than men (McDonald, 2008; Blumenberg, 2004; England, 1993; Kwan, 1999). Once youth reach driving age, their behavior dramatically favors the automobile, with 40% of teens aged 16–18 reporting to be the primary drivers of a household vehicle. Research conducted in various communities in the United States shows that teens gain greater independence as they age; however, this independence comes with a greater reliance on the automobile. Younger teens use a wider variety of modes (Clifton, 2003). By late adolescence, the automobile is a well established part of the lives of American teens. Relatively little is known about the degree of automobile dependence amongst teenagers in the Canadian context.

The degree of auto-dependency and lack of independent travel amongst American teens can partially be attributed to a general lack of transit use. There are over 28 million teenagers in the United States, making up approximately 9–21 percent of U.S. transit ridership depending on urban area size (Cain, 2006). Transit accounts for approximately 1–3 percent of teenagers' aggregate person trips. This can be attributed to lack of transit supply, reliability issues, safety concerns, cost and general negative perceptions associated with public transit travel (Cain 2006).

Another growing concern is the reduction in active travel mode-use for both discretionary and school travel. Studies show that the issue of active travel can be linked to variables that are not always directly linked to urban form. Kerr et al. (2007) look at pedestrian travel in Atlanta by youths aged 5–18 years. The results show a more significant relationship between urban form variables and the travel choices of people in high-income households. Among low-income and non-white youth, environmental variables generally exhibited weak associations with the choice to walk. This suggests that lack of vehicle access creates a necessity to walk that would exist regardless of whether a neighborhood is walkable or not. Tal and Handy (2008) examine children's biking for non-school purposes, specifically exploring the factors associated with biking to Saturday morning youth soccer games in

Davis, California. The findings show that over three-quarters of players and their parents drove to the game, with fewer than 20% biking. While the distance from home to the game is a significant deterrent to using non-motorized modes, players who bike to school and whose parents bike regularly are much more likely to bike to the games. Although this study focuses on a very specific case, it points to the need for more research exploring the influence of physical, attitudinal and logistical factors on a child's mode choice.

Recently, there has been attention placed on the trip to school, focusing on the shift from children walking to school to be predominantly driven there by a parent (Grize et al., 2010; Buliung et al., 2009; Ewing et al., 2004; Fulton et al., 2005; McMillan, 2005; McDonald, 2006). McMillan (2007) examines the influence of urban form on the trip to school, as well as the magnitude of influence urban form and non-urban form factors have on children's travel behavior. The study focuses on 16 elementary schools in California in order to assess ways in which the Safe Routes to School (SR2S) policies can be made more effective. Odds ratios indicate that perceptions of neighborhood and traffic safety, transportation options and social/cultural norms have a greater magnitude of influence on travel behavior than that of urban form. However, it was found that the urban form variables contributed significantly to the model fit.

Again, there is relatively little work done in the Canadian context. Buliung et al. (2009) studied the spatial trends in active transportation of children aged 11–15 for school trips in the Greater Toronto Area. Similar to other studies, they found that between 1986 and 2006, walking mode share for trips to school declined significantly. Children aged 11–13 walked more in urban regions than in the suburban regions; however, children aged 14–15 walked more in the suburbs and took transit more in the urban regions. The results point to a general need for more active transportation policies and programs.

## 2. Methodology and data

The GTA is Canada's largest metropolitan region. It includes the City of Toronto and four surrounding municipalities (Durham, York, Peel and Halton). As a whole, it is similar to other North American cities, exhibiting trends such as increasing individual auto-ownership and auto-driver trip rates, as well as increasing suburbanization of the population and employment into areas poorly served by transit (Miller and Shalaby, 2003). At the same time, the GTA (particularly the City of Toronto) deviates from some of these patterns. The continuing strength of the Toronto central area has allowed for the provision of strong, viable transit service and orientation. Furthermore, there is high-density development throughout even the inner suburban portions of the city. Thus, while current trends are headed in an unsustainable direction, the region possesses the potential required to facilitate an efficient transportation system for all travelers.

This paper presents a descriptive analysis of the evolution of teen travel in the GTA from 1986 to 2006, with a focus on current trends. The reason for this analysis is to gain a general understanding of how teenagers in the GTA travel and the kinds of choices they make in relation to their region of residence. Four research questions are examined: (1) How has teen mode choice varied over time? (2) How do these choices vary as teens transition from the 13–15 age group to being of driving age (16–19)? (3) How do these choices vary across the different urban and suburban regions of the GTA? (4) What are some of the differences between teen travel and adult travel?

The data analyzed are drawn from the Transportation Tomorrow Survey (TTS), a large-scale personal travel behavior survey

undertaken in the GTA. The TTS is an on-going survey program that consists of a 1-day telephone interview of GTA residents every 5 years, using consistent survey instruments and procedures. The latest version was conducted on behalf of twenty-one local and provincial agencies.

The 1986 TTS includes completed interviews for a 4.2% random sample of all households in the GTA (171, 086 persons). The 1991 TTS data are not used because the sample was limited to specific areas exhibiting large population growth. The 1996 (312, 781 persons), 2001 (374, 182 persons) and 2006 (401, 653 persons) data were analyzed, each one using a sample size of 5%. Travel behavior for randomly selected households (including children 11 years or older) was proxy reported by an adult household member.

### 2.1. Limitations

One limitation of the TTS data set is its treatment of discretionary travel. Discretionary travel is defined as all trips other than home-based work and home-based school. The TTS survey divides these trips into three sub-categories: home-based shopping, home-based other and non-home-based. Unfortunately, due to the use of third-party respondents to report trips made by other household members, discretionary travel is under reported in this survey. The under reporting is significant with respect to public transit, auto-driver and cycling trips; however, the TTS provides correction factors. Due to this limitation, it is difficult to get a rich picture of teen discretionary travel patterns. The survey data is more reliable in terms of the trip to and from school.

Further to this issue, total trip-making is underestimated because walk trips are recorded for work and school trips only in the TTS survey. Bicycle trips are recorded for all trip purposes in the 1996, 2001 and 2006 surveys, but only for school and work trips for the 1986 survey. Thus, the TTS data provides an adequate preliminary trend assessment of overall teen travel, but supplementary data are needed in order to fill in the details (Fig. 1).

## 3. Results—GTA trends (1996–2006)

In order to understand teen mobility in the GTA, there are a few key points regarding the public transportation system that must be mentioned. Downtown Toronto and its inner suburban ring are served by the highly coordinated Toronto Transit Commission (TTC). The TTC consists of a grid network of surface routes (buses and streetcars) covering the city and feeding into a radial subway system. The rest of the GTA is served by buses with varying levels of frequency and reliability. Many neighborhoods in the downtown core are considered to be pedestrian friendly. They exhibit principles that promote livability as highlighted by Jane Jacobs, such as short blocks, a mix of uses, a mix of old and new buildings and sufficient density to support transit (Jacobs, 1961). There are approximately 700,000 teens aged 13–19

currently traveling in this region, representing about 10% of all GTA travelers.

The presence of viable public transportation is a likely influence on a teen's decision to obtain a driver's license or a transit pass. Table 1 shows that in the urban city of Toronto, there has been a 10% decrease in the percentage of teens aged 16–19 with a license over the past two decades. Conversely, in the suburban municipalities the numbers have not dropped significantly, and have even increased slightly (York, Halton). In 2001, all municipalities exhibit an upward spike in the percentage of teens (16–19) with a license, and a drop in the percentage of teens (13–19) with a transit pass (Table 2). Table 2 also shows that Toronto exhibits the largest growth in the number of teens with a transit pass (4%), followed by Hamilton (2%). This is not surprising in light of the superior transit supply available in these municipalities. The dip in transit passes in 2001 is possibly due to survey collection error.

### 3.1. Overall trip generation and modal shares from 1986 to 2006

Throughout the GTA, teens aged 13–19 average a daily trip rate of 2.5 trips per day. Daily trip rates are generally higher in the suburban municipalities than in the urban municipalities. If the trip rates are disaggregated by type, it is clear that teens aged 16–19 are making a wider variety of trips, with more discretionary, non home-based and work trips being made. Overall, trip rates have not changed appreciably over the past two decades (Table 3).

Between 1986 and 2006, there has been an increase in personal automobile travel for all teens, particularly in terms of auto-passenger travel (see Fig. 2). This increase is evident in both age groups. Passenger mode shares have increased significantly for the younger group (13–15), from 22.1% to 39.7%. This increase is met with an 8.6% drop in active travel mode shares (walking and biking), and an 8.3% drop in transit shares. Parents and caregivers are likely facilitating this modal shift by driving teens to their various destinations. The 16–19 year olds are also exhibiting a shift toward auto-passenger mode, showing an increase of 11.1% over the past two decades. It is interesting to note, however, that auto-driver mode shares have decreased from 22.8% to 14.8%. This could suggest a drop in independent travel for this age group. Unfortunately, at this time the TTS survey does not collect information on whether a trip is made alone or with a companion (parent, caregiver, friend, sibling, etc.). For the older age group, the active travel modal shares have not changed appreciably over the past 20 years, while the transit share has seen a 3.9% drop.

### 3.2. Trip to school and discretionary travel 1986–2006

To better understand the differences in mode choice between the two age cohorts across the GTA region, school and discretionary travel are examined more closely. As expected, there has

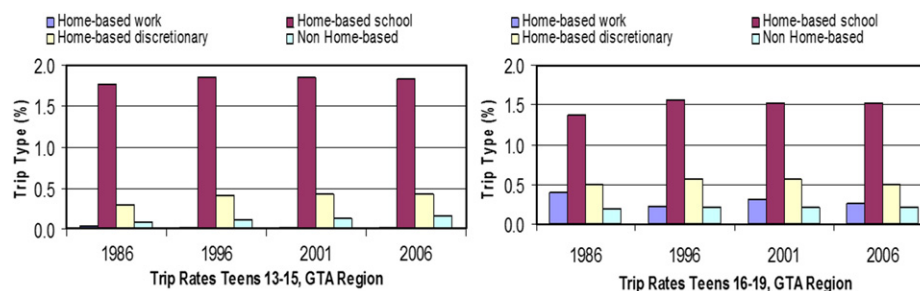


Fig. 1. Daily trip rates for whole GTA region by type and year.

been a slight decline in overall walk mode shares for both age groups, as well as a notable increase in auto-passenger mode shares. The younger teens tend to walk to and from school more than the older teens (8–12% larger walk mode shares). This could be because elementary school catchment areas are generally smaller than those of high schools. Also, within the GTA, several high schools have special programs (e.g. French immersion, music and art focused streams, accelerated mathematics streams, etc.), allowing students to attend schools that are not located within their neighborhood. It also appears that the older group uses public transit more, while the younger group uses the school bus more, particularly in suburban regions. This is because in the City of Toronto, when a child attending middle school (grades 6–8) or high school (grades 9–12) lives more than 4.8 km from their school, they do not have the option of school bus transportation but can request to receive TTC tickets from the school board.

The auto-driver mode shares for the trip to school (16–19 age group) have decreased across all jurisdictions over the past two

**Table 1**  
Percentage of teens aged 16–19 with a license, by region.

	1986	1996	2001	2006
Toronto	47.4	39.2	44.2	37.5
Durham	59.8	52.3	57.1	54.4
York	55.1	56.7	65.0	56.7
Peel	56.2	50.2	58.3	50.4
Halton	58.0	57.5	62.1	59.1
Hamilton	48.5	50.4	55.2	46.9

**Table 2**  
Percentage of teens aged 13–19 with a transit pass, by region.

	1986	1996	2001	2006
Toronto	n/a	13.9	11.6	17.9
Durham	n/a	12.0	8.7	12.4
York	n/a	7.2	4.2	8.1
Peel	n/a	6.2	4.1	5.4
Halton	n/a	4.2	2.6	6.2
Hamilton	n/a	14.4	9.3	16.4

**Table 3**  
Total trip rates for teens in GTA region.

	13–19	13–15	16–19
1986	2.34	2.18	2.44
1996	2.48	2.39	2.56
2001	2.54	2.45	2.61
2006	2.47	2.45	2.49

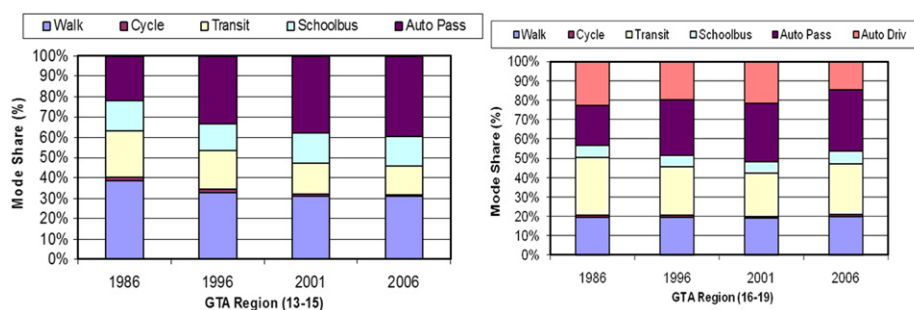
decades. This is likely related to the introduction of graduated licensing in Ontario in 1994. The process begins with a written test, allowing the teenager to drive while supervised by an adult with over five years of driving experience. After 12 months (or 8 months if a certified training course is taken), the teen can take a road test, and if he/she passes, can then drive unsupervised provided he/she abides by a strict set of regulations. After another 12 months, the teen can take a second road test, which if passed will allow him/her to obtain a full license. This graduated licensing scheme comes with a set of complicated insurance regulations, which, if not followed, can result in high premiums.

In Toronto and Hamilton the car trips are replaced by transit trips. In the suburban municipalities, they are replaced by an increase in auto-passenger trips. This may indicate that urban areas with better transit supply provide more of an opportunity for older teens to travel independently.

Another interesting result is that from 1986 to 2006, there is little variation in walk mode shares across the GTA jurisdictions. It could be expected that the suburban-style built form would be less conducive to walking than the urban-style one. However, the results show that in 2006, for teens aged 16–19, the suburban municipalities of Durham, Peel and Halton even have a slightly larger walk mode share than Toronto and Hamilton. This suggests that if schools are located reasonably close to the homes of students, they are likely to walk there. Although York, the fastest growing suburban jurisdiction, has the smallest walk mode share, it is the only municipality that shows an increase in walk mode shares for both age groups over the past two decades (4.2% for teens aged 16–19). This suggests that regardless of neighborhood level urban form, the desire to walk, bike and take transit to school exists amongst this age group.

Looking at discretionary travel mode shares, it is clear that the private automobile dominates (Tables 4 and 5). For teens aged 13–15, the passenger mode share has increased by 12.1% in Toronto (urban), 12.9% in Hamilton (semi-urban), 4.6% in York (suburban) and 3.12% in Peel (suburban). For teens aged 16–19, the increase has been very dramatic, from an 8.5% increase in Halton (suburban) to a 22.1% increase in Peel. Equally dramatic is the decrease in auto-driver mode shares for this age group. Driver shares have dropped anywhere from 13.3% in Halton to 25.4% in Peel. These fluctuations do not seem to be significantly tied to the urban form, as changes have similar magnitude and direction across the board. It appears that 16–19 year olds are increasingly being driven around by others (parents, friends, siblings) as opposed to driving themselves. Again, this finding must be considered in light of the introduction of stricter licensing regulations, as well as increases in teen driver insurance premiums.

Transit mode shares have also decreased for both age groups in all jurisdictions. The drop is particularly significant for the 13–15 year olds, from a 2.6% drop in Halton to a 19.8% drop in



**Fig. 2.** Total mode shares for teens in GTA region.



**Table 4**

Percentage change in mode shares from 1986 to 2006 for teens aged 13–15 by GTA region.

Region	Walk	Transit	Auto-passenger
Toronto	2.23	–15.09	12.08
Durham	4.41	–4.67	–0.34
York	3.09	–8.51	4.57
Peel	2.30	–6.04	3.12
Halton	1.35	–2.61	–0.35
Hamilton	6.79	–19.83	12.92

**Table 5**

Percentage change in mode shares from 1986 to 2006 for teens aged 16–19 by GTA region.

Region	Walk	Transit	Auto-driver	Auto-passenger
Toronto	2.07	–0.90	–16.11	13.92
Durham	2.82	–1.47	–17.90	15.52
York	2.21	–0.14	–16.51	13.65
Peel	2.37	0.80	–25.35	22.13
Halton	5.32	–1.90	–13.34	8.49
Hamilton	1.69	–2.55	–14.82	13.96

Hamilton. In Toronto, there has been a 15.1% drop in discretionary transit mode shares despite the superior transit supply in this jurisdiction. This could be due to fare increases coupled with a lack of transit investment in these areas. In contrast, walk mode shares have increased across all jurisdictions for both age groups. For the 13–15 age group, Durham and Hamilton have had the greatest increase in walk mode shares (4.4% and 6.8%, respectively). York region, a typical suburban municipality, has seen a 3.1% growth in walk mode shares, which is higher than the 2.2% growth in Toronto. For the older age group, Halton (another suburban jurisdiction) exhibits the largest growth in walk shares (5.3%). These results are surprising given the assumption that teens are more likely to walk and take transit for discretionary travel in Toronto than in the suburban areas (Fig. 3).

### 3.3. Teen travelers as compared to adult travelers in the GTA

To assess some of the ways in which teen and adult travel patterns differ, mode choice by trip type and trip length are examined for three age groups: 13–15, 16–19 and 20–70. Data from 2006 for Toronto (urban) and Halton (suburban) are examined. Considering Tables 6 and 7, it is clear that regardless of trip type, auto-driver is by far the dominant mode for adult travelers in both jurisdictions. Unlike teen travelers, adult mode choice follows a more predictable pattern in relation to neighborhood-level built form attributes. In Halton, where there is poor transit supply, low residential density (approximately 20 dwellings/hectare), and mostly single-use development, auto-driver mode shares are very high (71.14–90.31%). In Toronto where there is strong, viable transit supply, higher residential density (approximately 150 dwellings/hectare), grid-pattern street networks with mixed-use development and other pedestrian amenities, walk and transit shares are higher. Adult home-based work and school trips have a walk mode share of 6.53% and 14.74%, respectively, both lower than the walk mode shares for both teen age groups. Halton has very small walk and transit mode shares of less than 2% for all trip types except home-based school. Adult transit shares are highest in Toronto, representing 32.02% of home-based work trips and 60.83% of home-based school trips. Furthermore, in contrast to adult travelers, teen traveler auto-passenger mode shares appear to be much less dominant for all trip types and jurisdictions.

Looking at the trip lengths, the data show that 80% of the trips to school for teens 13–19 are less than 5 km, which is ideal for using modes such as walking, biking or public transportation. The discretionary trip profile shows the tendency toward longer trip lengths, which corresponds to the dominance of motorized modes for these trips. It would be interesting to collect more detailed data in order to determine what kinds of discretionary trips teens in the GTA are making and why they are perhaps longer than their trips to school.

Modal split by trip length (2006 data) for teens and adults in Toronto and Halton are shown in Fig. 4. Again, it can be seen that regardless of neighborhood built form, teens in both age groups walk for approximately half of their trips that are less than 2 km (1.2 miles) in length. Conversely, the built form does seem to have a relationship with adult walk shares. In Toronto, for trips less than 2 km (1.2 miles), the walk mode share is 14.46% but drops to 2.94% in Halton.

For trips over 2 km (1.2 miles), the neighborhood urban form and transit supply impact mode shares for all three age groups in different ways. For teens in Toronto, as the trip length increases, so do auto-passenger shares (especially for the 13–15 year olds) and transit shares (especially for the 16–19 year olds). Although the driver mode is dominant for adults in Toronto, transit does exhibit a strong presence. In Halton, teen transit shares are low for trips over 5 km (3 miles). Adult transit shares are even lower than those of teens, particularly in Halton, where they shrink to almost zero. The lack of transit supply likely contributes to the increase in auto-driver mode shares for longer distances in both these jurisdictions. Finally, while teens in both municipalities walk for about half of their trips under 2 km (1.2 miles) and around 5% of their trips that are 3–5 km in length, adults almost never walk for any trip over 2 km (1.2 miles). This can be partially attributed to the difference in nature of trip-making behavior amongst adults and teens. For example, adults make provisioning trips (e.g. grocery shopping) that are made easier when traveling by car. Also, the trip to work is generally unconstrained for adults, whereas the trip to school often falls within the neighborhood. The difference in mode choice could also be a result of teens not having access to an automobile and having to make do with walking or transit, regardless of preference.

If the data are examined further, it is clear that adult trip lengths are predominantly longer than those taken by teens aged 13–19. The portion of trips that are over 2 km (1.2 miles) drops by 14% as soon as the trip-maker region of residence moves from the downtown core to the inner urban core. This portion drops another 3–5% as the trip-maker's region of residence moves from the inner urban core to the inner ring (Etobicoke, North Toronto, Scarborough) and outer ring suburbs (York and Halton regions). This is due primarily to employment destinations, but also to discretionary travel destinations. It could also be a result of differing attitudes, preferences and personal freedom. Overall, the results are interesting and suggest that teens and adults travel in significantly distinct ways. It is important to make genuine attempts at understanding the differences in order to meet the needs of various groups of travelers, who use the transportation system in different ways.

## 4. Discussion and conclusion

The examination of teen travel between 1986 and 2006 in the GTA using TTS data is revealing in several ways. Overall, there has been an increase in personal automobile travel for both age groups, particularly in terms of auto-passenger travel. For teens aged 13–15, the increase in auto-passenger mode has been met with a decrease in active travel mode shares and transit shares.

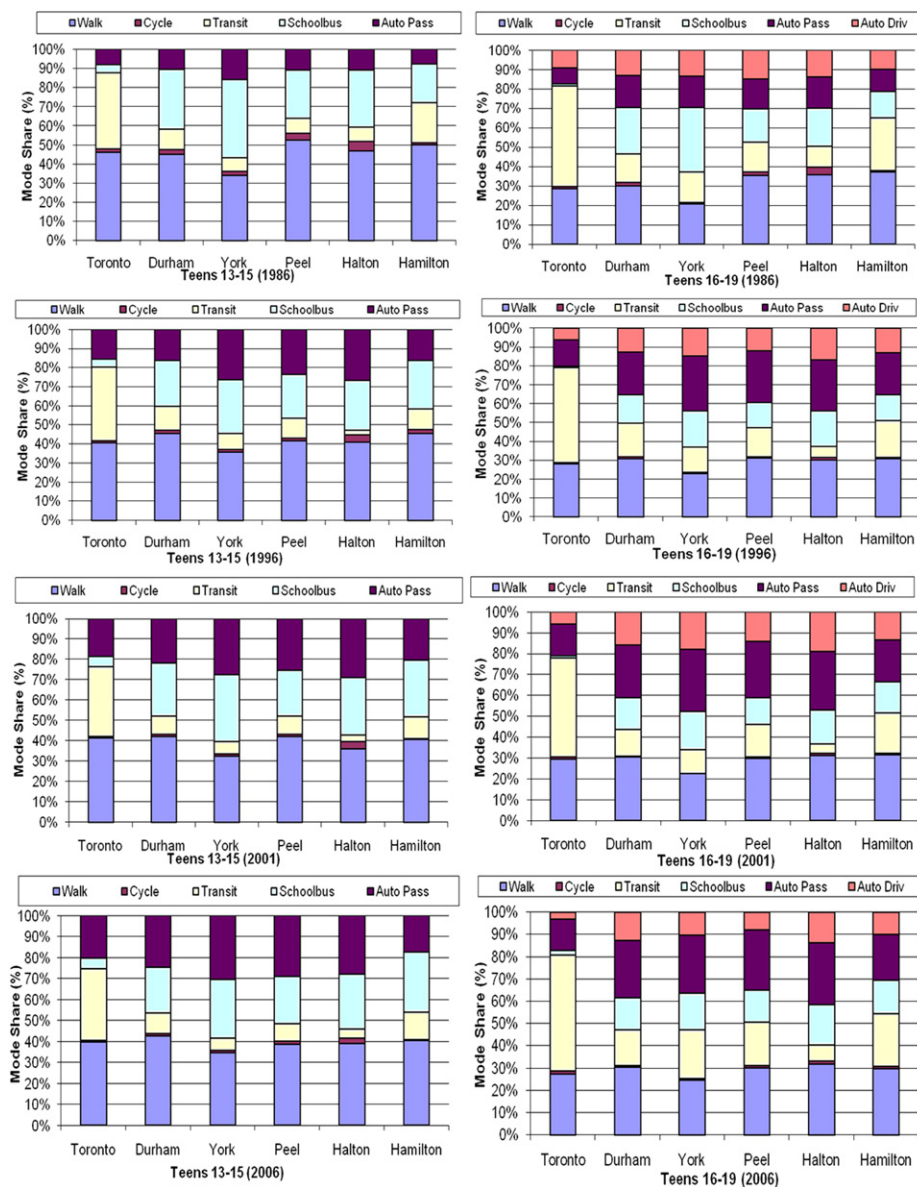


Fig. 3. School travel mode shares by municipality and year in the GTA.

Table 6

Mode shares by trip type for teen and adult travelers in Toronto (2006 data).

	Walk	Cycle	Transit	Auto-drive	Auto-pass
ADULTS					
HBW	6.53	1.42	32.02	<b>51.85</b>	8.11
HBS	14.74	2.00	<b>60.83</b>	15.59	6.76
HBD	1.25	1.05	12.94	<b>69.00</b>	15.62
TEENS (13–15)					
HBW	27.38	0.00	31.95	0.00	<b>40.67</b>
HBS	<b>39.65</b>	0.81	33.98	0.00	20.29
HBD	8.74	0.61	20.83	0.00	<b>66.32</b>
TEENS (16–19)					
HBW	13.16	2.16	<b>44.59</b>	14.26	25.50
HBS	27.55	1.19	<b>52.15</b>	3.21	13.86
HBD	3.51	1.40	28.18	18.52	<b>48.23</b>

HBW=Home-based work trips; HBS=Home-based school trips; HBD=Home-based discretionary trips.

Table 7

Mode shares by trip type for teen and adult travelers in Halton (2006 data).

	Walk	Cycle	Transit	Auto-drive	Auto-pass
ADULTS					
HBW	1.93	0.23	1.52	<b>90.30</b>	6.00
HBS	4.23	0.00	15.13	<b>70.85</b>	9.39
HBD	0.13	0.17	0.48	<b>85.57</b>	13.59
TEENS (13–15)					
HBW	29.86	0.00	8.89	0.00	<b>61.25</b>
HBS	<b>38.95</b>	2.59	4.38	0.00	28.07
HBD	9.74	1.56	3.03	0.00	<b>76.90</b>
TEENS (16–19)					
HBW	14.60	1.39	5.35	32.20	<b>46.47</b>
HBS	<b>31.79</b>	1.43	7.21	13.67	27.62
HBD	3.20	1.06	6.38	22.22	<b>50.08</b>

HBW=Home-based work trips; HBS=Home-based school trips; HBD=Home-based discretionary trips.

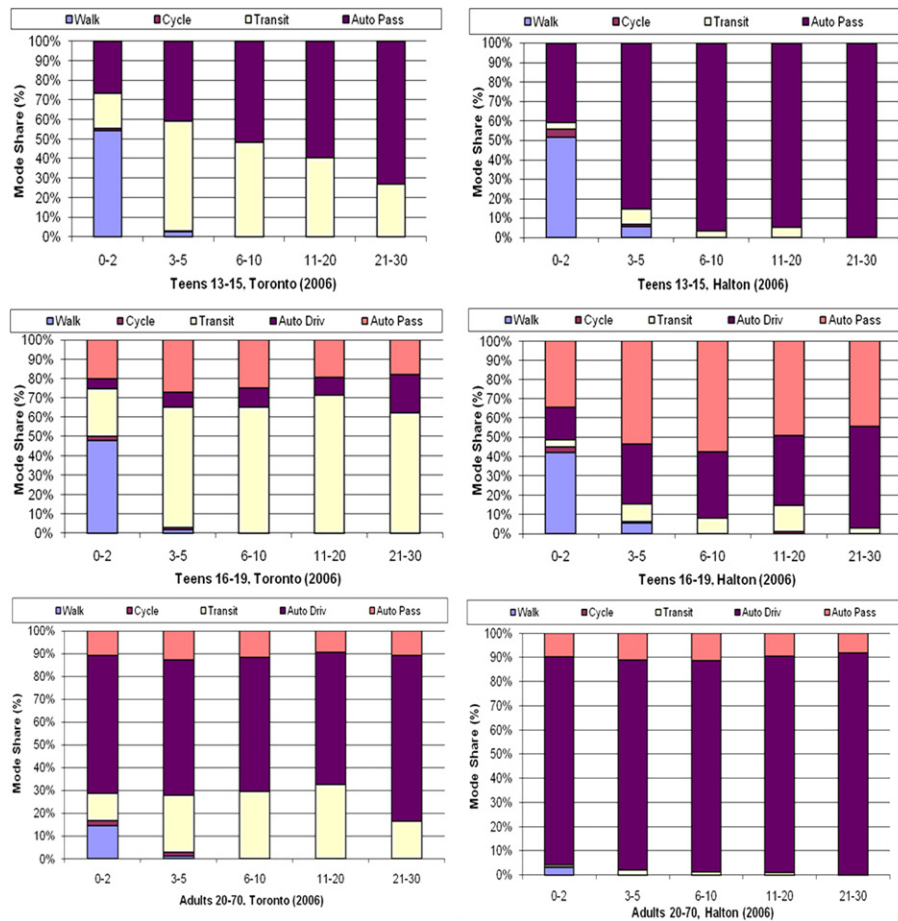


Fig. 4. Modes shares by trip length for teen and adult travelers in Toronto and Halton for 2006.

For the older group, the auto-passenger mode has increasingly dominated the auto-driver mode, suggesting a drop in independent travel.

It appears that, currently, teens in this region mostly walk or take transit to school, but are driven around by others for most of their discretionary trips. From 1986 to 2006, there is little variation in school trip walk mode shares across the GTA jurisdictions. Regardless of neighborhood-level built form, teens in the GTA make a significant number of walk trips. Nevertheless, there has been a slight decline over the years in active travel to school throughout the region for both age groups, and a sharper decline in auto-driver trips to school for the older group. In urban jurisdictions, these trips are replaced with transit and in suburban jurisdictions they are replaced with auto-passenger trips. This is an indication that transit supply and transit-oriented land-use provide more choice for teens and possibly induce a more autonomous mobility profile. In the same vein, the data show that areas with better transit supply exhibit larger growth in the number of teens with transit passes and a significant decrease in the percentage of teens aged 16–19 with a license over the past two decades. This suggests that the driver's license as a symbol of adulthood and freedom may not be as entrenched in the GTA as it was in Clifton's (2003) study of American teens.

As mentioned, the examination of discretionary travel reveals the prevalence of the private automobile in teen travel. Auto-passenger mode shares have increased dramatically for both age groups, with the older group increasingly being driven around by others (parents, friends and siblings). Surprisingly, walk mode shares have also increased across all jurisdictions for both age groups. Suburban areas with minimal pedestrian amenities

exhibit a greater growth in walk shares than Toronto. In contrast to the trip to school, transit use for discretionary travel has decreased in all jurisdictions, regardless of transit supply or built form.

As expected, teens choose to walk for short trips and seldom walk for trips that are over 5 km (3 miles). Usually, transit or auto-passenger modes are used for longer trips. Generally, the trips taken by teens in these areas are less than 10 km (6 miles). It appears that the trip to school is often short and that discretionary trips are longer. This corresponds to the finding that teens generally do not walk for their discretionary travel. Nevertheless, regardless of their region of residence, approximately 50% of their trips are short (under 2 km/1.2 miles), a sharp contrast to the trip length profile of adults in the same regions. This is possibly due to schools generally being located within a child's neighborhood, whereas employment can be scattered all over the GTA. The discrepancy could also be a result of difference in attitudes toward discretionary travel.

An important finding from this study is the significant difference between teen and adult travel behavior, particularly in terms of their correspondence with conventional travel behavior associated with certain built form attributes. Years of research has shown that adult travelers are more likely to walk or take transit in areas with strong, viable transit supply, higher residential density (approximately 150 dwellings/hectare), grid-pattern street networks with mixed-use development and other pedestrian amenities. Conversely, in suburban areas with single-use development, spread out amenities and lower residential density, adults are more likely to drive. The analysis of the TTS data for adults in the GTA generally conforms to these ideas. On the other

hand, the analysis of the same data for teens aged 13–19 is less predictable. As mentioned, in some cases transit supply and built form seem to have an impact on the decision to walk or take transit, and in other cases, teens choose to walk or take transit despite built form differences.

The results of the analysis support the hypothesis that neighborhood-level urban form is an important factor, but perhaps not directly linked to a teen's decision about school or discretionary travel. If this is the case, other factors, such as real or perceived neighborhood safety, traffic, household transportation options or scheduling, caregiver attitudes and socio-demographics, may be equally or even more important. These results are similar to those of McMillan (2007), which suggest that programs focusing on modifications to urban form to increase walking or biking may see little change in modal splits. Both studies find that planning decisions should be based on understanding the needs of all travelers, especially those who are dependent users of the transportation system.

From a transportation planning and policy perspective, the overall findings offer hope for increasing the use of alternative modes. Teenagers, like other travelers with limited access to automobiles, are more reliant on walking and transit for their trips. Contrary to American teens (Clifton, 2003), teens in downtown Toronto are not abandoning walking and transit as soon as the automobile becomes an option. Thus, there is a desire to walk or take transit, as long as use of these modes is an option. Increasing the frequency of certain transit routes in suburban areas would provide these teens with the opportunity to take transit for more of their discretionary trips, rather than receiving rides. Also, improving pedestrian infrastructure in suburban areas by adding pathways, sidewalks and traffic calming measures such as painted lines that reduce street-width, could go a long way in encouraging teens to walk.

Further work should be done to take a closer look at the kinds of discretionary trips teens in the GTA are making. Are they usually driven to these activities as is suggested by the TTS data? Are these trips generally longer than their trip to school? Do these trips differ for various age cohorts? And finally, who ultimately makes the mode choice — is it the teen's decision or the parents' decision to use the auto-passenger mode? Are these teens being driven around because they lack adequate means of transit; or are other personal or parental concerns such as the dangers of traffic or fear of crime driving this decision? Determining the constraints on discretionary travel, and whether these constraints are influencing the “choice” to be driven around, will help inform transit policy that can effectively meet the needs of this demographic.

Exploring these questions may require conducting interviews or focus groups with different groups of teenagers around the GTA. It may also require collecting more detailed data regarding mode choice and attitudes toward various modes. While the results presented confirm that built form is one of many factors that shape teen travel, they do not reveal the other factors involved in the process. For example, what role do attitudes and perceptions play in the decision-making process, and how are these attitudes shaped? The key will be to tease out the various factors that mingle in order determine the trip-making process for

this group. This understanding can help with the development of policy that encourages more active travel amongst teens, and hopefully, other groups of travelers.

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