Automated Vehicles in the Greater Toronto and Hamilton Area: Overview from a 2016 Consumer Survey

Part B: Data Overview

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TRANSFORM

Acknowledgements

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1.0 Overview

This report presents the descriptive findings from a consumer survey conducted in November 2016 on the topic of autonomous vehicles. These results should provide the basis for the discussion in *Part A: Summary and Discussion* and are further documented in *Part C: Survey Instrument*.

2.0 AV Attitudes

2.1 Awareness of Google Car

Figure 1. Responses to "I Have Heard of Google Car Before Today"

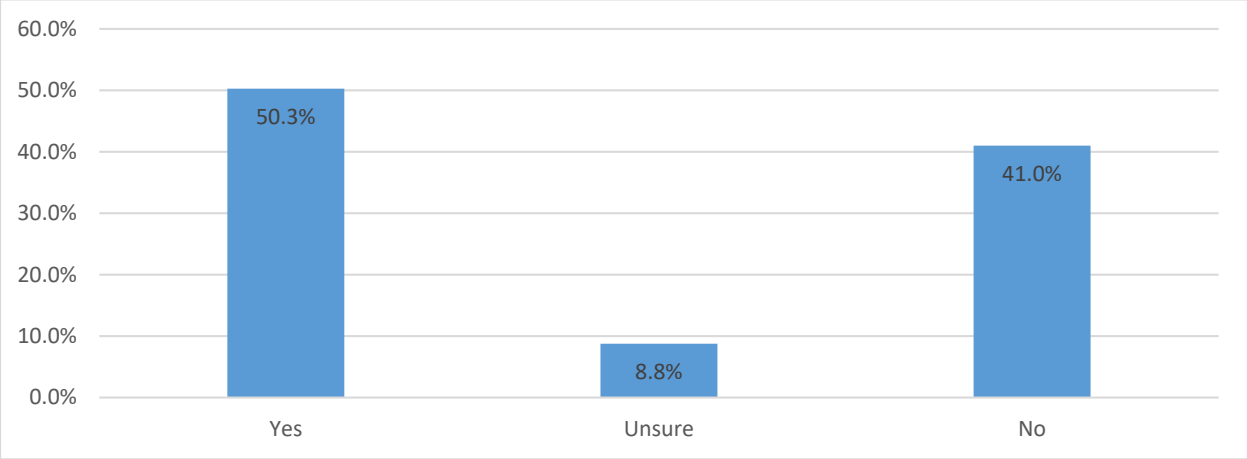
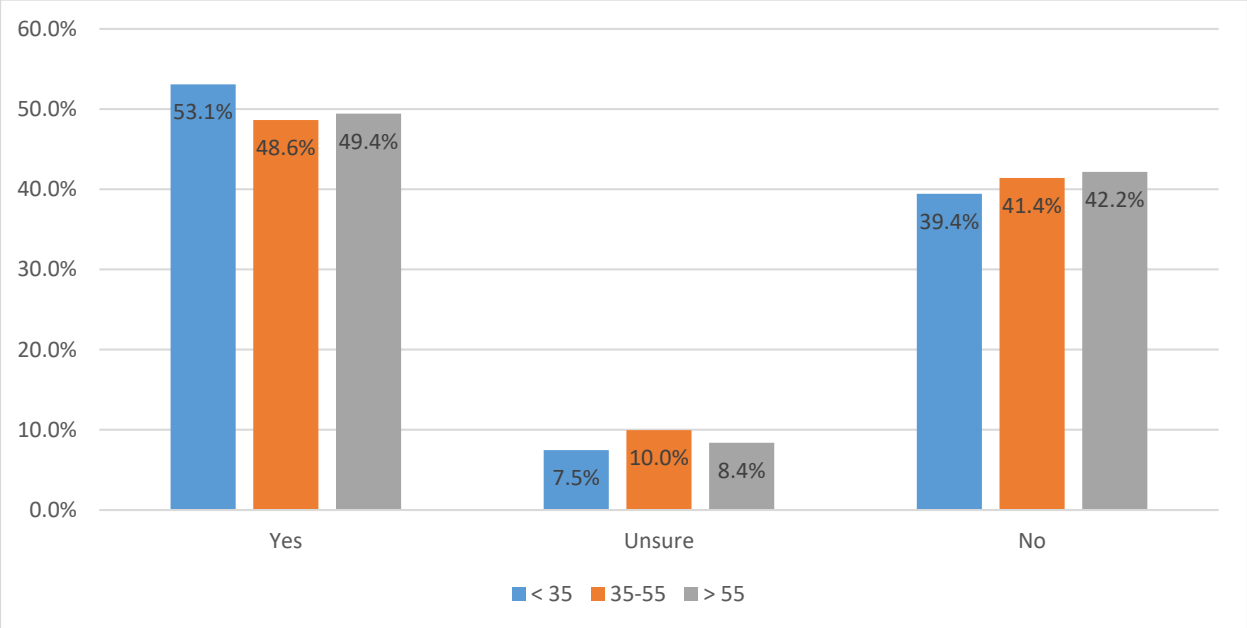


Figure 2. Responses to "I Have Heard of Google Car Before Today" (by Age)



Key Takeaways:

- Half of respondents have heard of the Google car, a reasonable indicator of specific familiarity with driverless cars

2.2 Awareness of Driverless Cars

Figure 3. Responses to "I Have Heard of Driverless Cars Before Today"

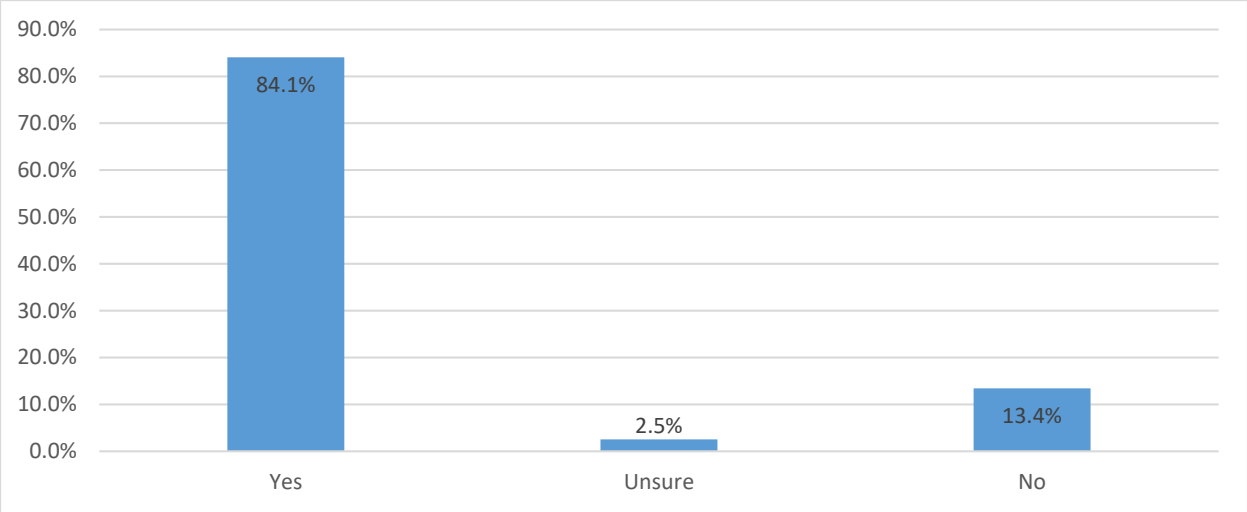
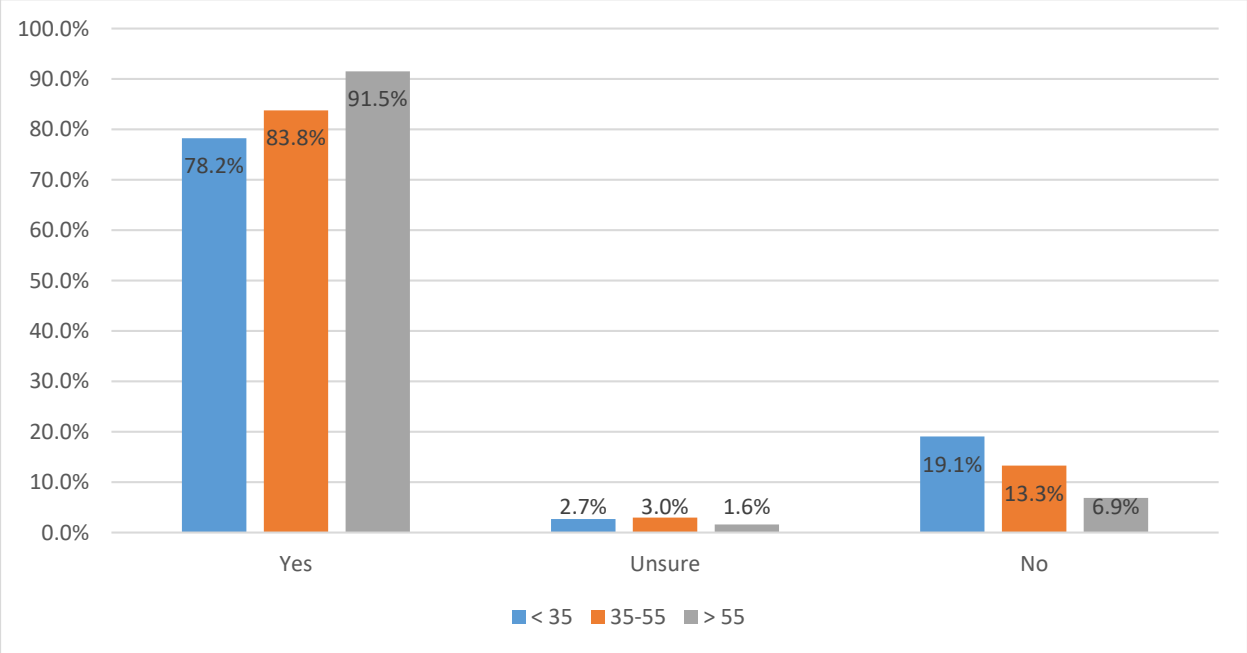


Figure 4. Responses to "I Have Heard of Driverless Cars Before Today" (by Age)

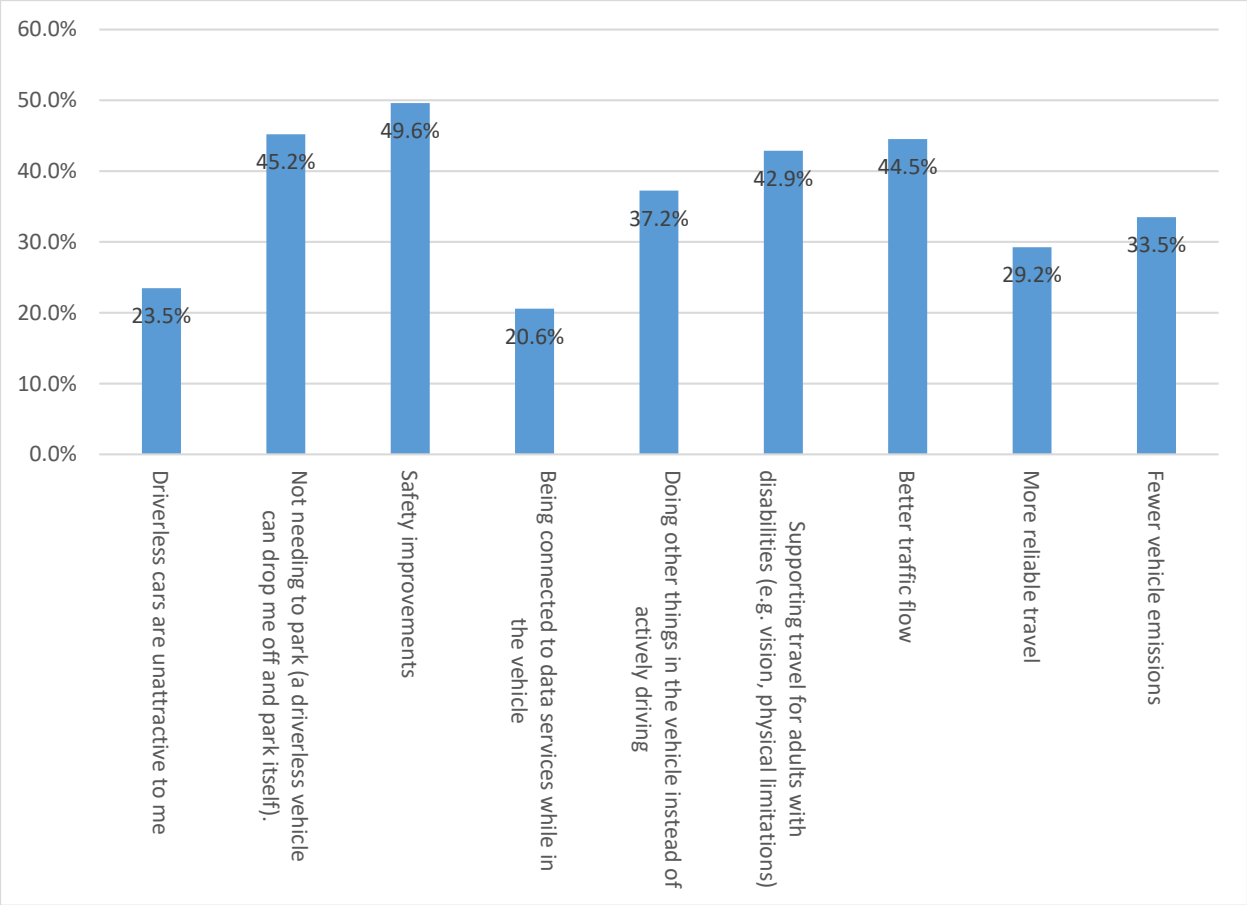


Key Takeaways:

- More than 80% of respondents have heard of AVs. Differences between knowledge of AVs and the Google Car suggest that even though individuals have heard of this technology, they may not be overly familiar

2.3 Interest in Driverless Car Benefits

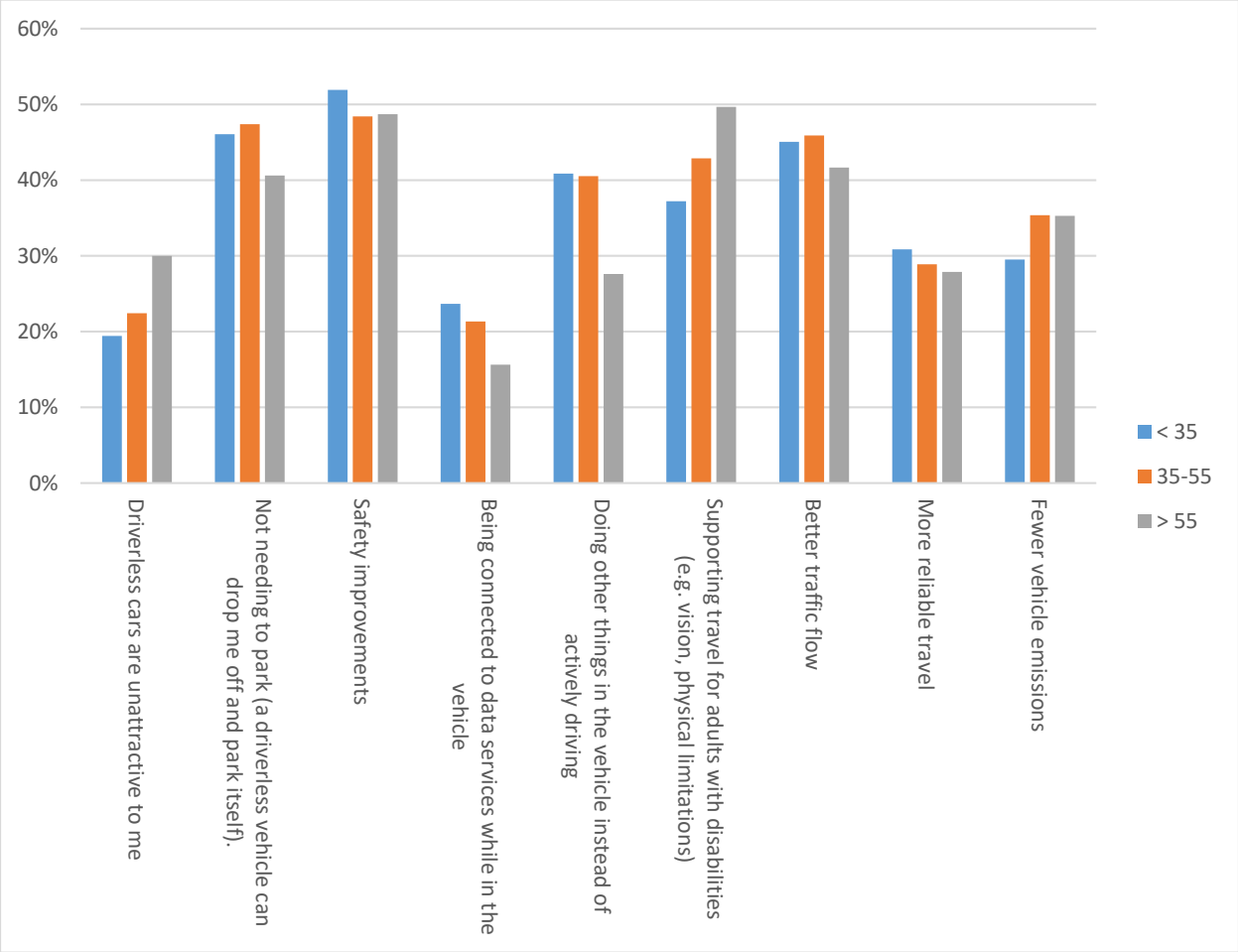
Figure 5. Driverless Car Benefits of Interest



Key Takeaways:

- One-quarter (23.5%) of respondents indicate AVs are unattractive to them.
- Higher-frequency AV benefits of interest (40% to 50%) include:
  - Safety
  - Parking
  - Traffic
  - Disability Services
- Lower-frequency AV benefits of interest (20 to 40%) include:
  - Multitasking
  - Emissions reduction
  - Reliability
  - Data connectivity

Figure 6. Driverless Car Benefits of Interest (by Age)



Key Takeaways:

- Strong age differences in
  - connection to data services,
  - support for disabilities,
  - multi-tasking, and
  - lack of interest entirely

2.4 Interest in Regular Use of Driverless Cars

Figure 7. Interest in Regularly Using Driverless Cars

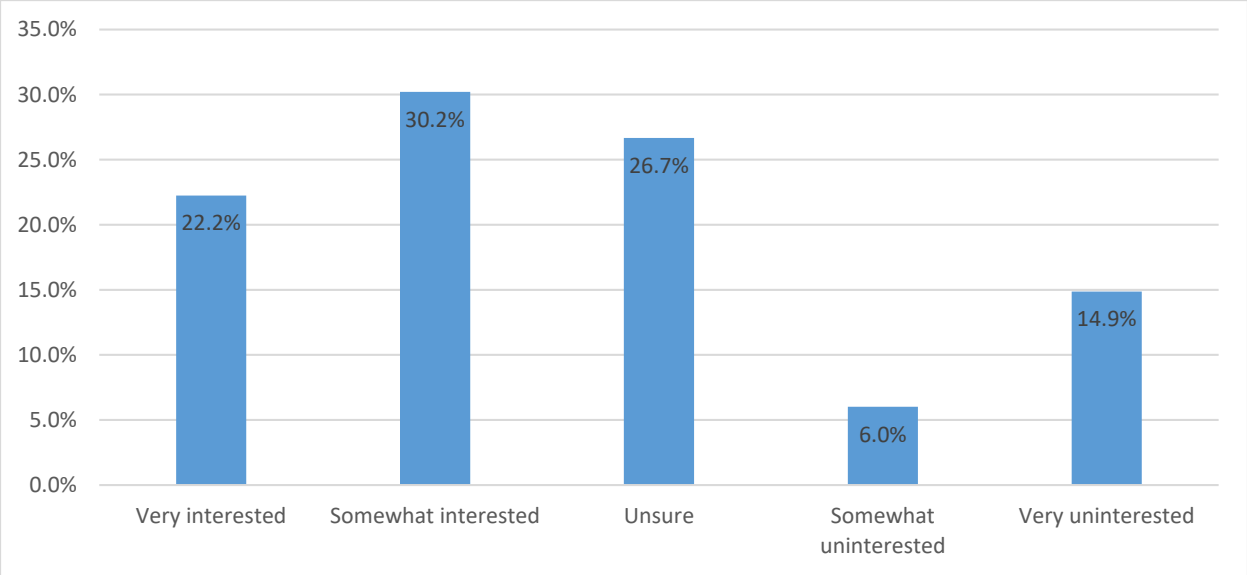


Figure 8. Interest in Regularly Using Driverless Cars (by Age)

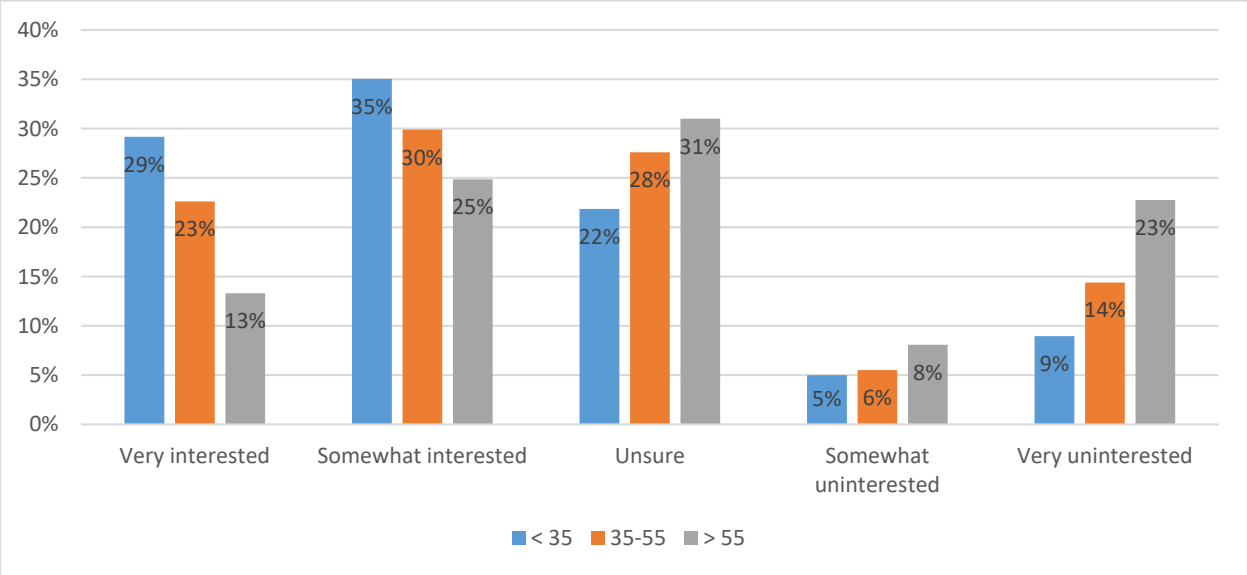
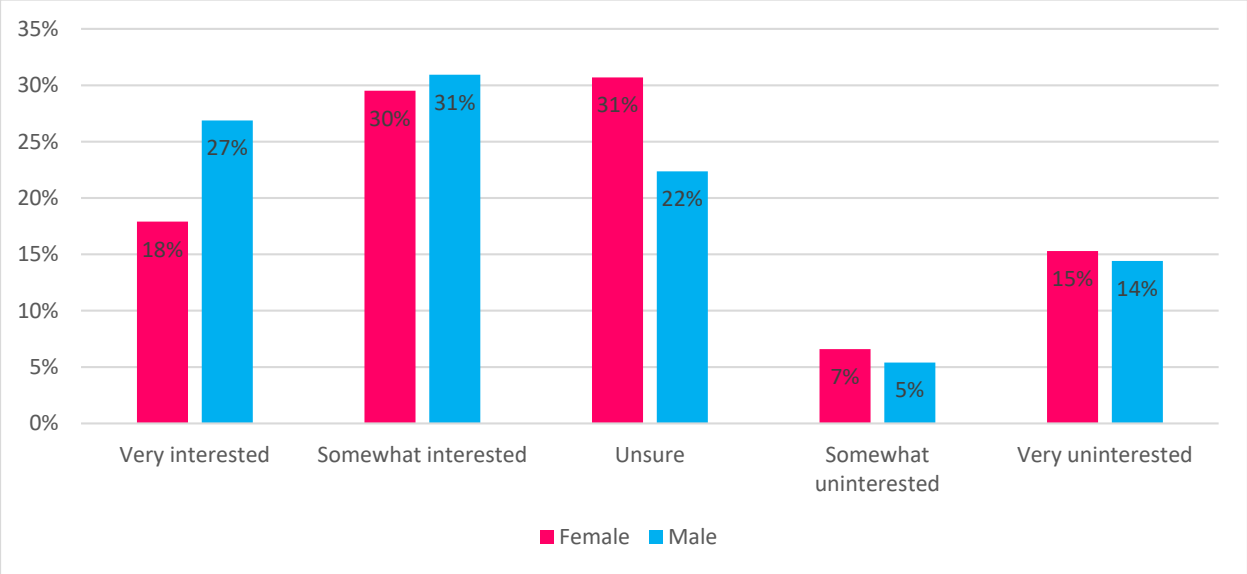


Figure 9. Interest in Regularly Using Driverless Cars (by Gender)

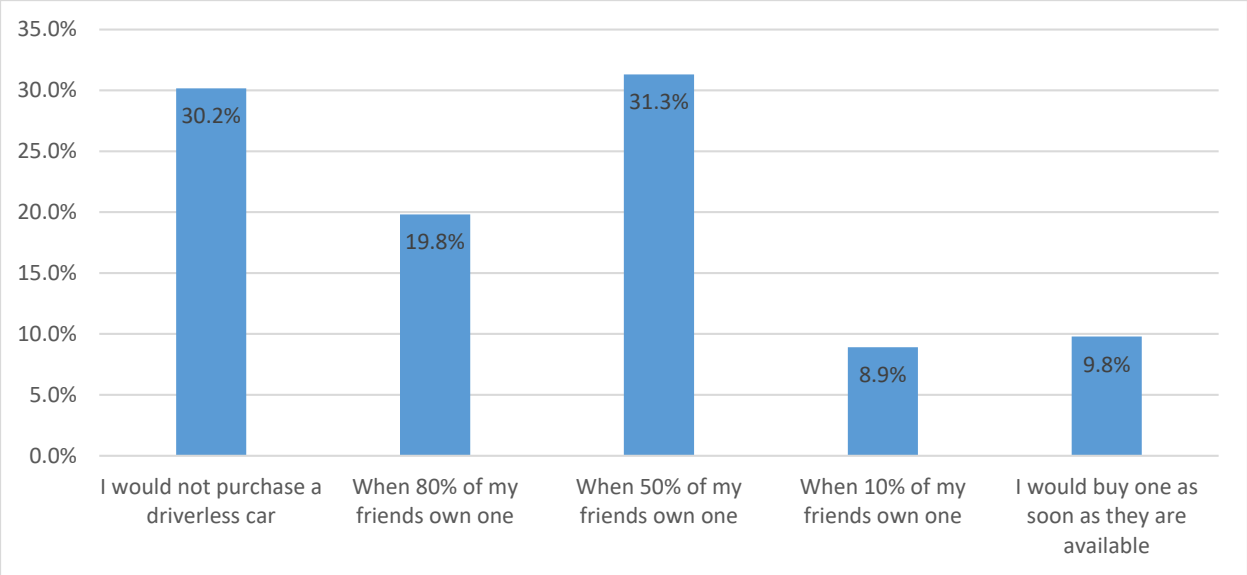


Key Takeaways:

- More than 50% of respondents were at least somewhat interested in regularly using a driverless car
- Declining interest and increasing disinterest in driverless car use with increasing age
- Males express more interest than females

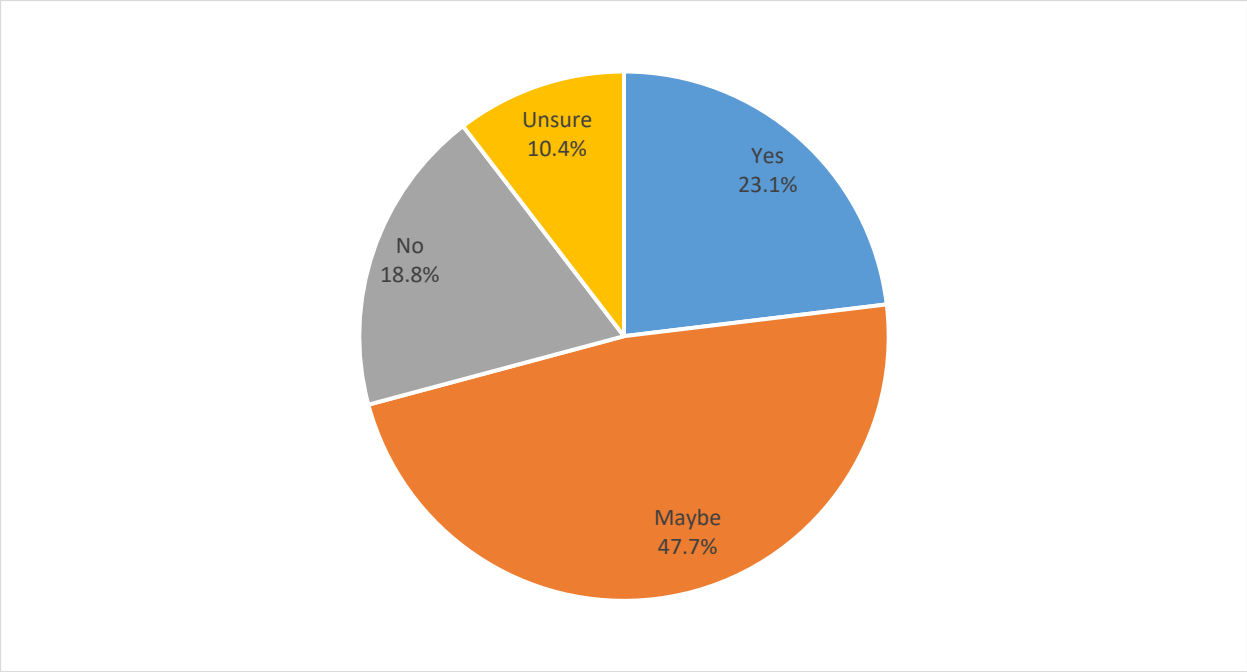
2.5 Purchasing a Driverless Car

Figure 10. Responses to "When Would You Consider Buying a Driverless Car?"



2.6 Paying for Additional Connected Capabilities

Figure 11. Interest in Paying Extra for Connected Vehicle Capability



2.7 Willingness to Pay for Partially Driverless Capabilities

Figure 12. Willingness to Pay Extra for Partially Driverless Capabilities

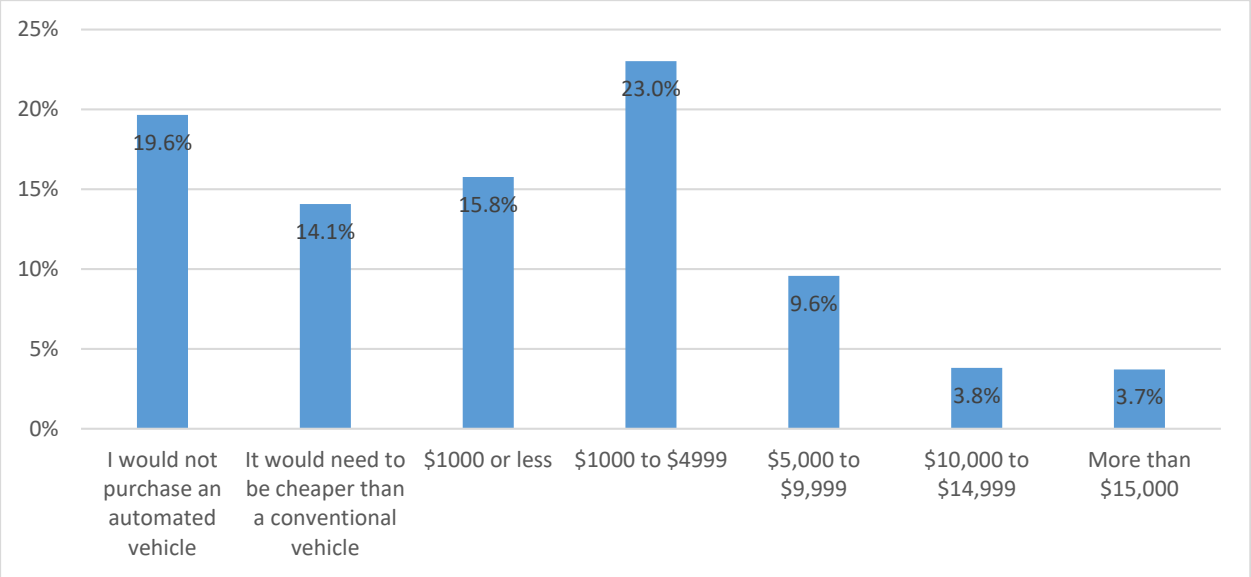
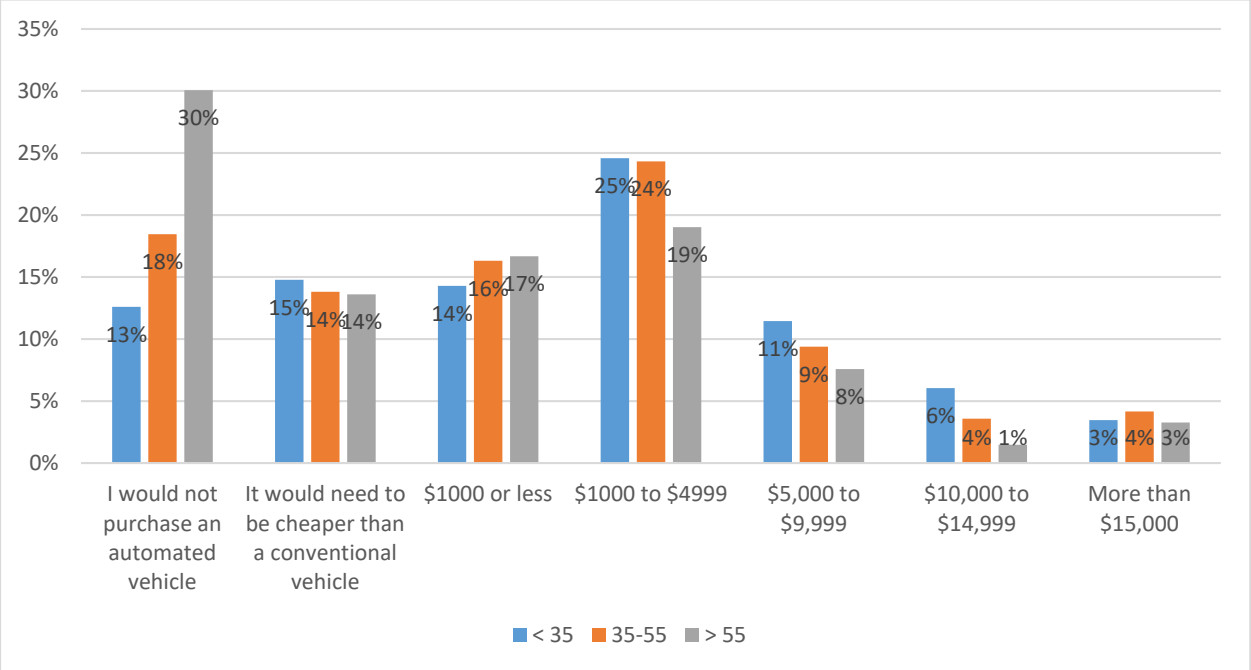


Figure 13. Willingness to Pay Extra for Partially Driverless Capabilities (by Age)



Key Takeaways:

- $1000-$4999 is dominant range for willingness to pay
- Nearly 20% unwilling to purchase driverless capabilities

2.8 Willingness to Pay for Fully Driverless Capabilities

Figure 14. Willingness to Pay Extra for Fully Driverless Capabilities

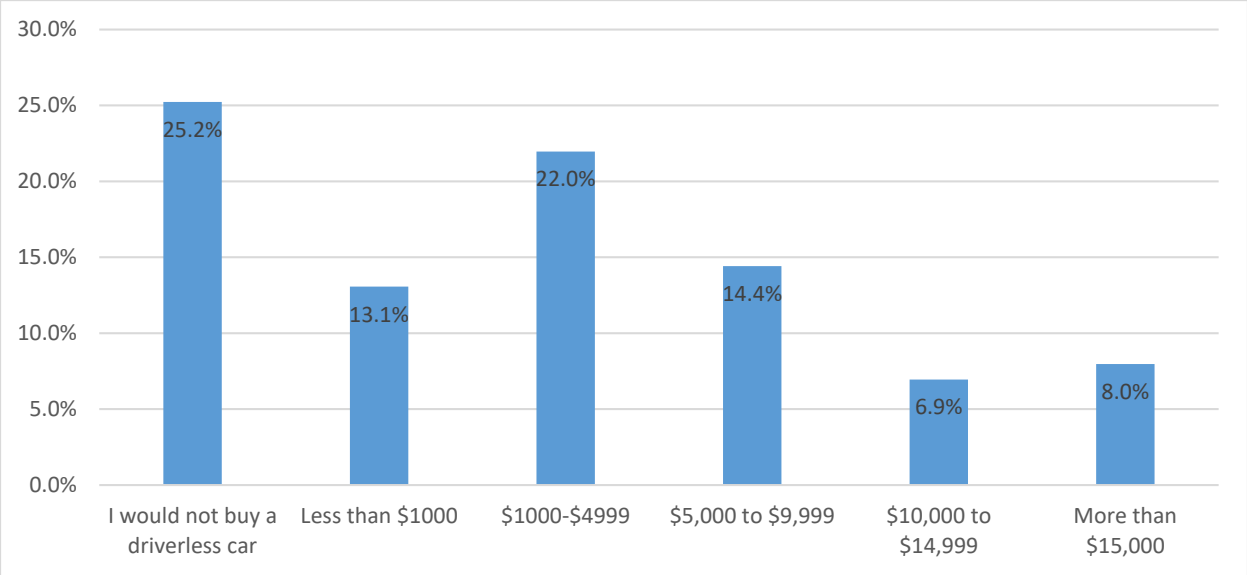
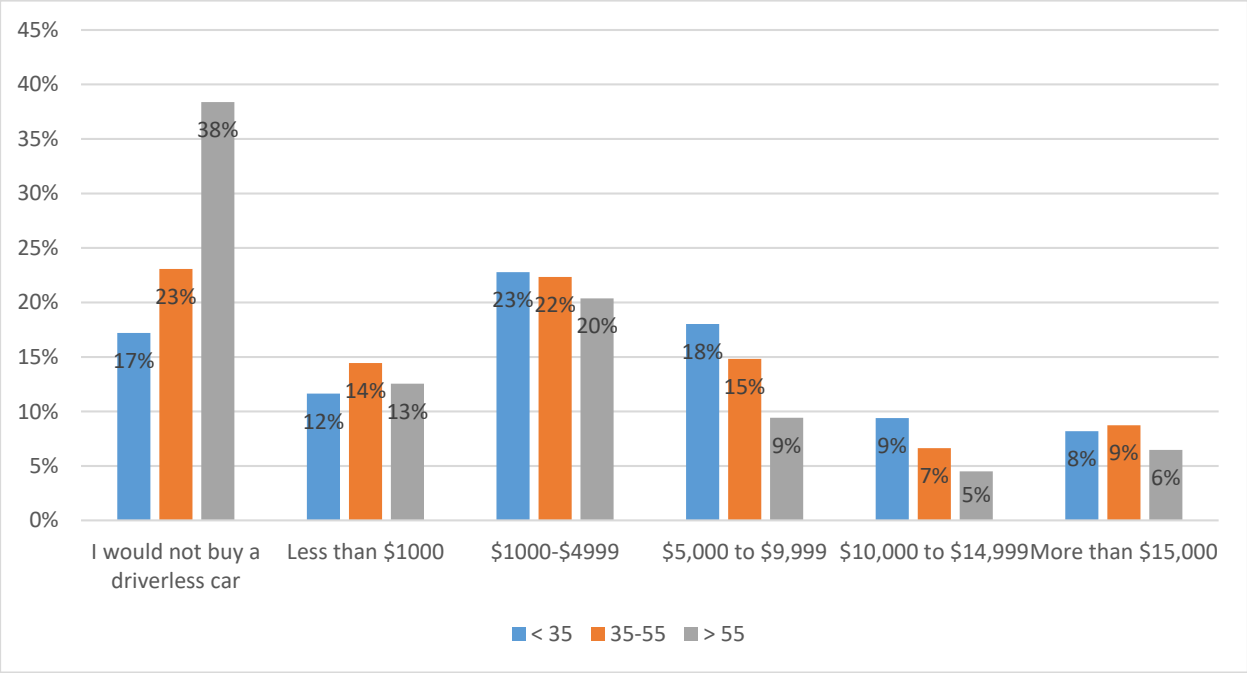


Figure 15. Willingness to Pay Extra for Fully Driverless Capabilities (by Age)



Key Takeaways:

- One-quarter of respondents (25%) and almost two-fifths (35%) of respondents over 55 state that they are unwilling to buy a fully driverless car, regardless of price

3.0 Prospective Travel and Location Choices

3.1 Travel Further to Work with Driverless Car

Figure 16. Willingness to Travel Further to Work in Driverless Car

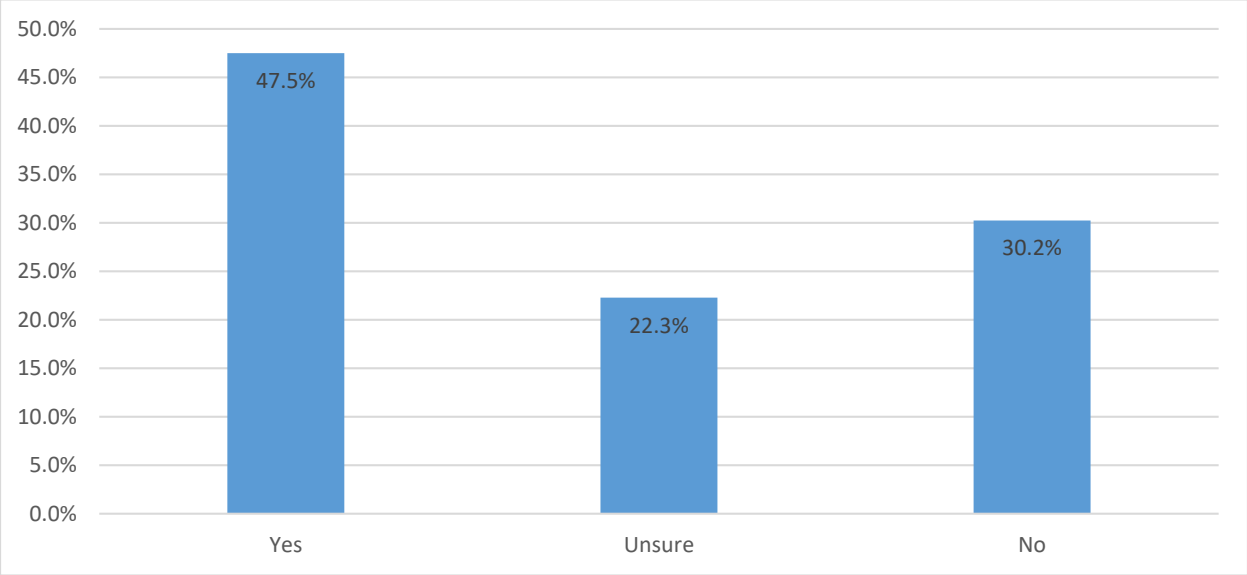


Figure 17. Willingness to Travel Further to Work in Driverless Car (by Region)

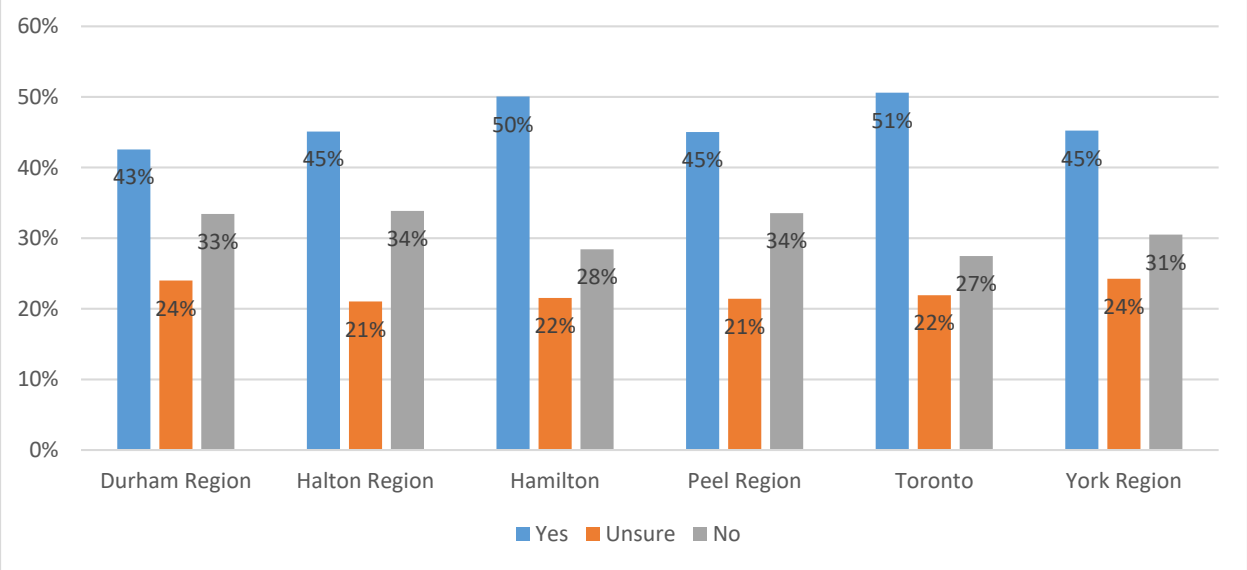
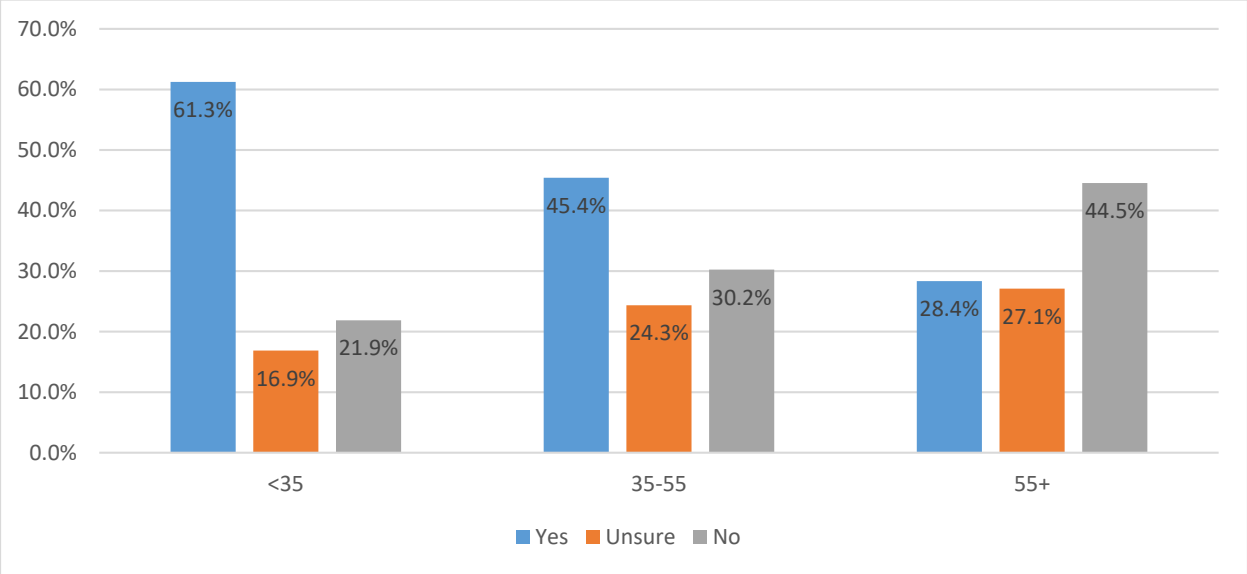


Figure 18. Willingness to Travel Further to Work in Driverless Car (by Age)



Key Takeaways:

- 47.5% of respondents willing to travel further to work in a driverless car
- The cities (Hamilton, Toronto) appear more willing to extend their commute distance
- Willingness to travel further declines as age increases

3.2 Travel Further to Work with Faster Driverless Car

Figure 19. Willingness to Travel Further to Work in Driverless Car if Faster

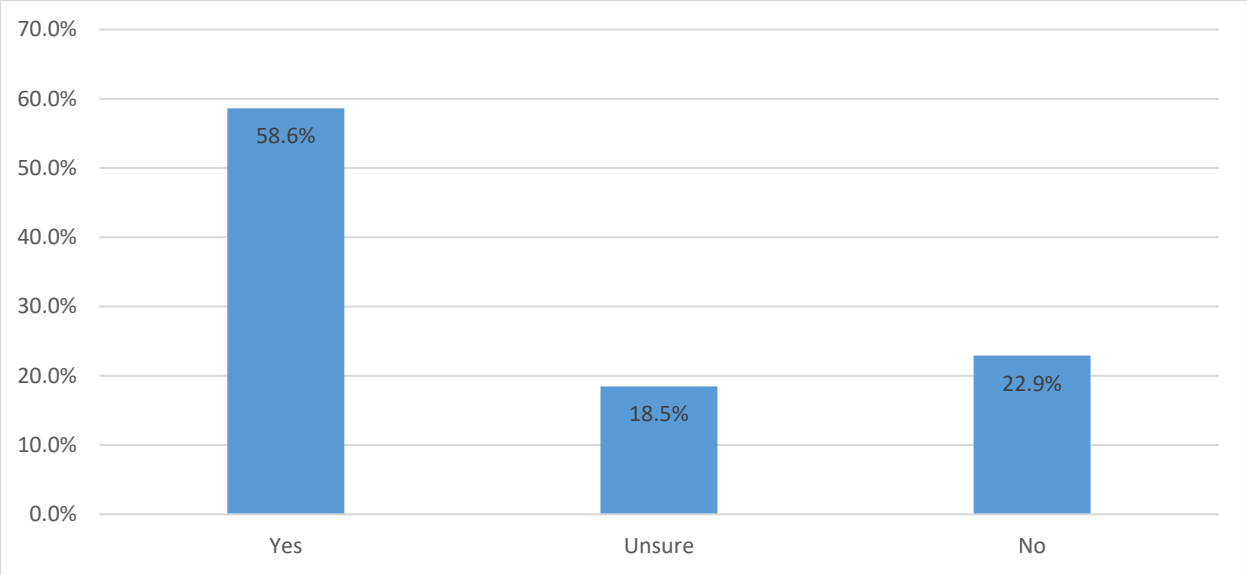


Figure 20. Willingness to Travel Further to Work in Driverless Car if Faster (by Region)

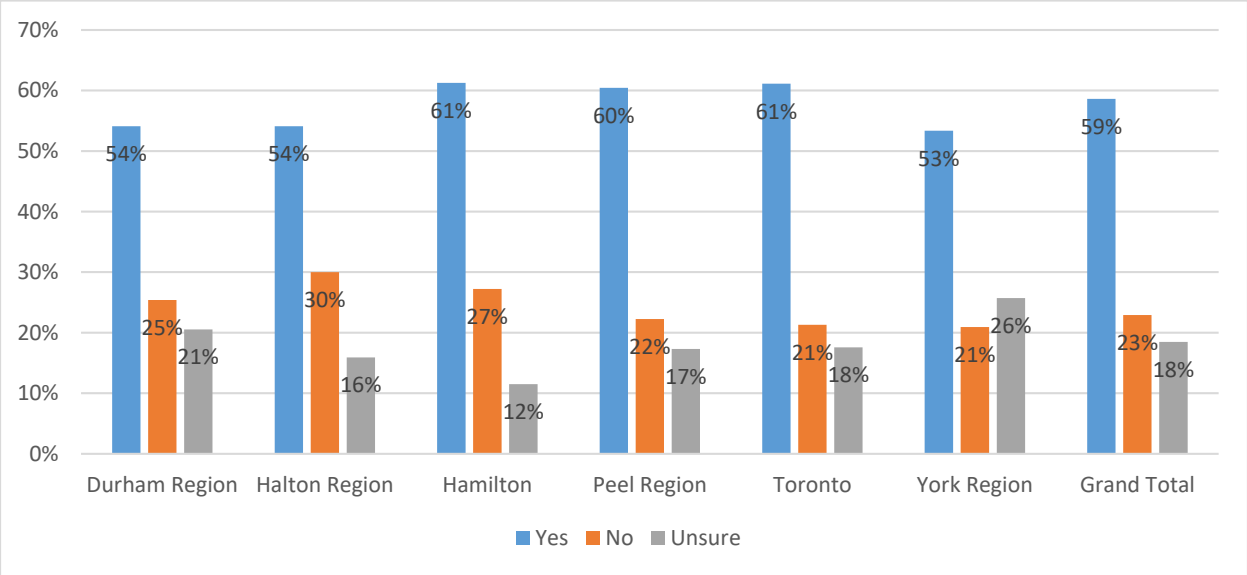
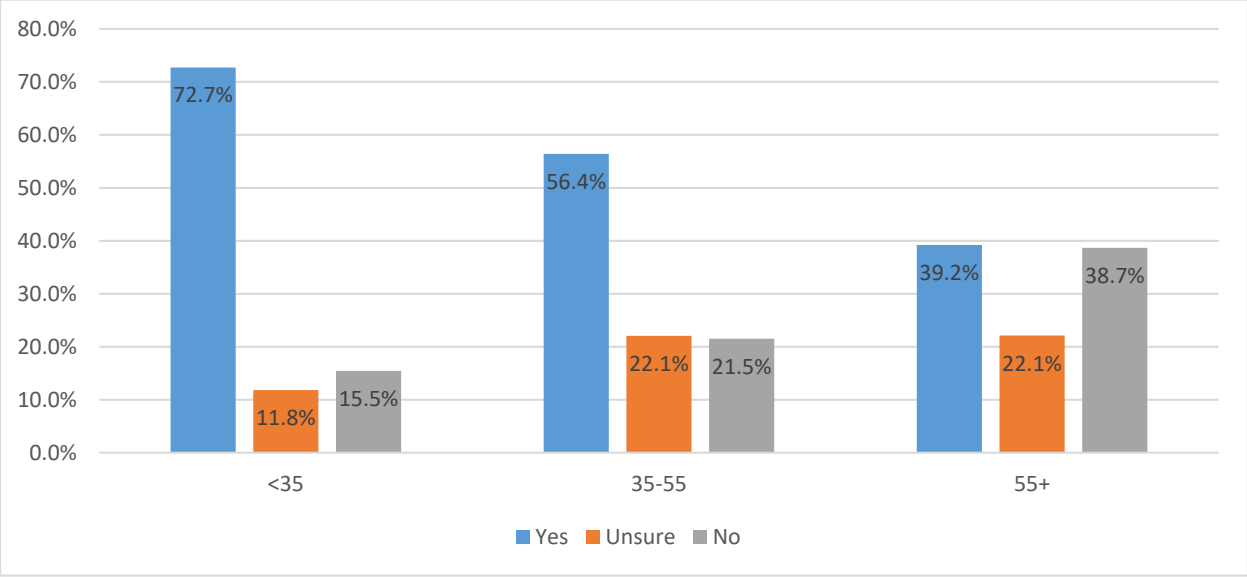


Figure 21. Willingness to Travel Further to Work in Driverless Car if Faster (by Age)

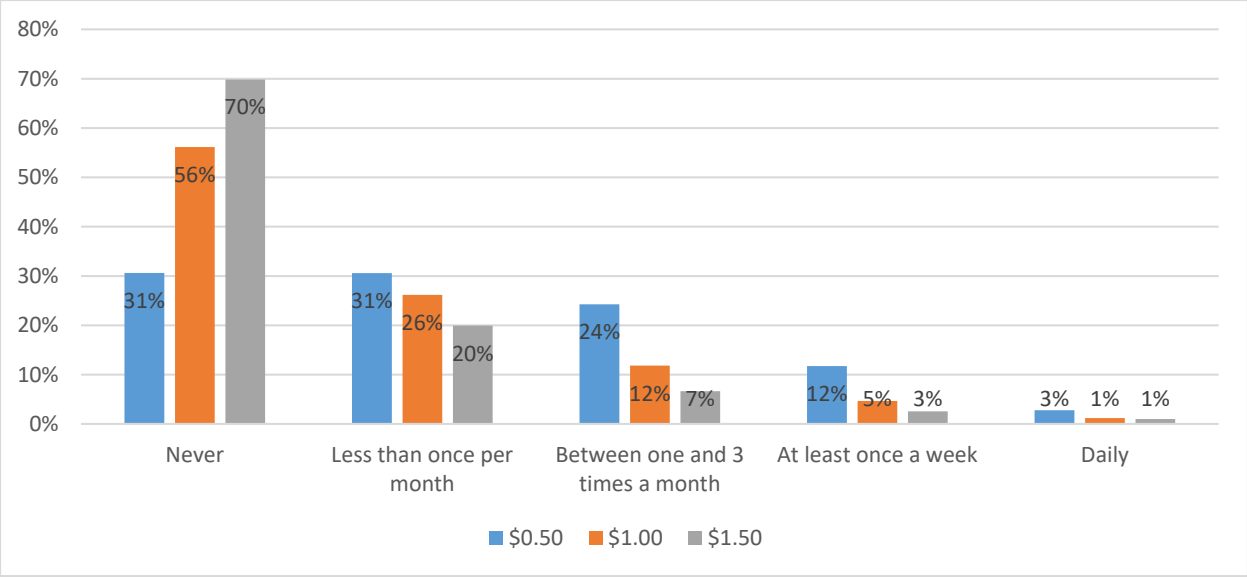


Key Takeaways:

- The prospect of faster travel by driverless cars motivates an even greater share (58.6%) to consider commuting further
- The cities and Peel Region show the greatest willingness to extend their commutes
- The decline in willingness to use with age still appears to hold

3.3 Frequency of Use at Price per KM

Figure 22. Stated Frequency of Use of Shared Driverless Cars at Different Prices, Not Including Accessing Public Transit ($ per KM)

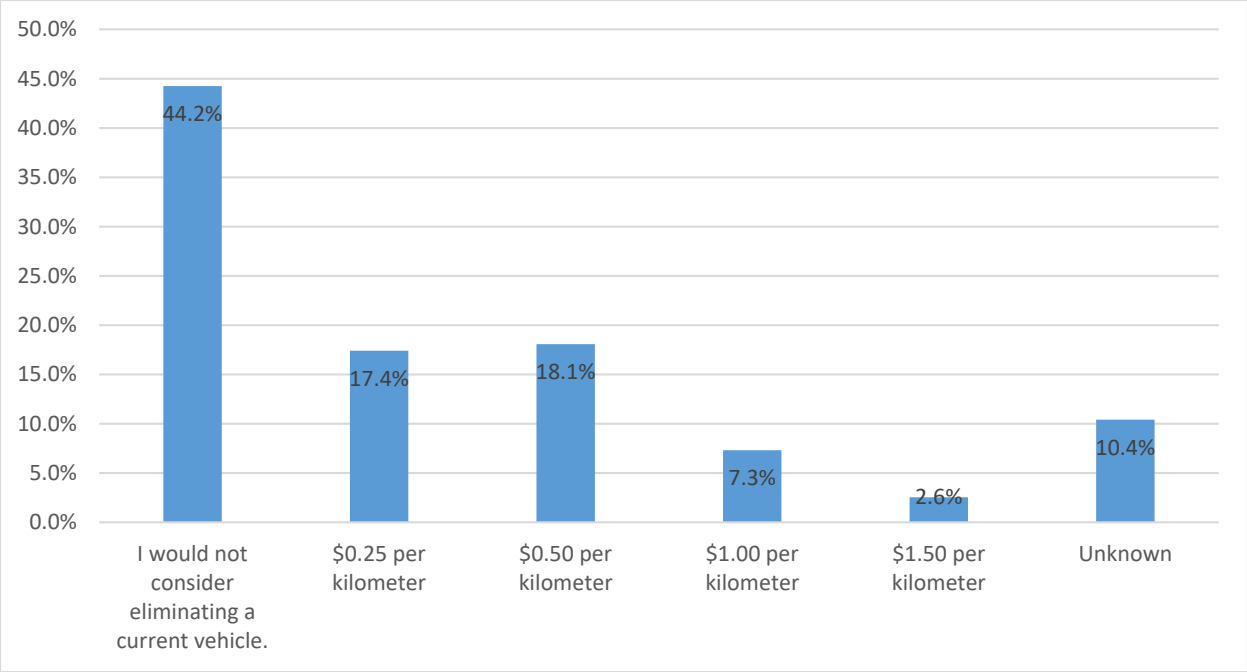


Key Takeaways:

- A majority of respondents choose not to use shared driverless cars at all with costs of operation of $1.00/km or more
- At any of the price thresholds given, regular use (once a week or more) is limited to a very small share of respondents

3.4 Price to Switch for All Commuting

Figure 23. Highest Price for Driverless Car Travel While Still Willing to Switch to Shared Driverless Cars for All Commuting



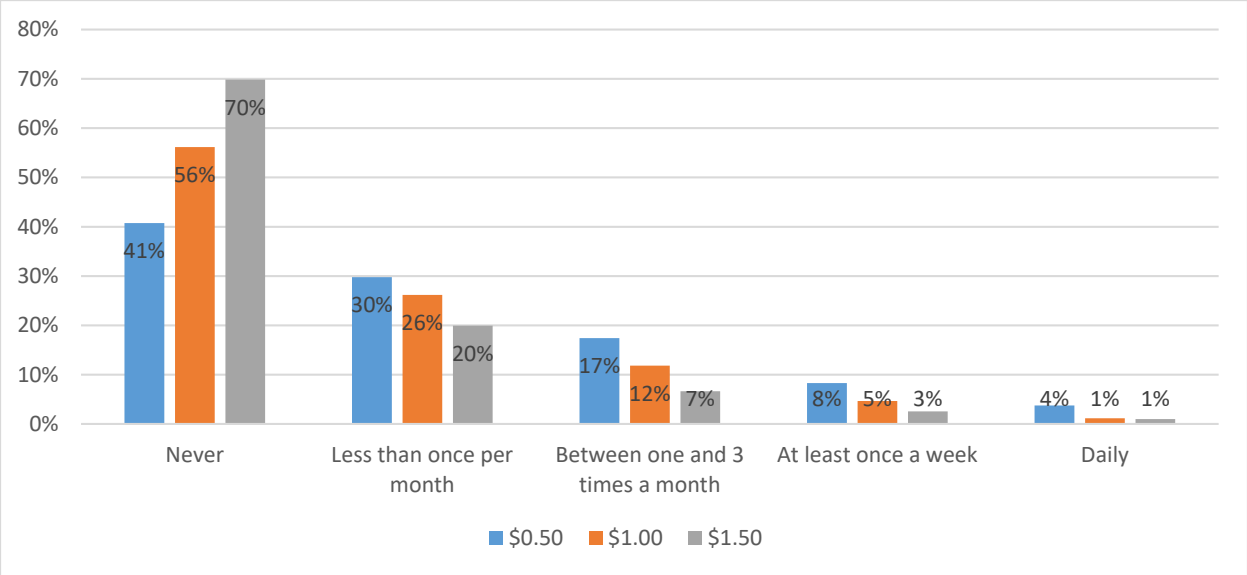
Key Takeaways:

- A price of less than $1.00 per kilometer would be necessary to expect a regular commuting mode share higher than ten percent.
- Cumulative total respondents willing to switch at different price thresholds:

$0.25/km	$0.50/km	$1.00/km	$1.50/km
45.4%	28.0%	9.9%	2.6%

3.5 Frequency of Use to Access Transit

Figure 24. Shared Driverless Car Trips to Transit at Different Prices (per KM)



Key Takeaways:

- A majority of respondents choose not to use shared driverless cars to get to transit at all with costs of operation of $1.00/km or more

3.6 Willingness to Share Driverless Car

Figure 25. Willingness to Travel in a Shared Driverless Car with Others

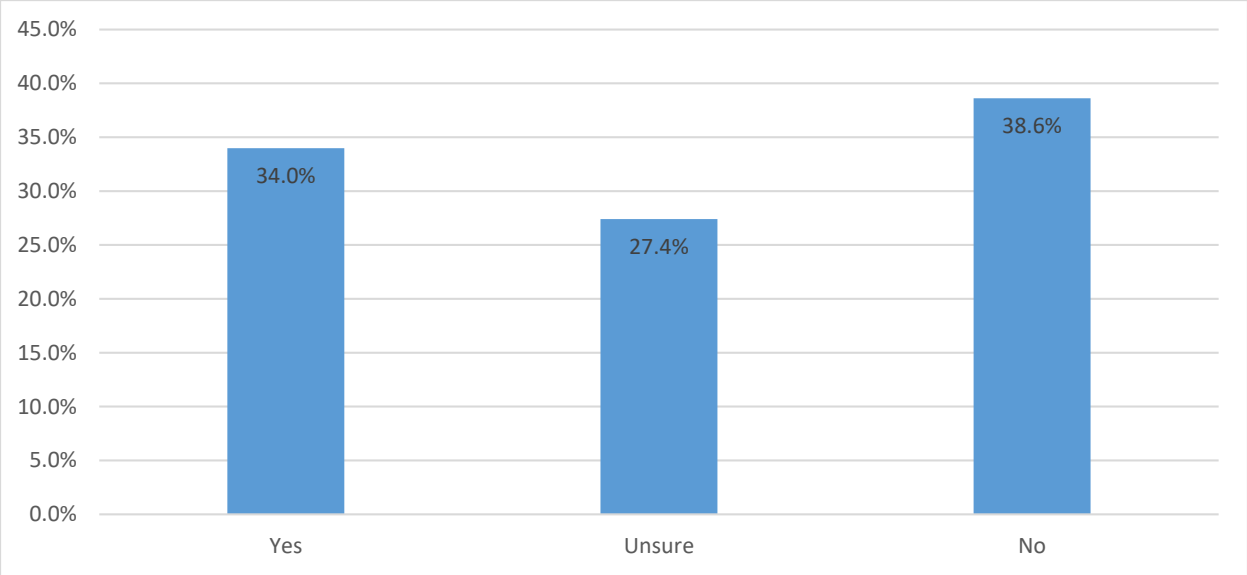


Figure 26. Willingness to Travel in a Shared Driverless Car with Others (by Age)

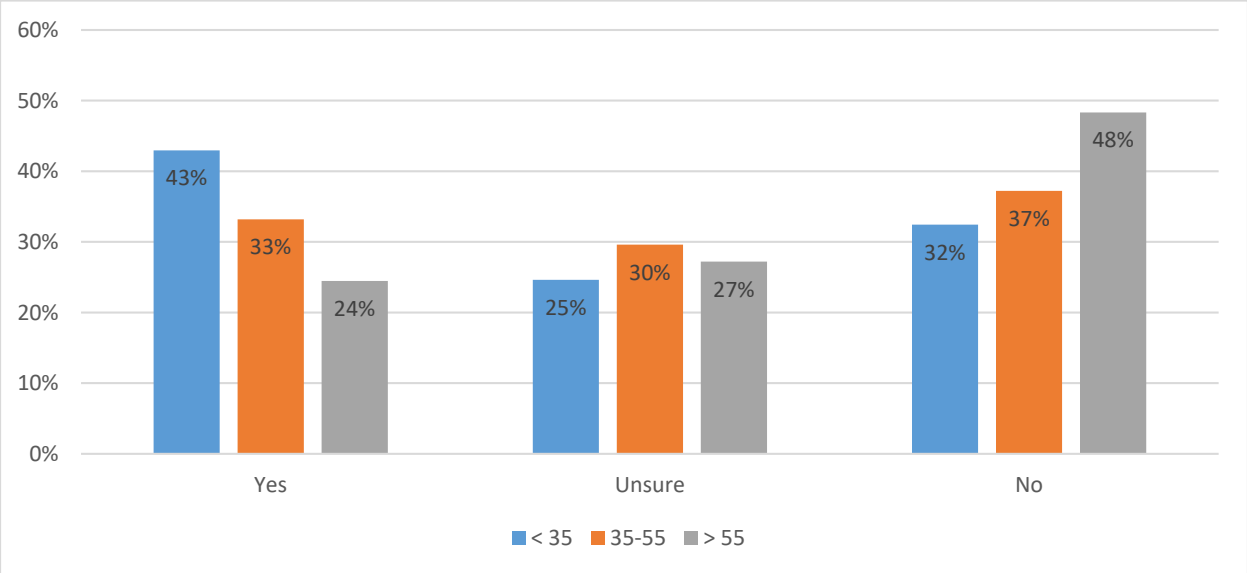
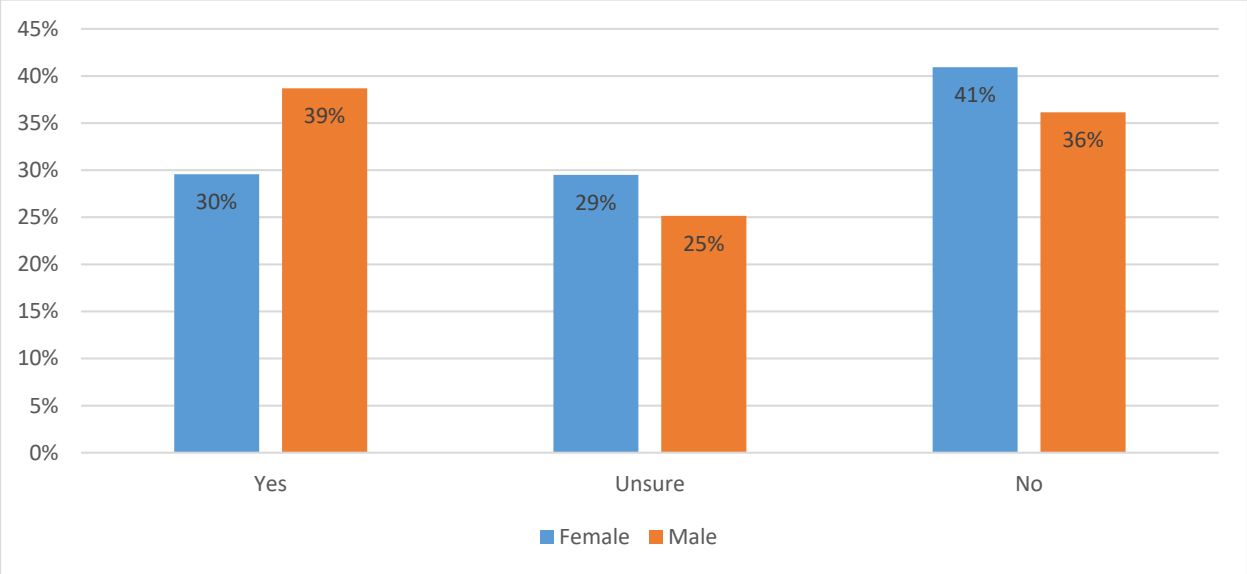


Figure 27. Willingness to Travel in a Shared Driverless Car with Others (by Gender)



Key Takeaways:

- Males are more willing to utilize shared autonomous vehicles
- Interest in using SAVs declines with age

3.7 Shared Driverless Car Access on Neighbourhood Attractiveness

Figure 28. Interest in High Shared Driverless Car Service Neighbourhoods

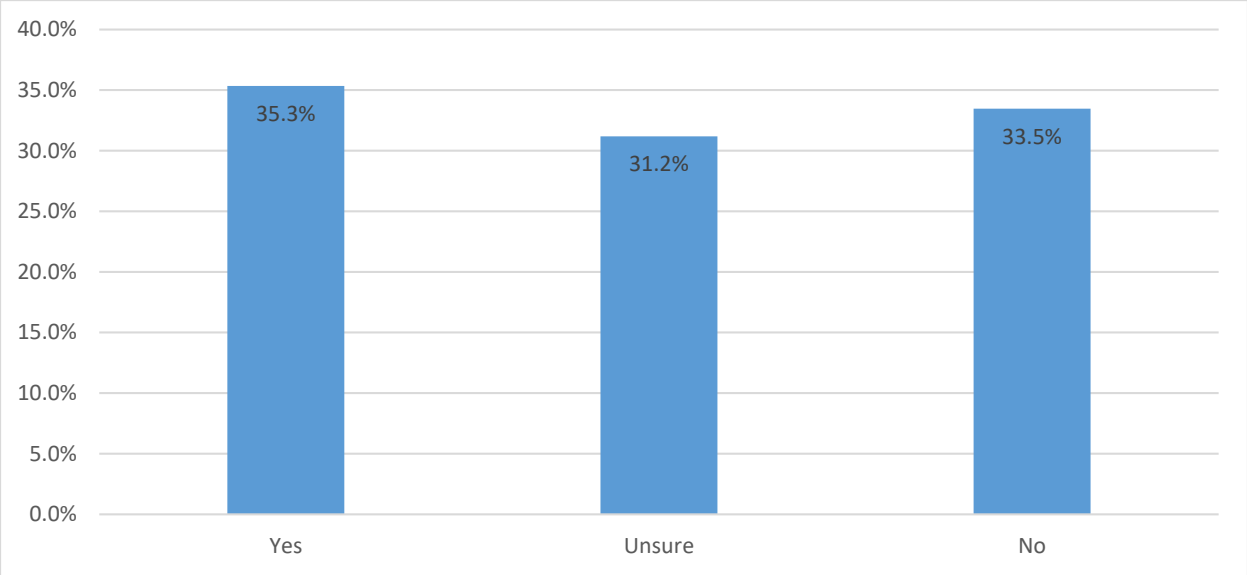
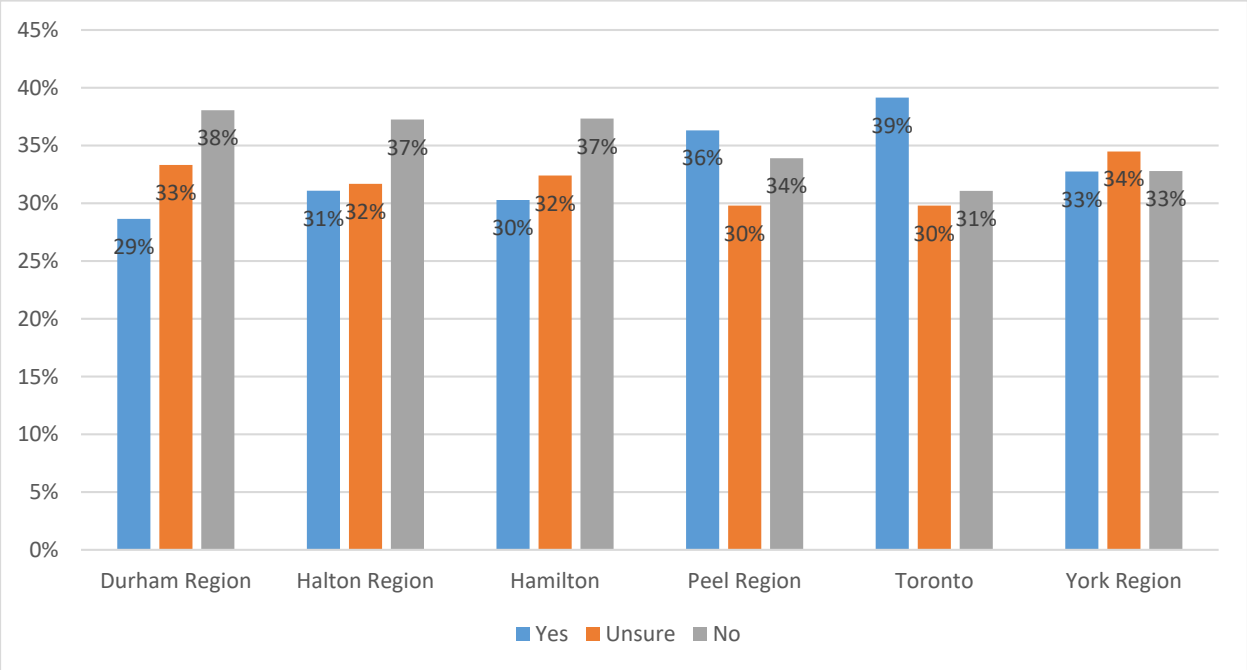


Figure 29. Interest in High Shared Driverless Car Service Neighbourhoods (By Region)



Key Takeaways:

- Close to even split on respondents' interest to locate in a neighbourhood with good shared AV services
- Toronto and Peel Region residents show higher levels of interest

4.0 AVs and Public Policy

4.1 Government Response

Figure 30. Responses to "Automated and Driverless Vehicles are Likely to Become More Common in the Future. How Should Governments Respond?"

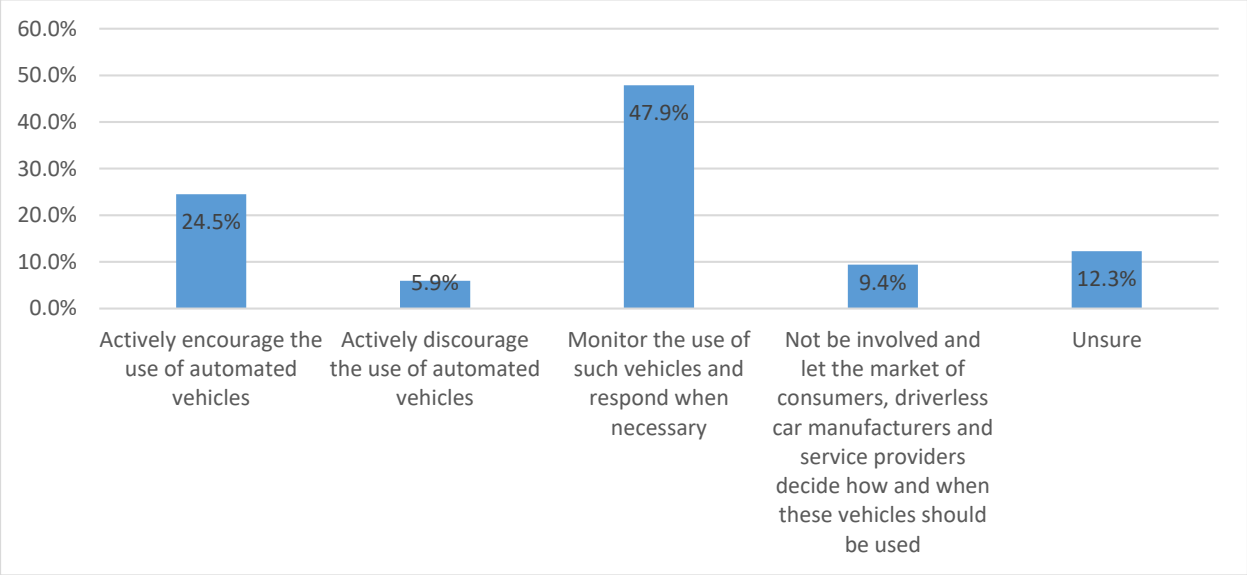


Figure 31. Responses to "Automated and Driverless Vehicles are Likely to Become More Common in the Future. How Should Governments Respond?" (by Age)

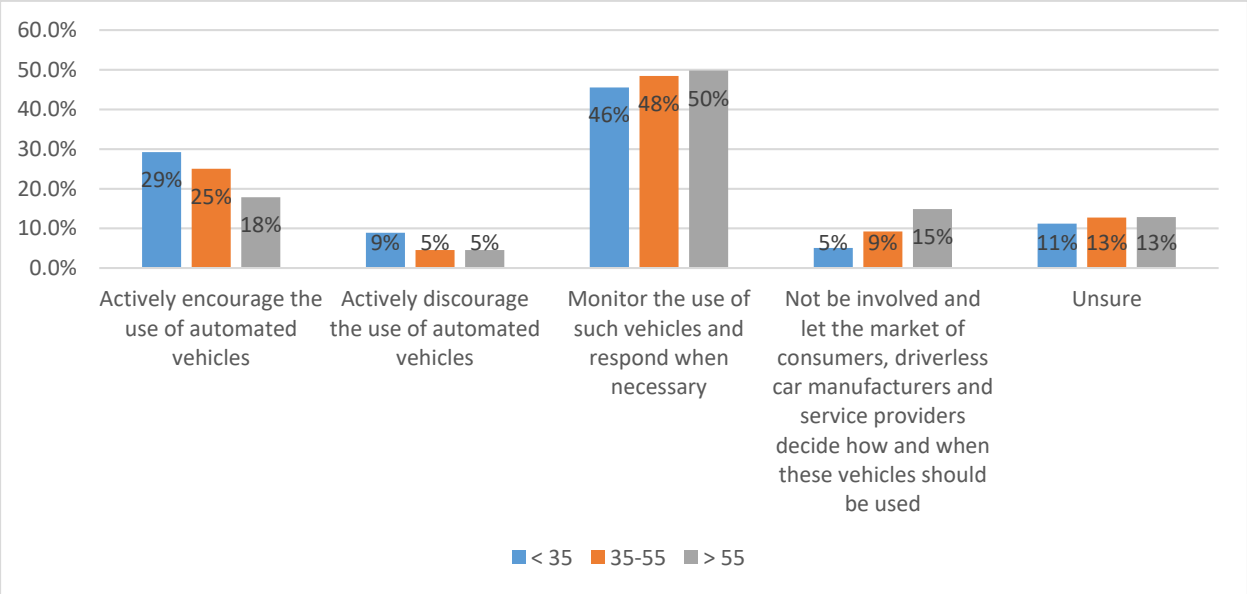
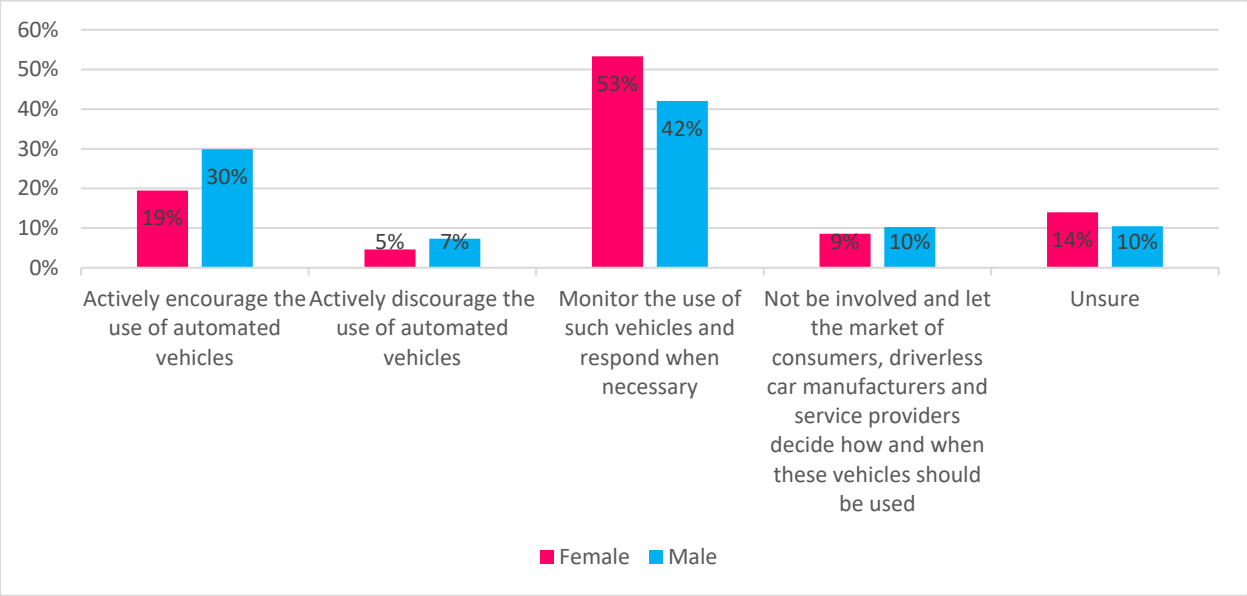


Figure 32. Responses to "Automated and Driverless Vehicles are Likely to Become More Common in the Future. How Should Governments Respond?" (by Gender)



Key Takeaways:

- Strong preference for wait-and-see approach from government

4.2 Public Investment

Figure 33. Responses to "Would You Support Investment to Encourage, Support, or Regulate Automated Vehicles?"

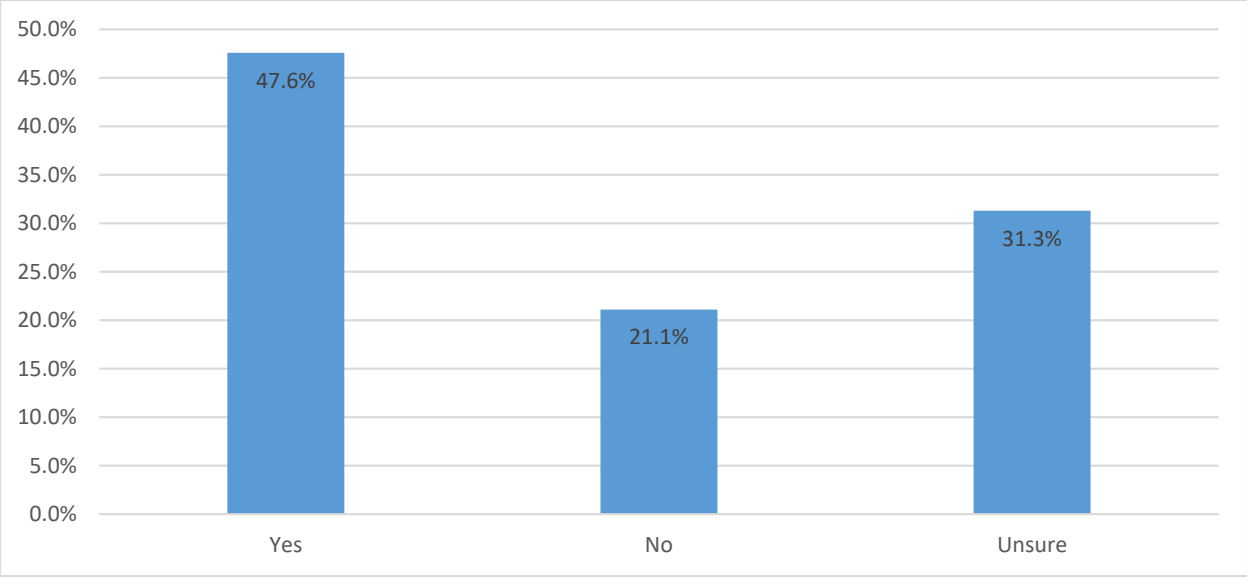


Figure 34. Responses to "Would You Support Investment to Encourage, Support, or Regulate Automated Vehicles?" (by Age)

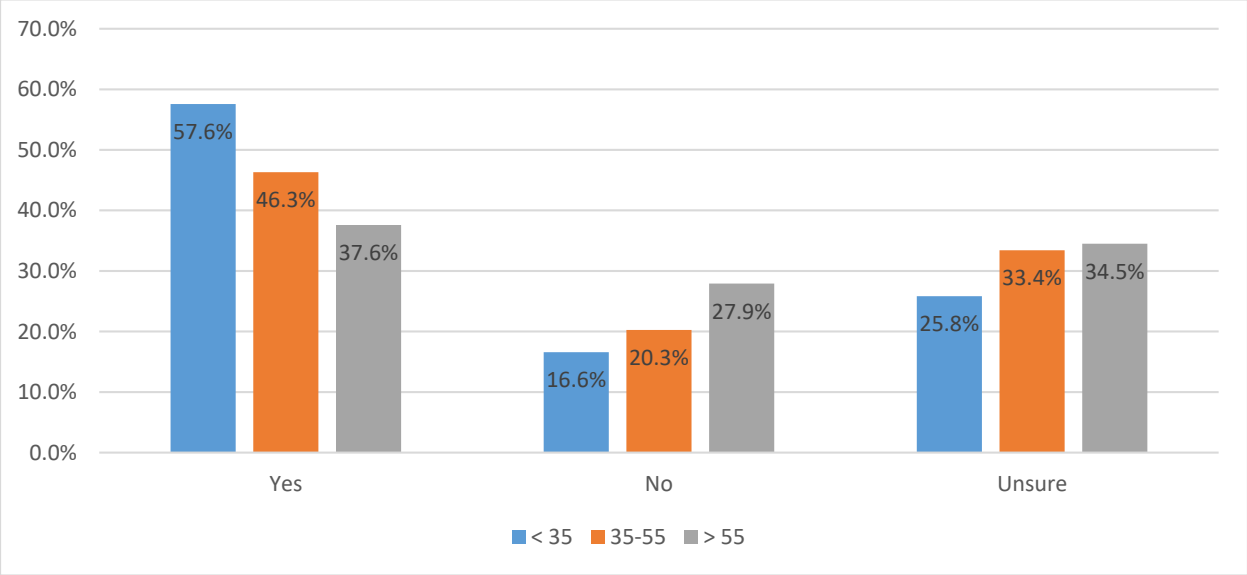
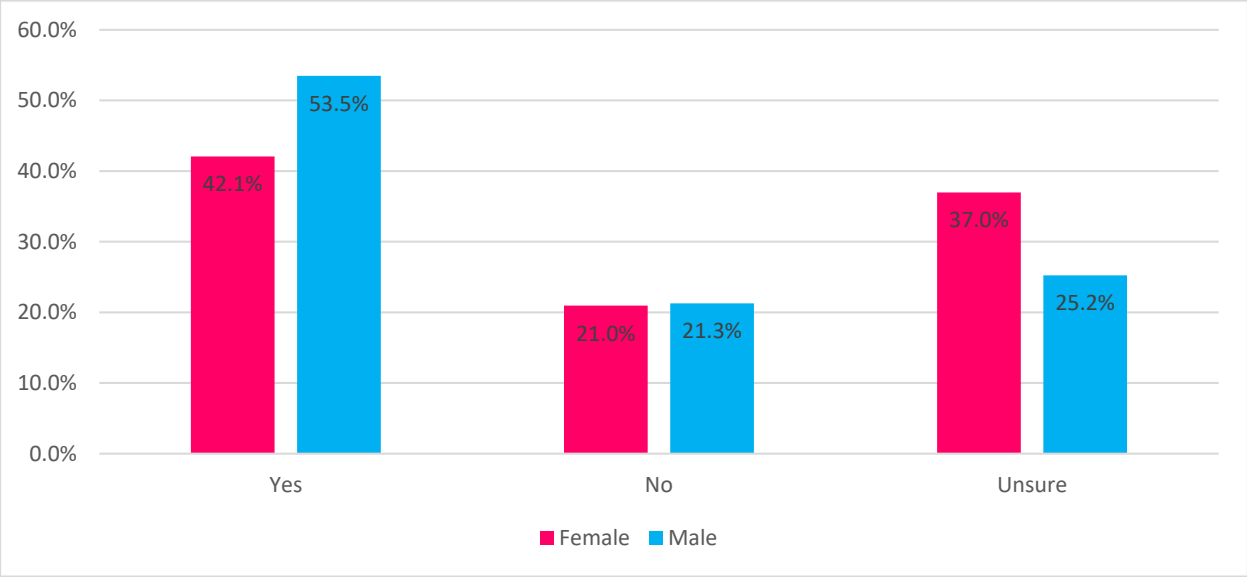


Figure 35. Responses to "Would You Support Investment to Encourage, Support, or Regulate Automated Vehicles?" (by Gender)



Key Takeaways:

- Approximately half (47.6%) of respondents support government investment to support AVs

4.3 Additional Taxes for Public Investment

Figure 36. Responses to "Should Investment to Support, Encourage, or Regulate Automated Vehicles be Funded through Additional Taxes?"

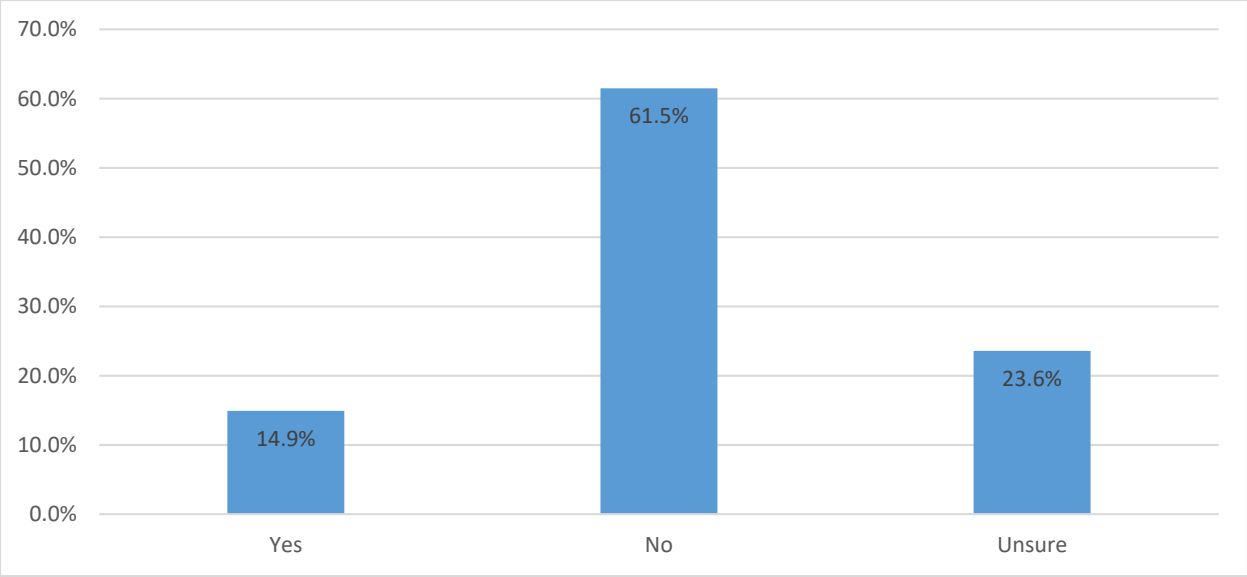
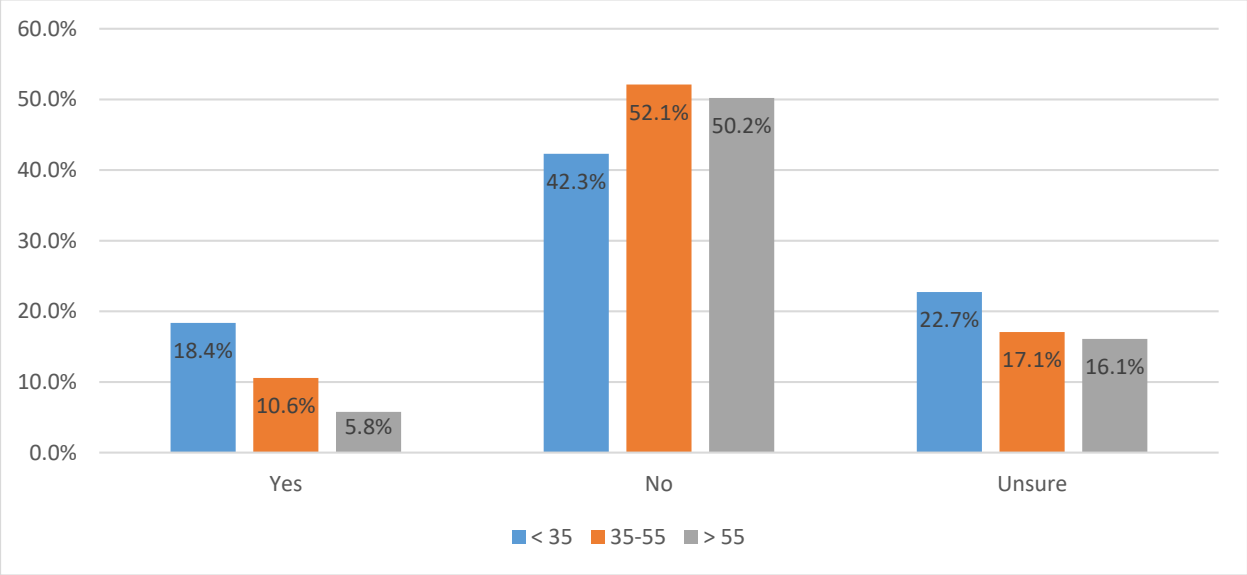


Figure 37. Responses to "Should Investment to Support, Encourage, or Regulate Automated Vehicles be Funded through Additional Taxes?" (by Age)

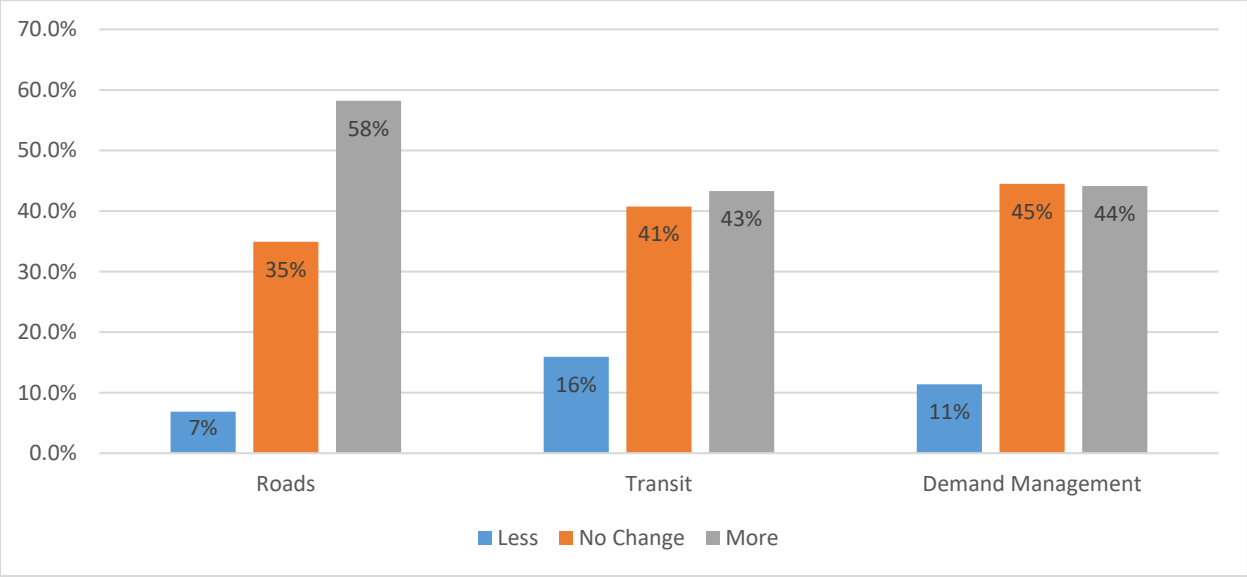


Key Takeaways:

- 61.5% opposed to additional taxes to fund public support of AVs

4.4 Use of Transportation Funding

Figure 38. Responses to "How Should Automated and Driverless Vehicles Impact Public Sector Transportation Spending in the GTHA?"



Key Takeaways:

- There is only majority support for increased spending on roads, given respondents' expectations of AVs' impacts

4.5 Government Regulation

Figure 39. Responses to "Do You Expect Governments to Regulate How Automated and Driverless Vehicles are Used?"

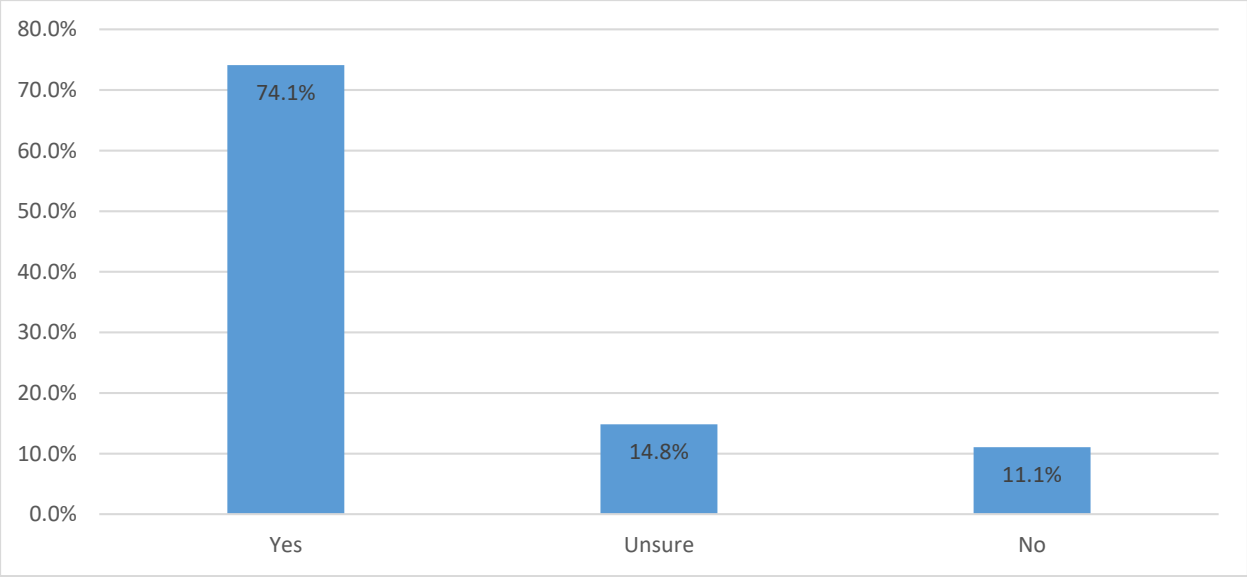


Figure 40. Responses to "Do You Expect Governments to Regulate How Automated and Driverless Vehicles are Used?" (by Age)

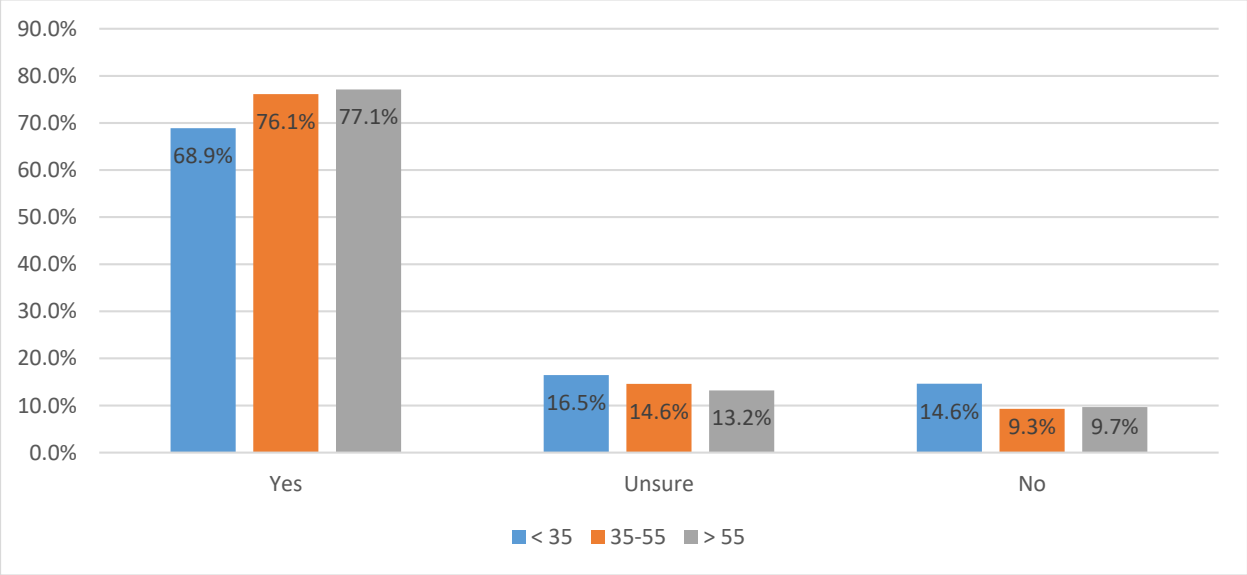
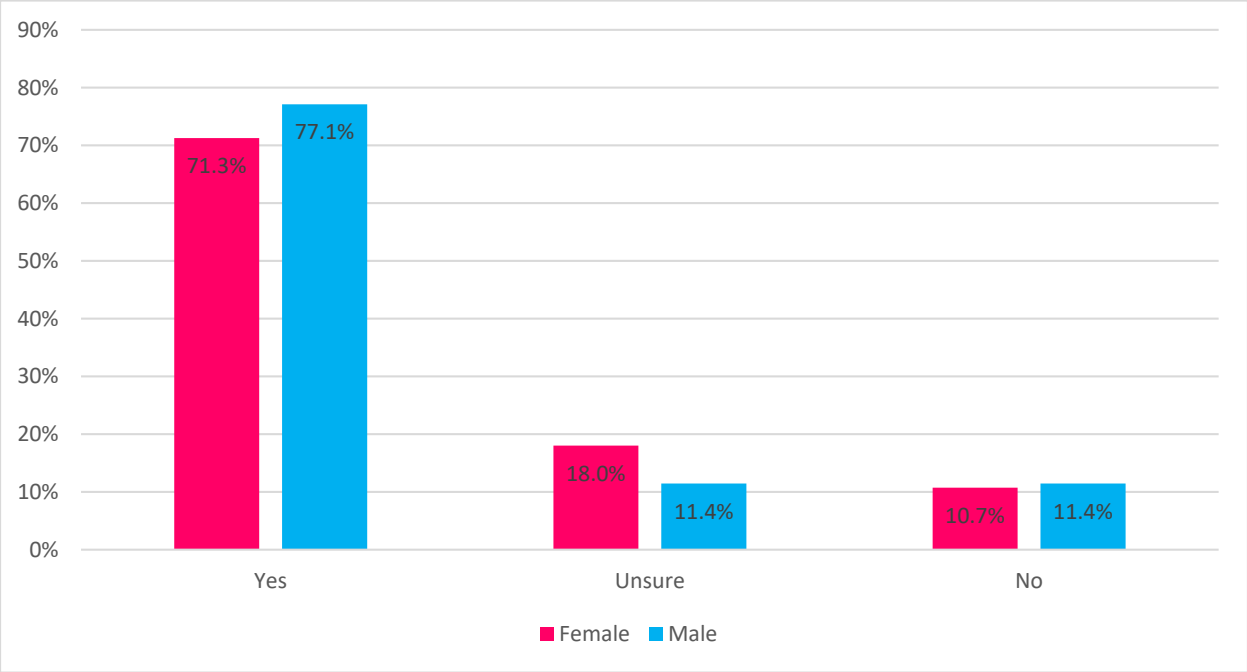


Figure 41. Responses to "Do You Expect Government to Regulate How Automated and Driverless Vehicles are Used?" (by Gender)



Key Takeaways:

- 74.1% support government efforts to regulate and encourage automated vehicle use

4.6 Government Innovation

Figure 42. Responses to "Should Governments Become 'Innovators' and Take the Lead on Using Driverless Cars?"

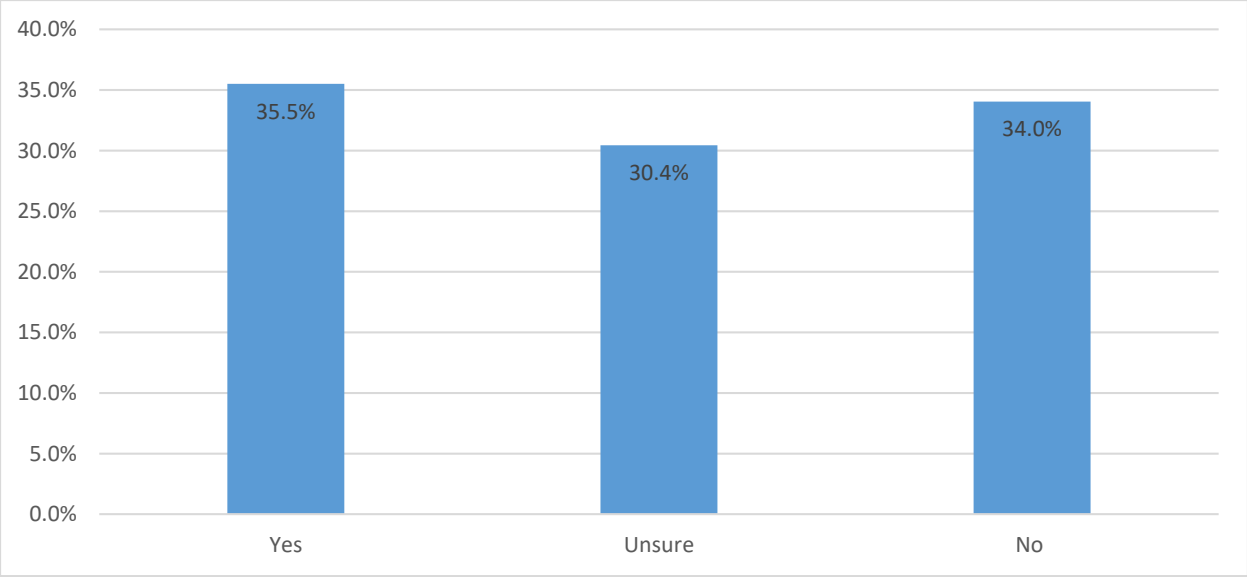


Figure 43. Responses to "Should Governments Become 'Innovators' and Take the Lead on Using Driverless Cars?" (by Age)

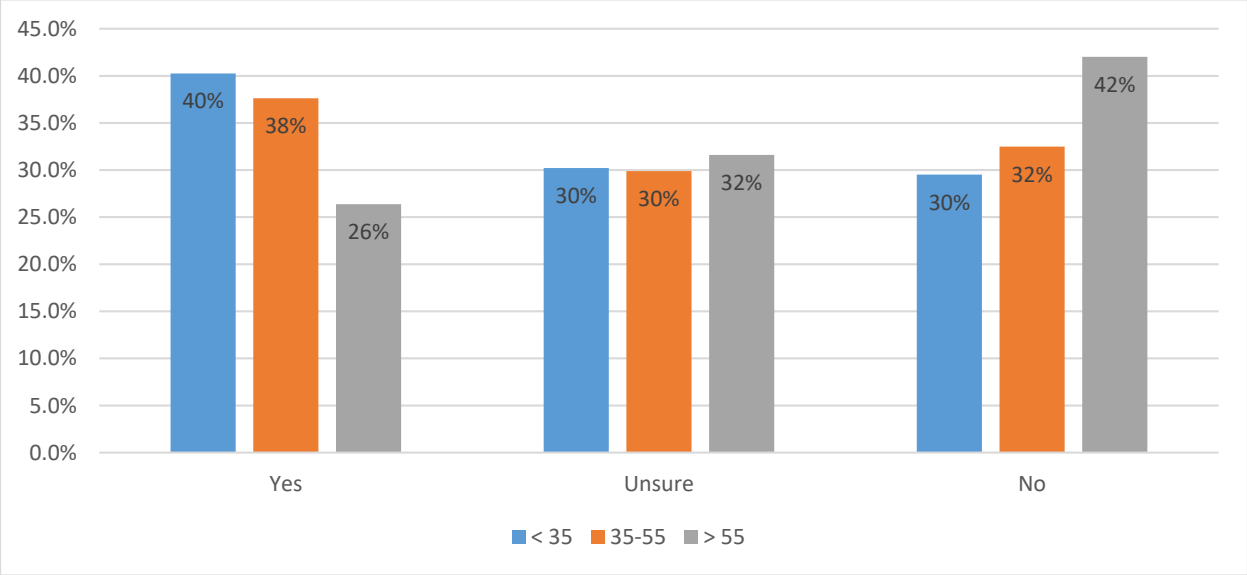
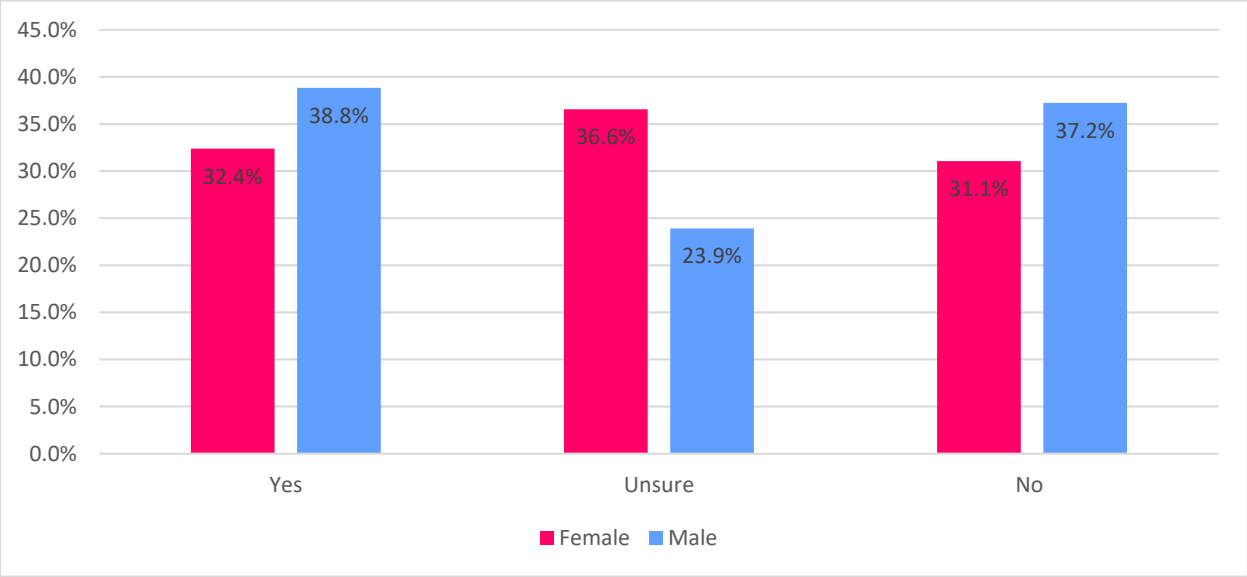


Figure 44. Responses to "Should Governments become 'Innovators' and Take the Lead on Using Driverless Cars?" (by Gender)



5.0 Demographics

5.1 Age

Figure 45. Age of Respondents

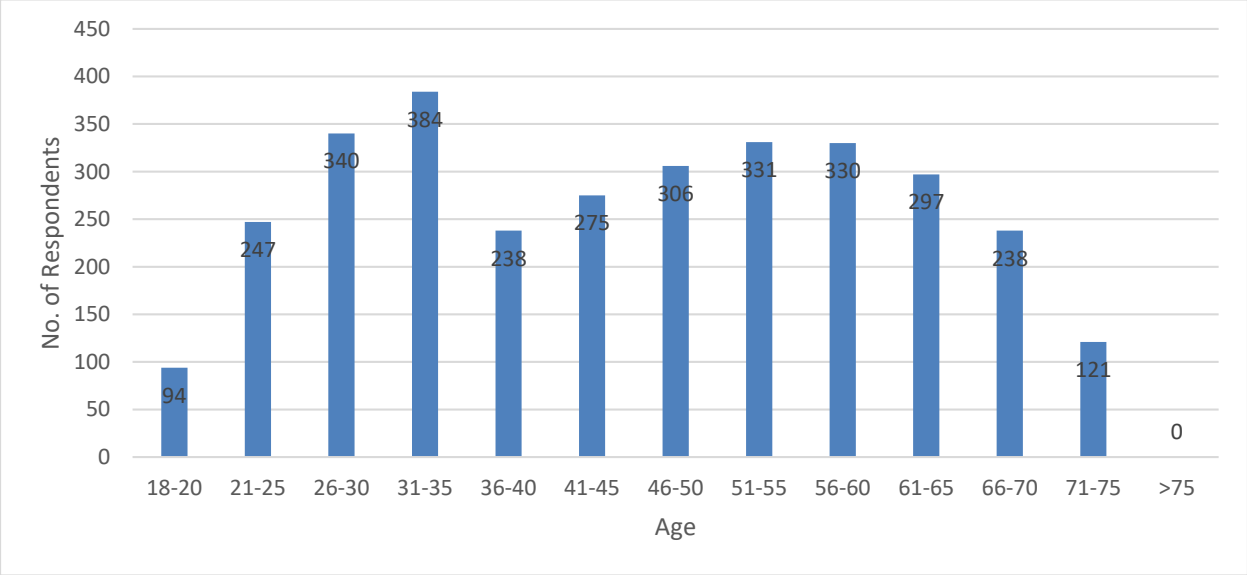
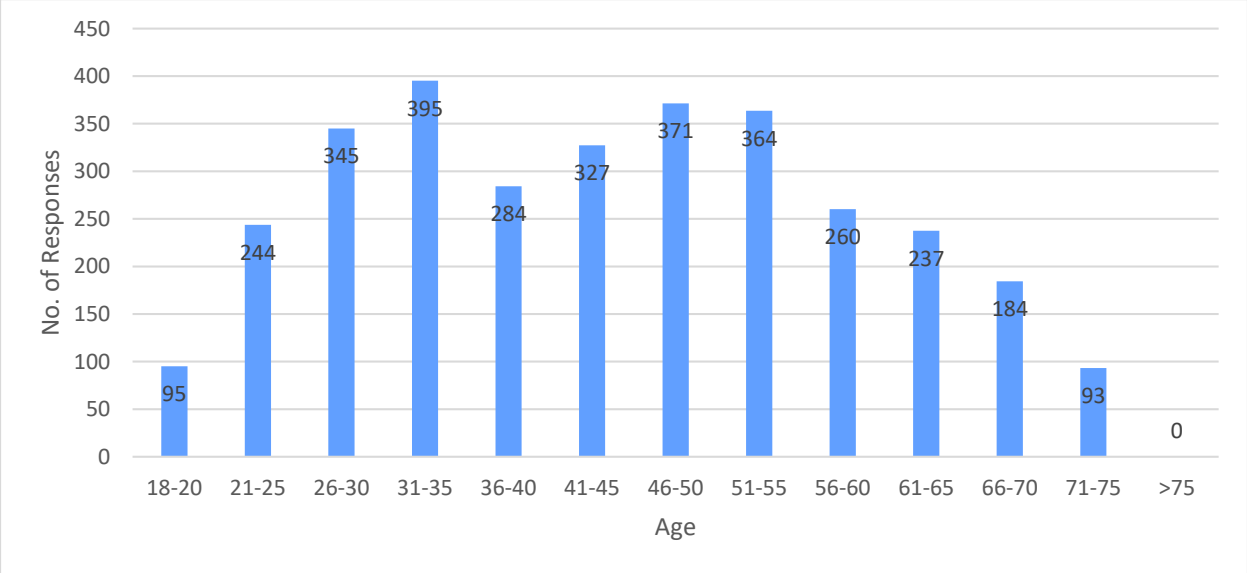


Figure 46. Age of Weighted Responses



5.2 Gender

Figure 47. Gender of Responses

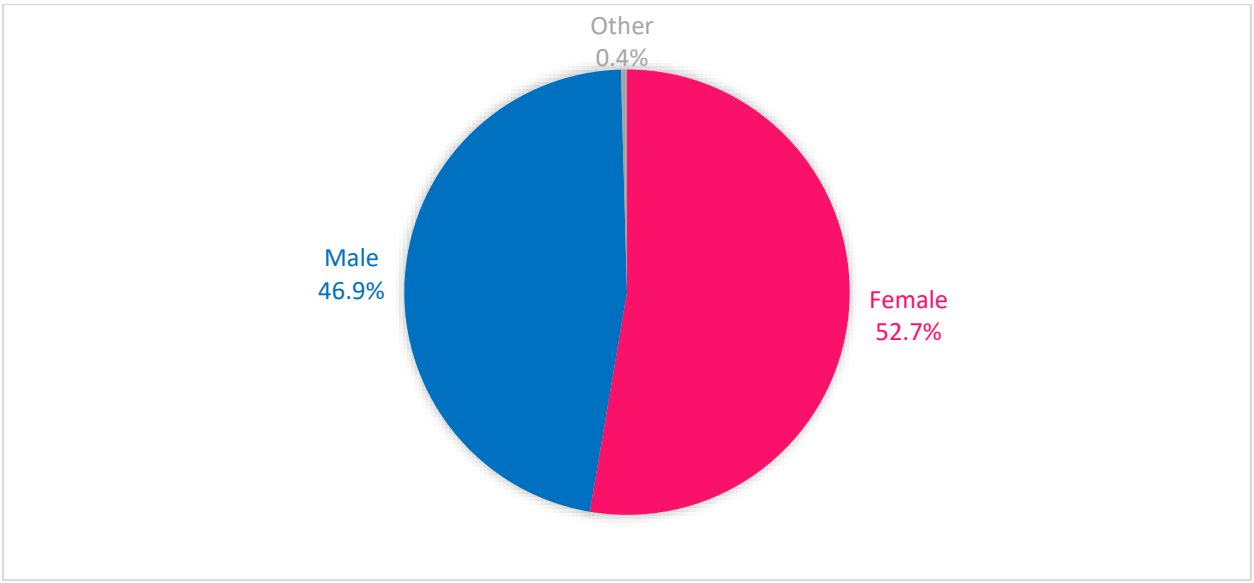
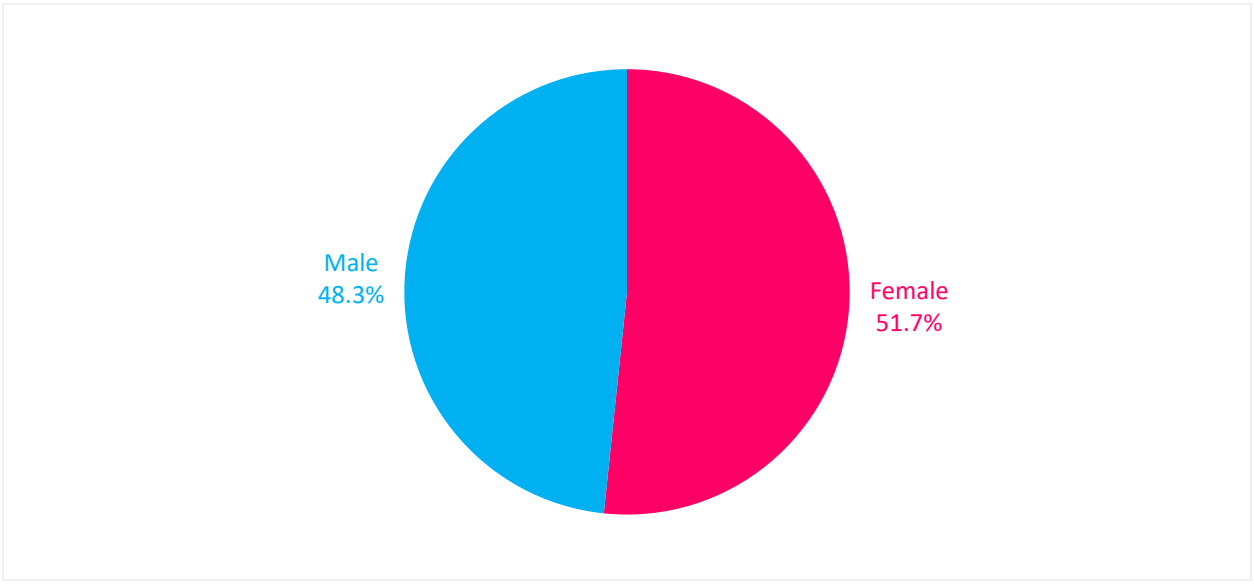


Figure 48. Gender of Weighted Responses



5.3 Age and Gender

Figure 49. Respondents by Age and Gender

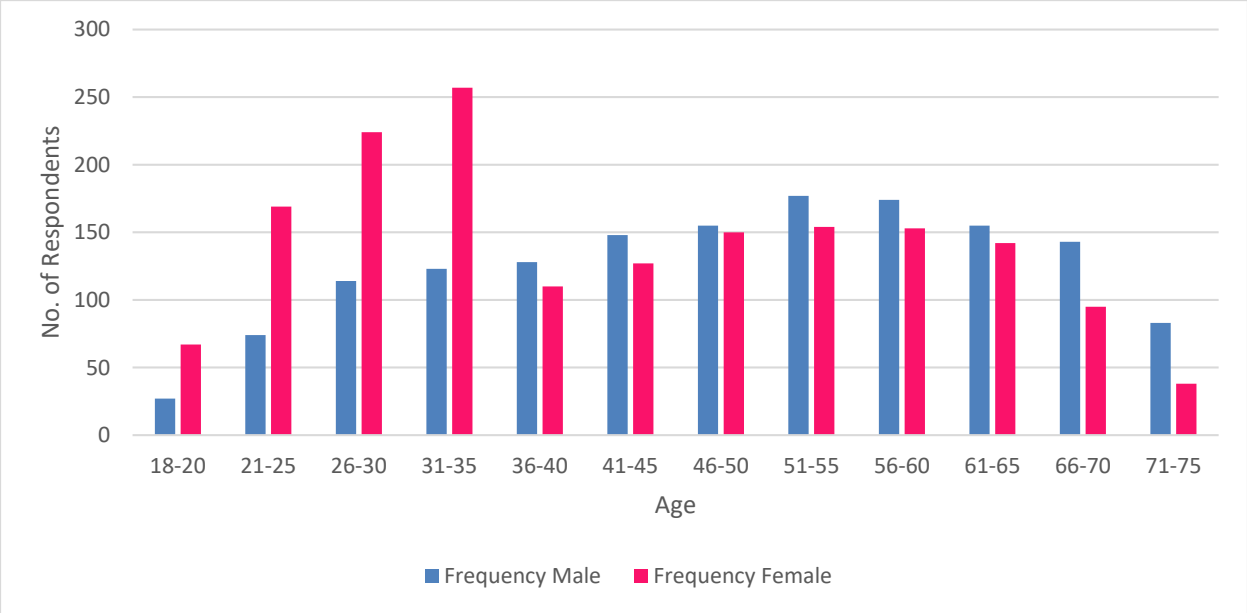
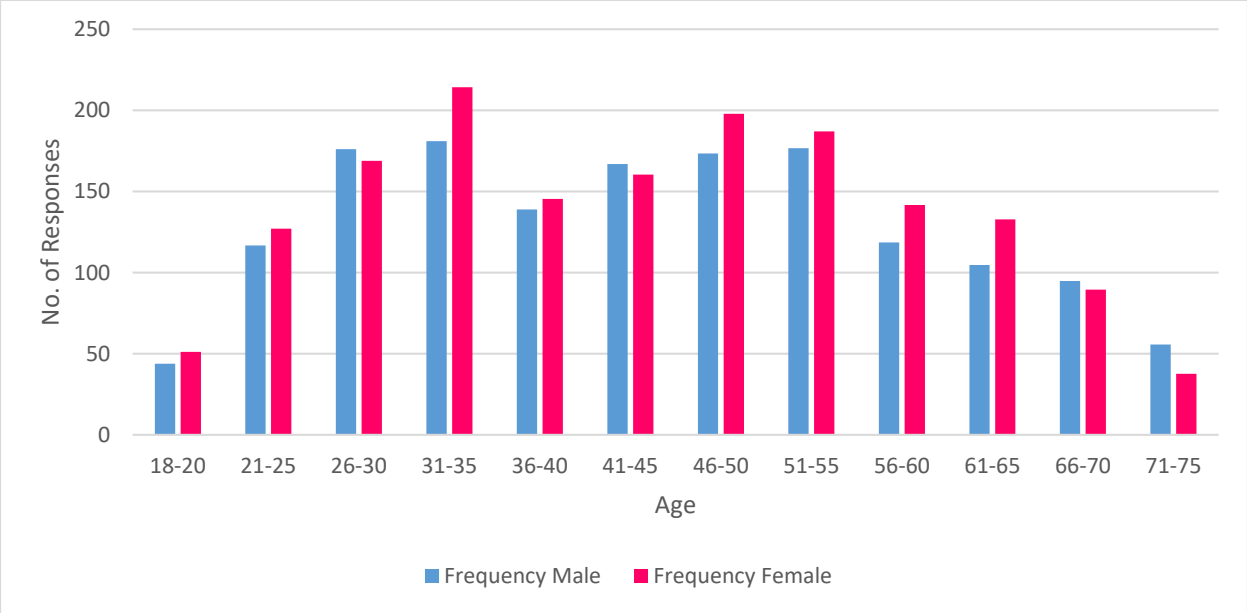


Figure 50. Weighted Responses by Age and Gender



Our raw sample had rather low proportions of young (< 35) male respondents. However, these proportions were weighted to be in line with those of the GTHA based on 2011 Statistics Canada data.

5.4 Region

Table 1. Regional Proportions of Samples

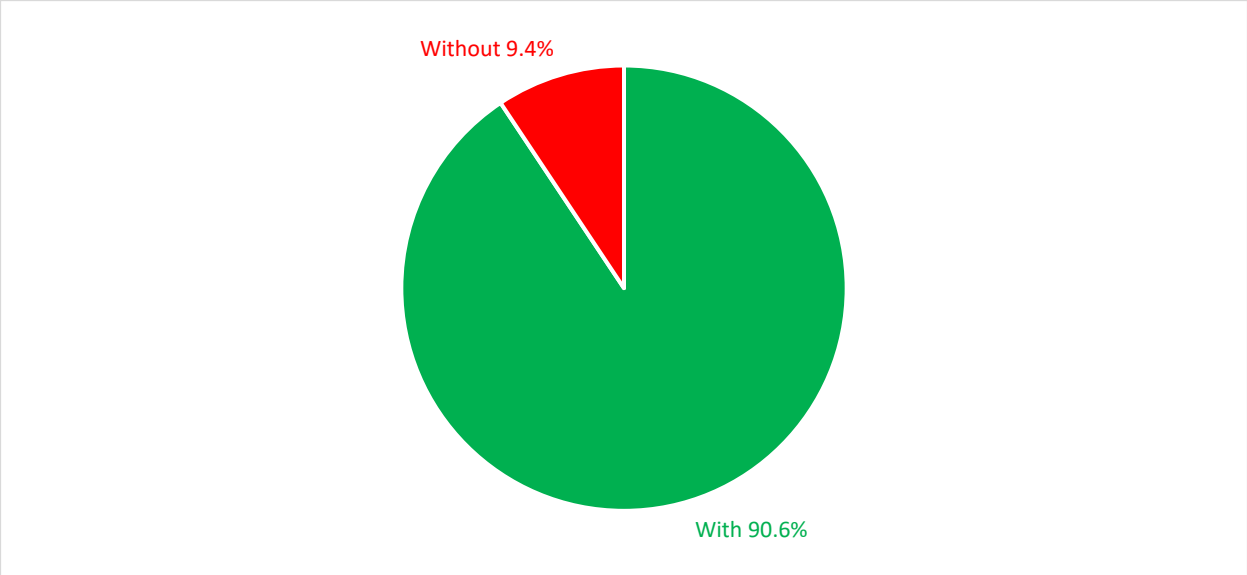
Region	No. of Respondents	% of Respondents	% of Weighted Responses	% of Census Population
Durham Region	400	12.5%	9.1%	9.2%
Halton Region	300	9.4%	7.4%	7.6%
Hamilton	300	9.4%	7.8%	7.9%
Peel Region	500	15.6%	19.5%	19.7%
Toronto	1200	37.5%	40.7%	39.8%
York Region	501	15.7%	15.6%	15.7%
Total	**3201**	**100.0%**	**100.1%***	**99.9%***

*Discrepancies in totals due to rounding error

Differences between each region's share of weighted responses and census population are due to the fact that the survey was restricted to individuals age 18-75. The weights were calculated in reference to each region's population share for that age range. Accordingly, the weighted proportions are equal to regional shares of the actual GTHA population, within ages 18-75. The overall census population, however, includes individuals outside of this age range, which, to differing extents, changes each region's share of that overall all-ages population.

5.5 Driver's License

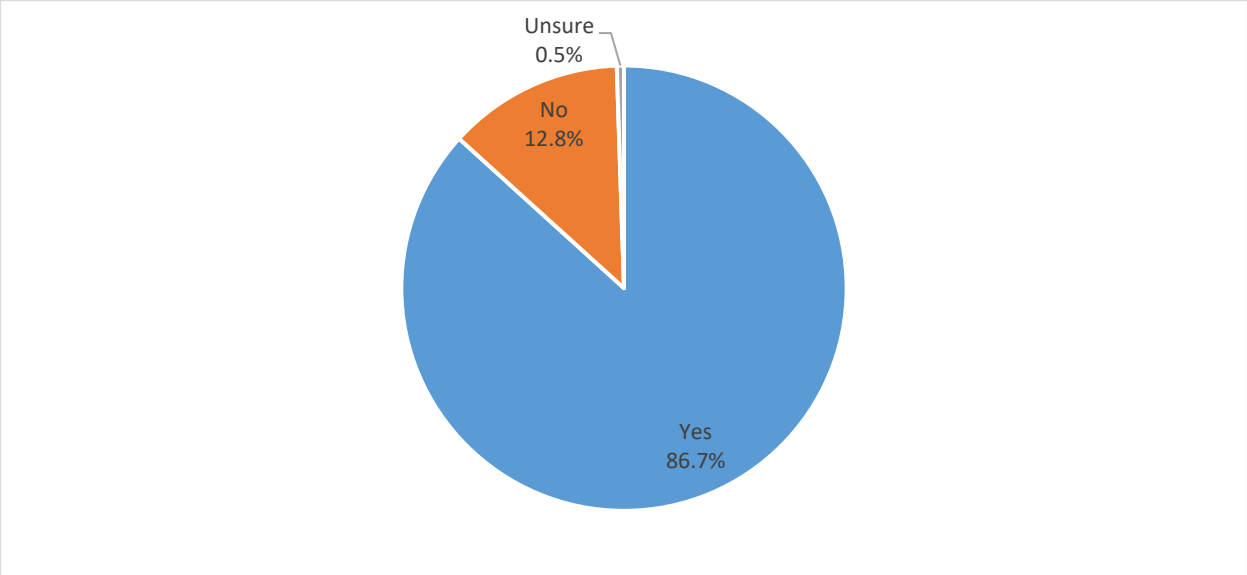
Figure 51. Individuals with Driver's License



Average Licenses Reported per Household: 2.1

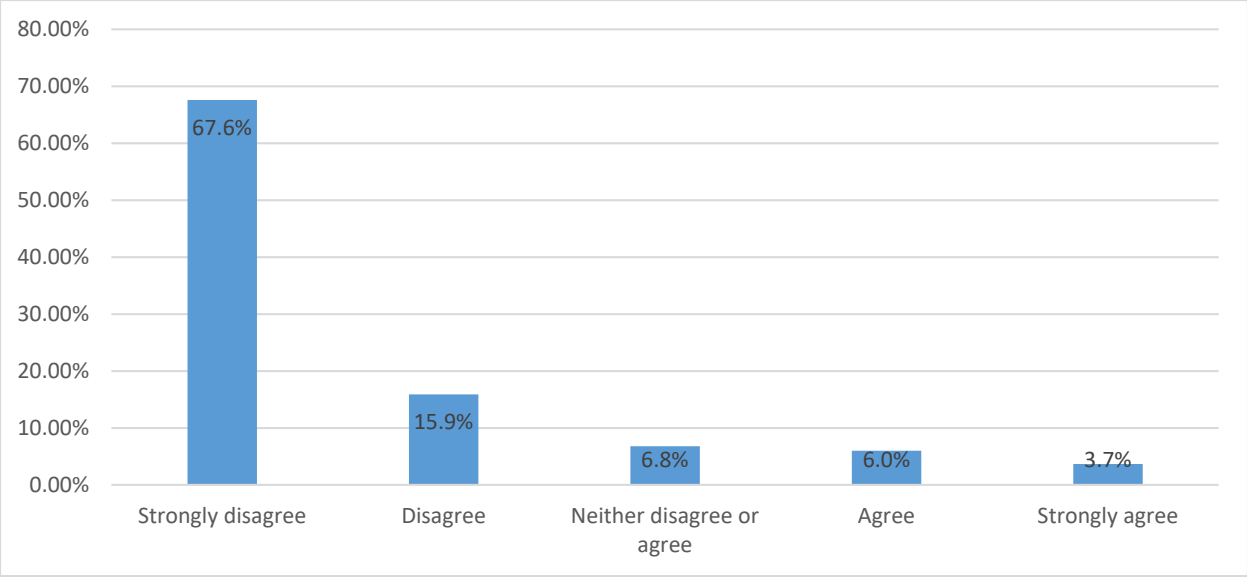
5.6 Smartphone

Figure 52. Individuals Regularly Carrying a Smartphone



5.7 Physical Disability

Figure 53. Responses to "I Have a Physical Disability Which Influences My Ability to Go Places"



5.8 Educational Attainment

Figure 54. Educational Attainment

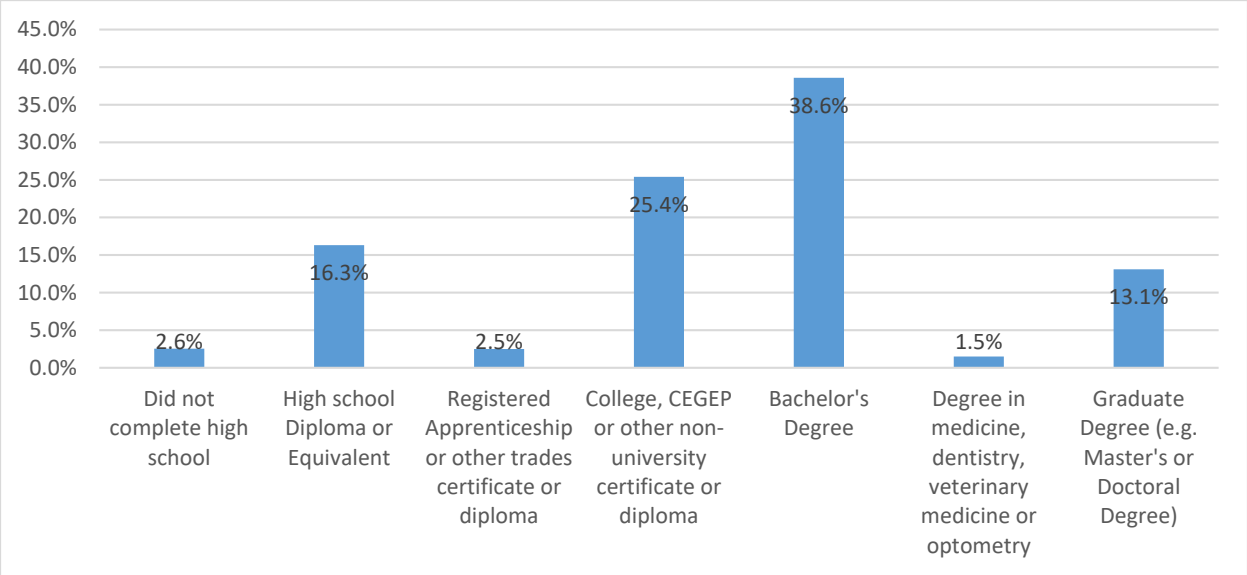
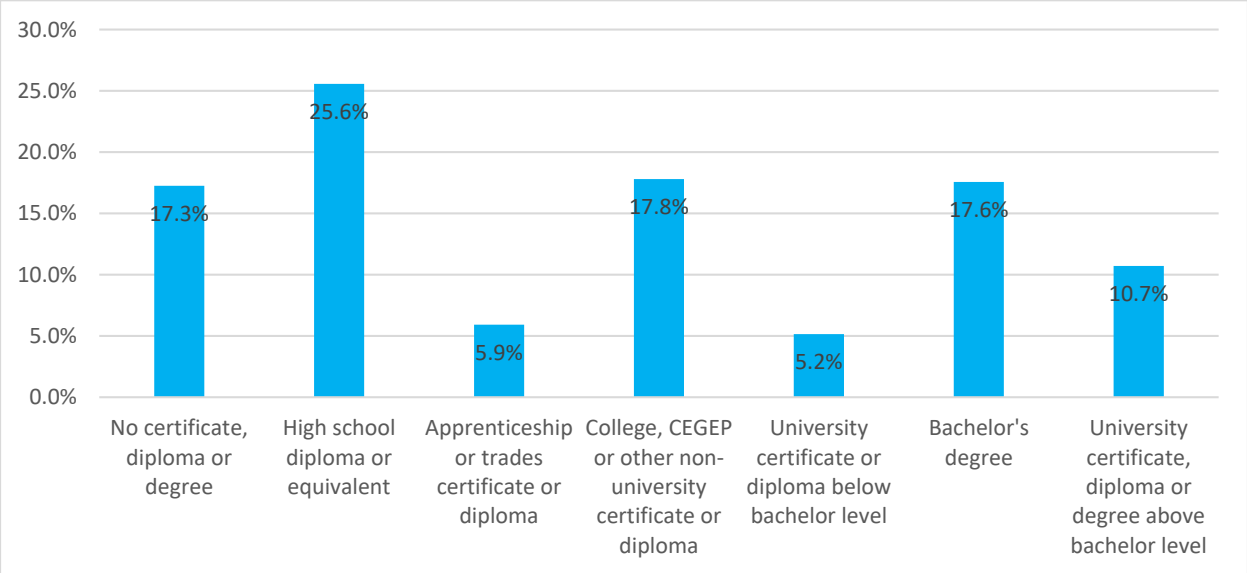


Figure 55. GTHA Educational Attainment in 2011 Census

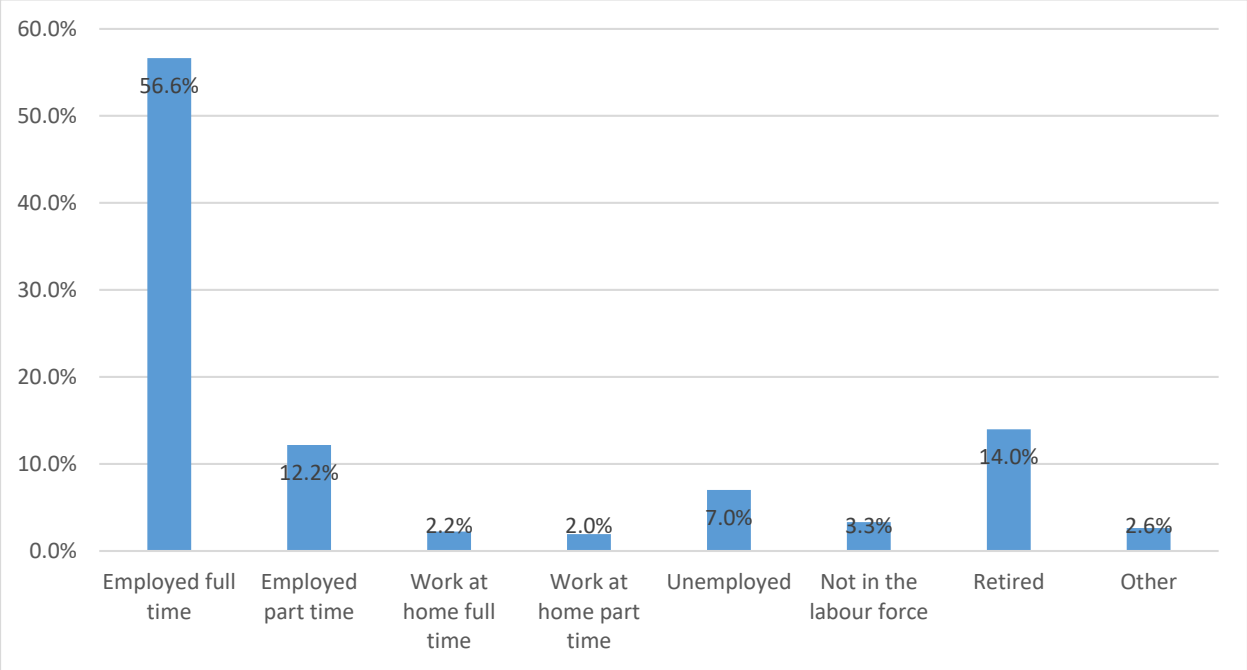


Even after weighting for gender, age and region, it appears that our sample's educational attainment is substantially higher than the actual underlying population of the GTHA (at least according to 2011 Statistics Canada data).

6.0 Employment and Commuting

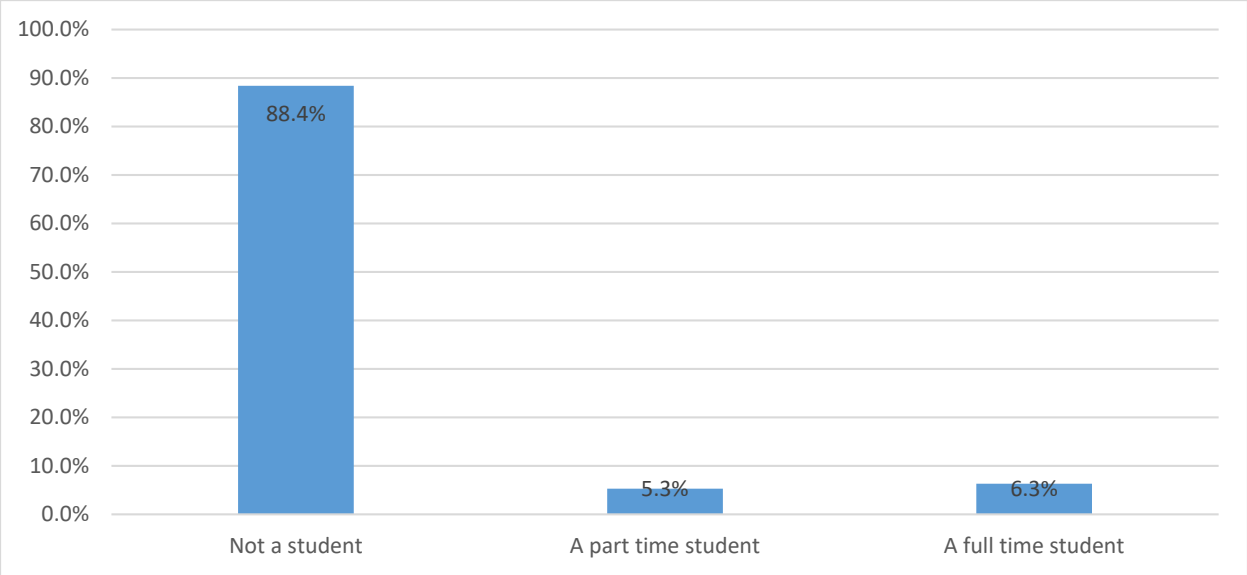
6.1 Employment Status

Figure 56. Employment Status



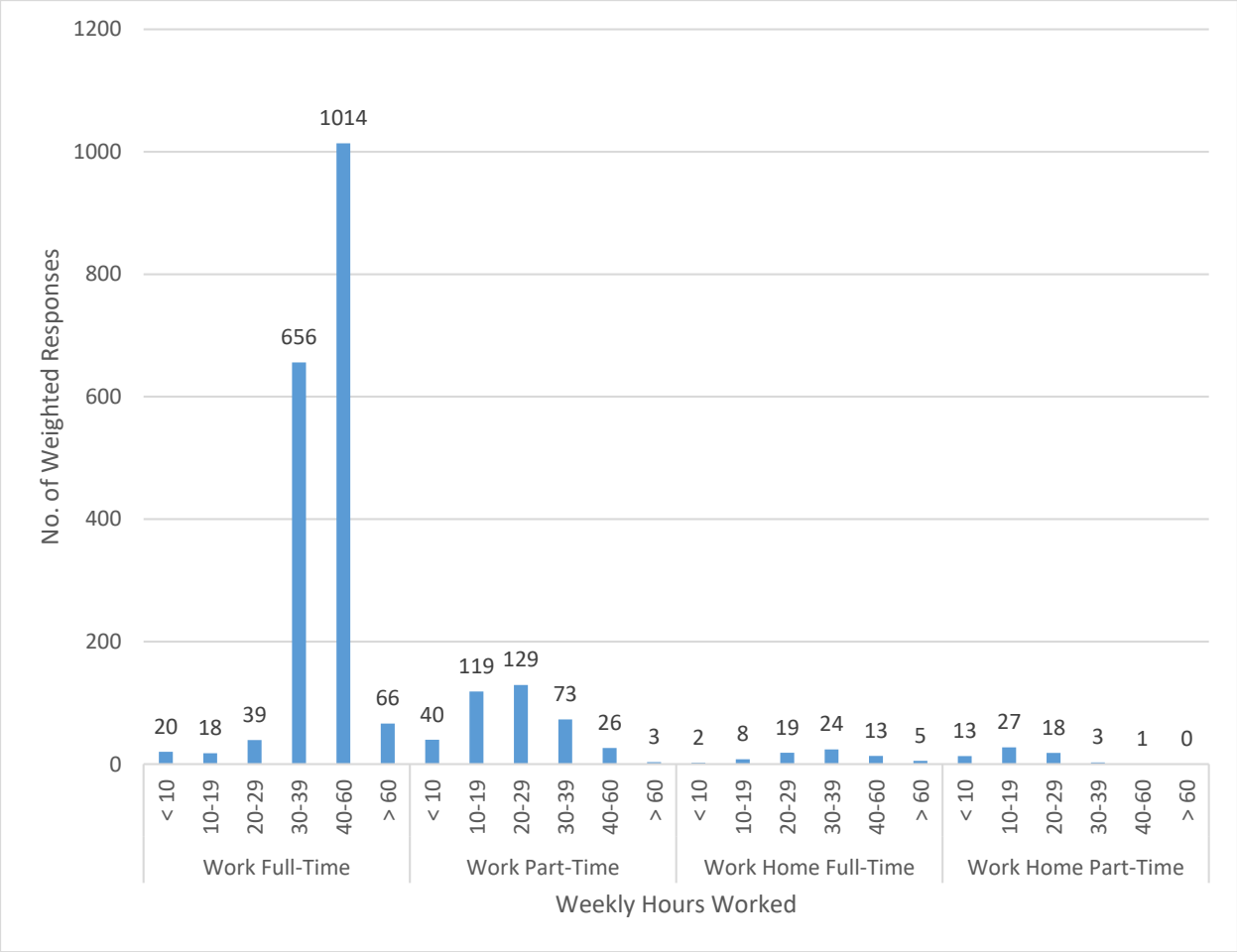
6.2 Student Status

Figure 57. Student Status



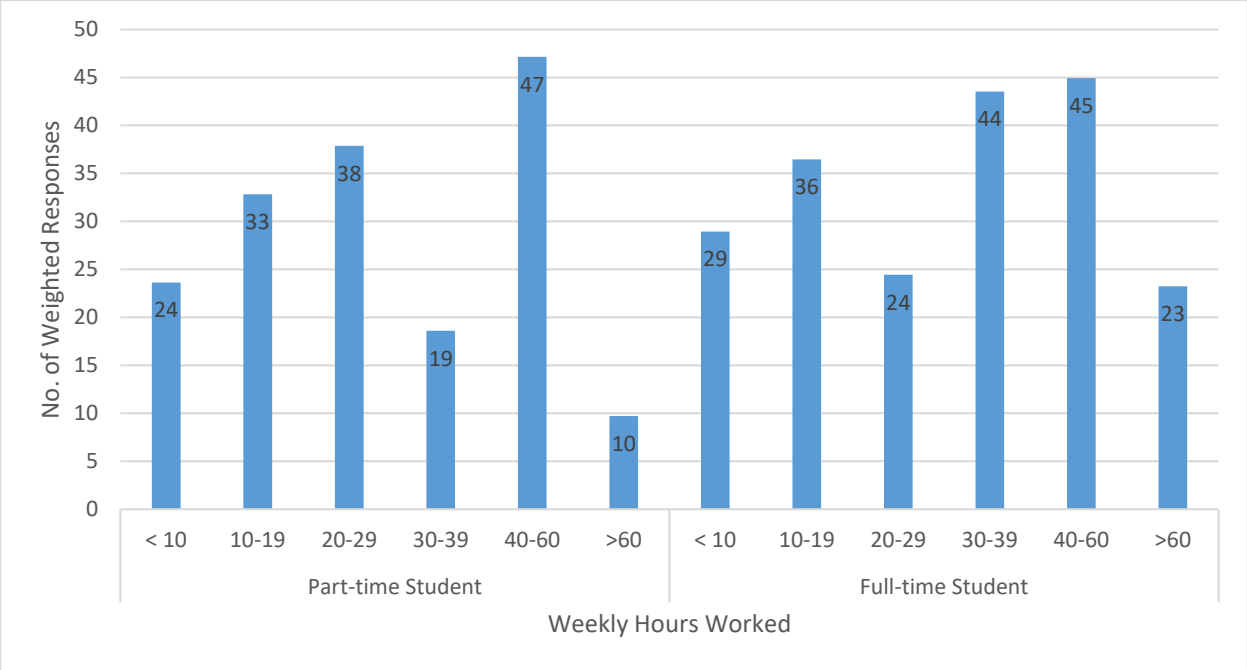
6.3 Weekly Hours by Employment Status

Figure 58. Weekly Hours Worked, Sorted by Employment Status



6.4 Weekly Hours by Student Status

Figure 59. Weekly Hours Worked, Sorted by Student Status



6.5 Occupation

Figure 60. Occupation

6.6 Travel Mode

Figure 61. Mode Used on Last Day of Work/School

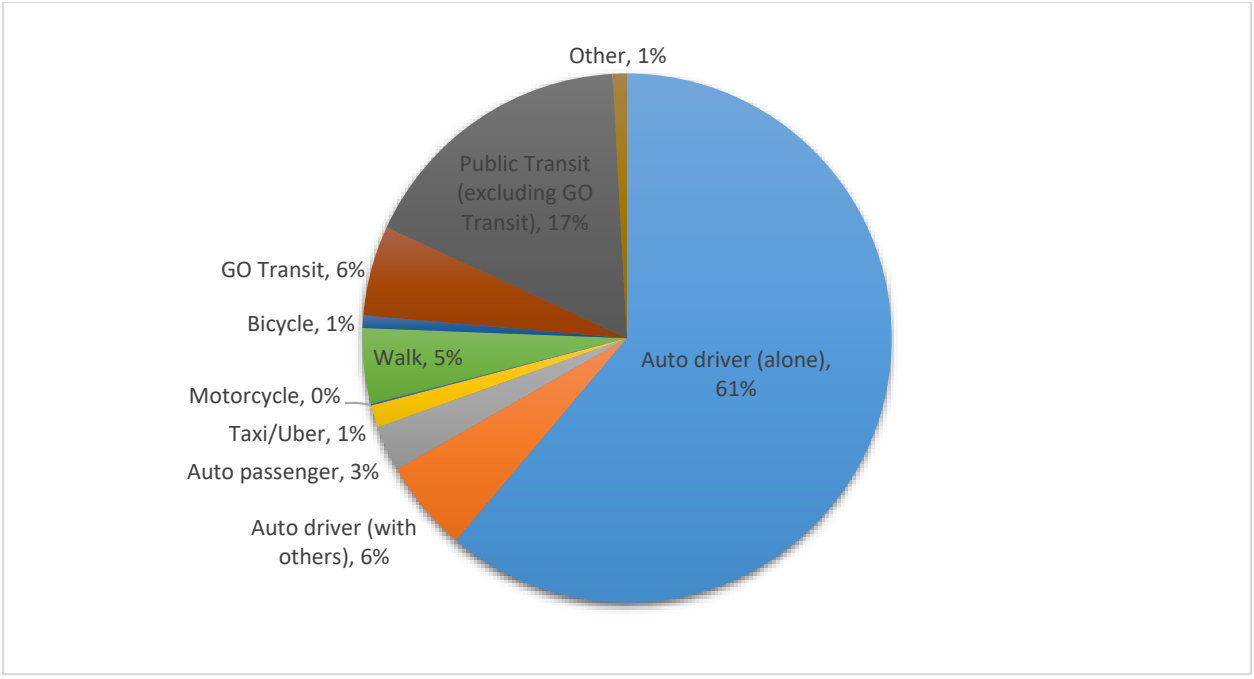
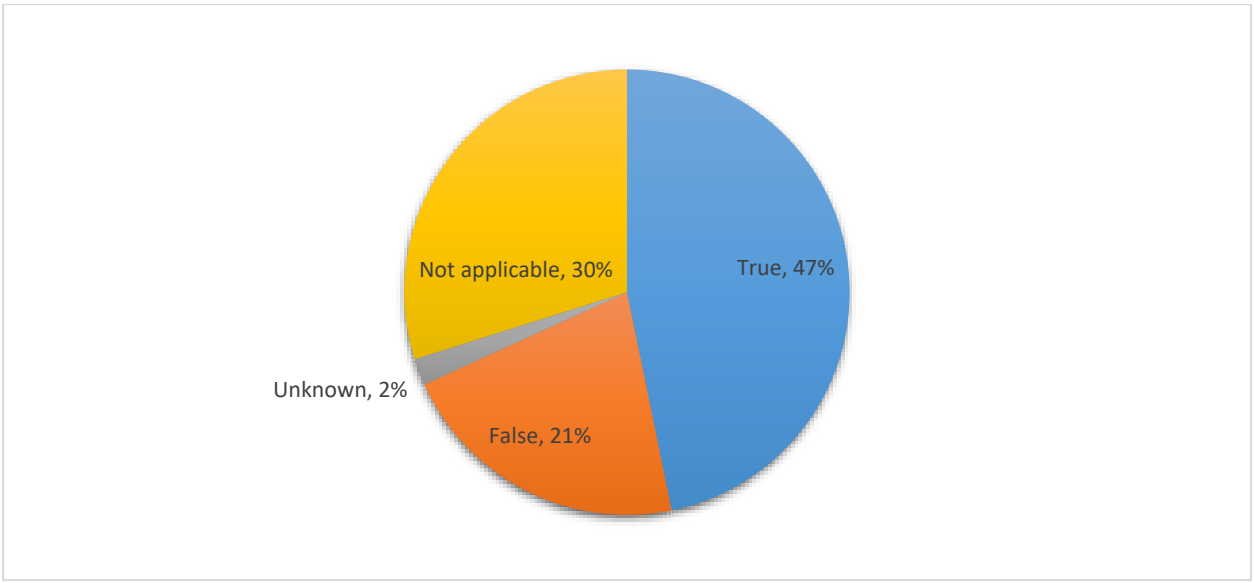


Table 2. Mode Used on Last Day of Work/School

Mode	< 35	35-55	> 55	Total
Auto driver (alone)	54.9%	63.9%	69.6%	61.2%
Auto driver (with others)	6.8%	5.0%	4.0%	5.6%
Auto passenger	2.8%	2.5%	3.9%	2.8%
Taxi/Uber	1.8%	1.0%	1.2%	1.4%
Motorcycle	0.2%	0.0%	0.3%	0.1%
Walk	5.8%	4.2%	2.7%	4.6%
Bicycle	1.0%	0.4%	1.5%	0.8%
GO Transit	4.8%	6.6%	3.6%	5.5%
Public Transit (excluding GO Transit)	21.0%	15.6%	12.2%	17.2%
Other	0.9%	0.8%	1.0%	0.9%

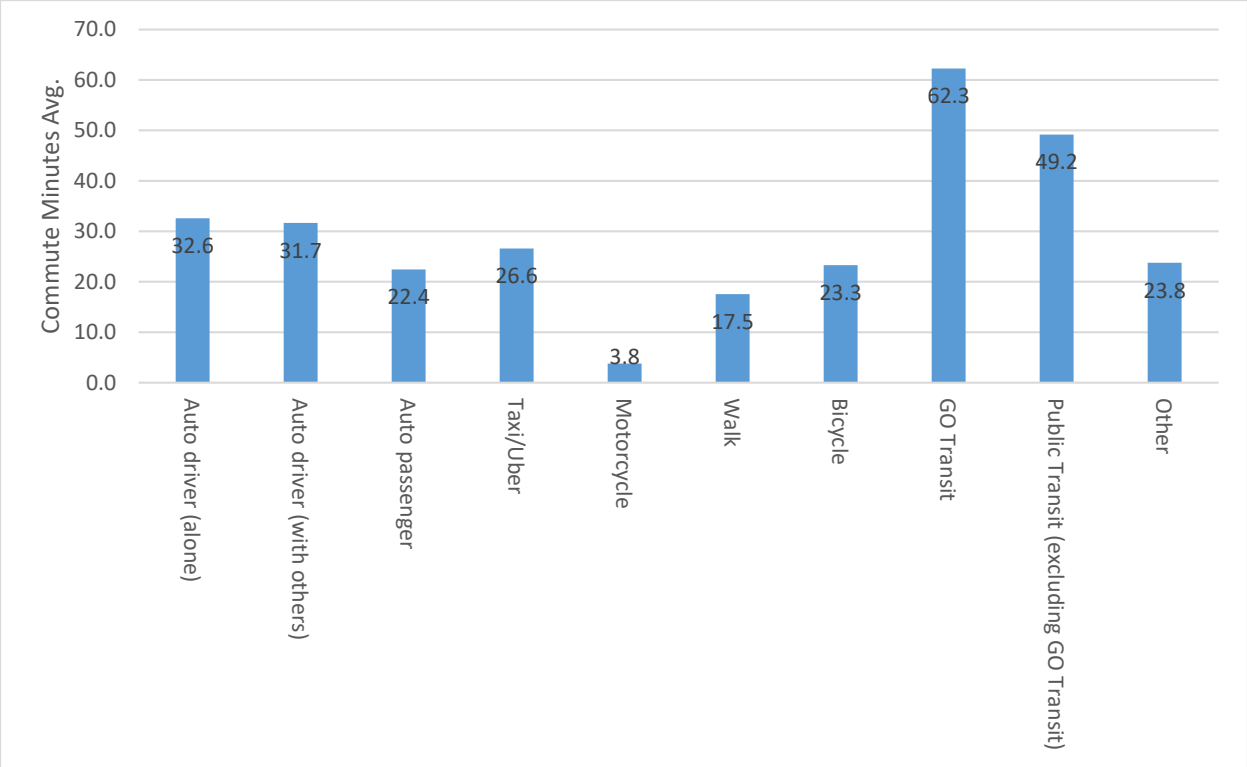
6.7 Car Parking

Figure 62. Individuals with Access to Free Work Parking



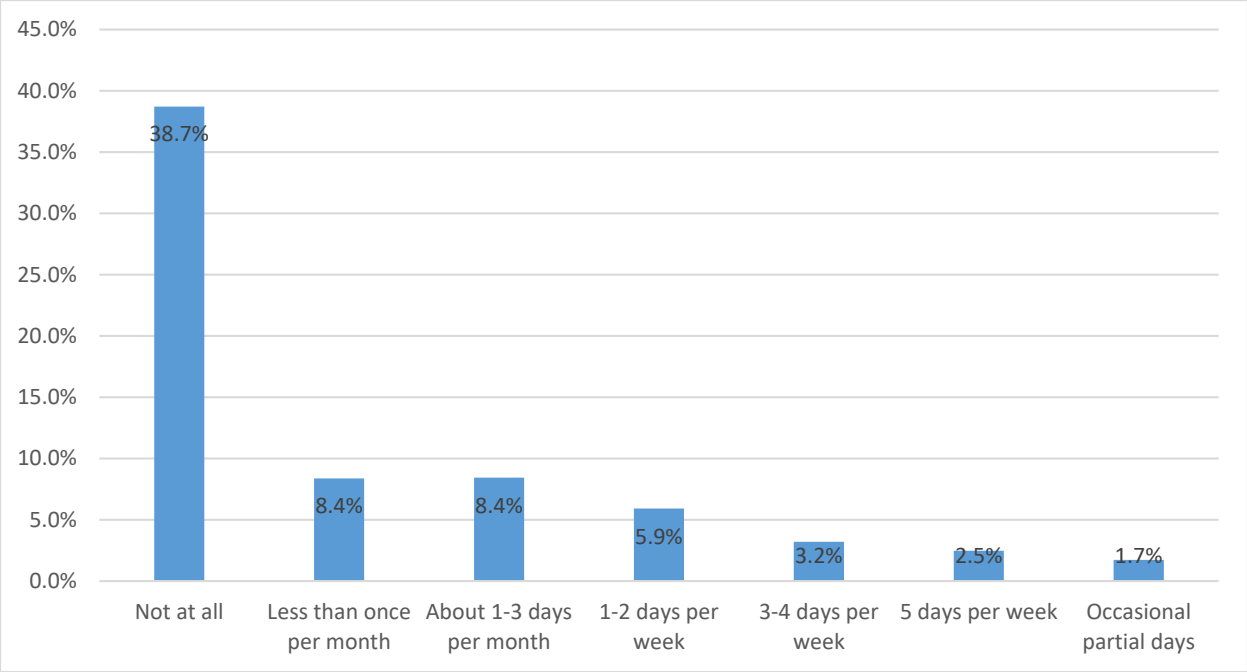
6.8 Travel Time

Figure 63. Mode Average Travel Time (in Minutes)



6.9 Teleworking

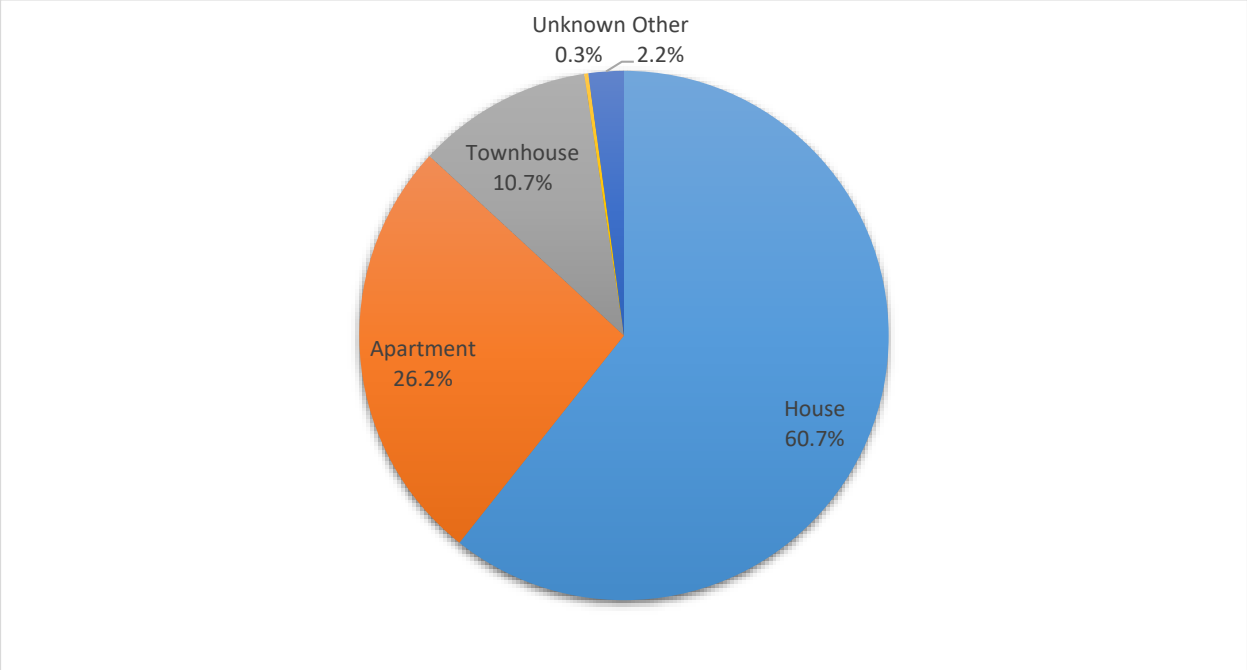
Figure 64. Frequency of Teleworking



7.0 Residence and Household

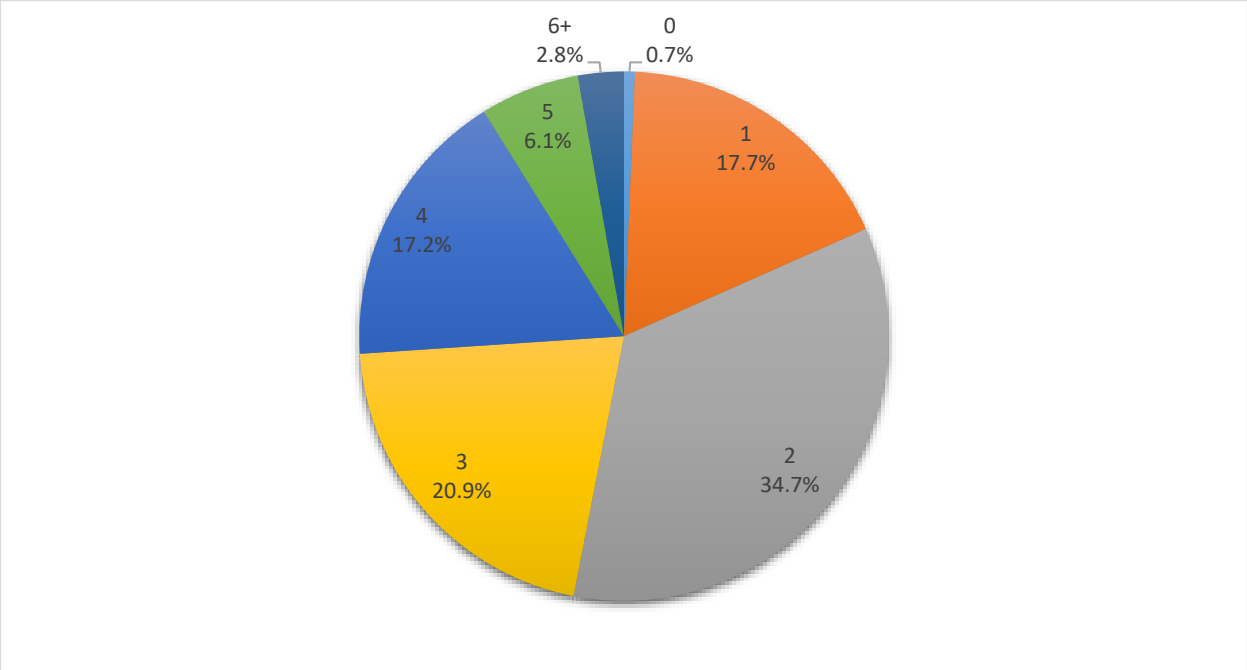
7.1 Dwelling Type

Figure 65. Dwelling Type



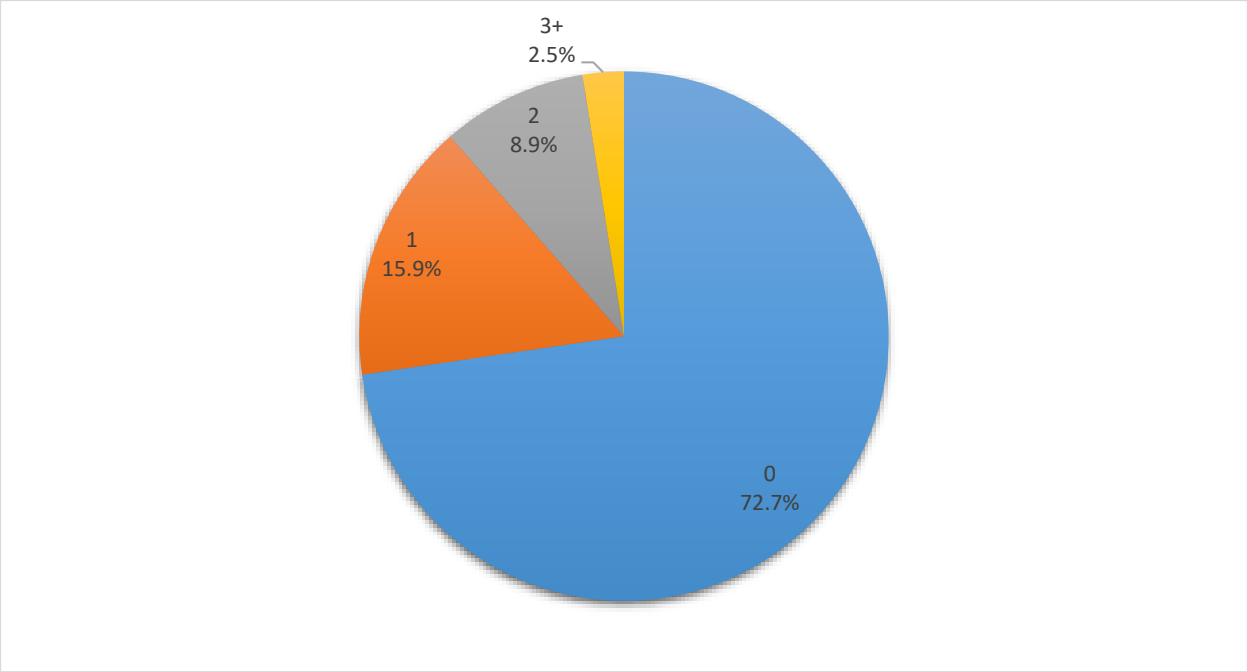
7.2 Household Size

Figure 66. Household Size



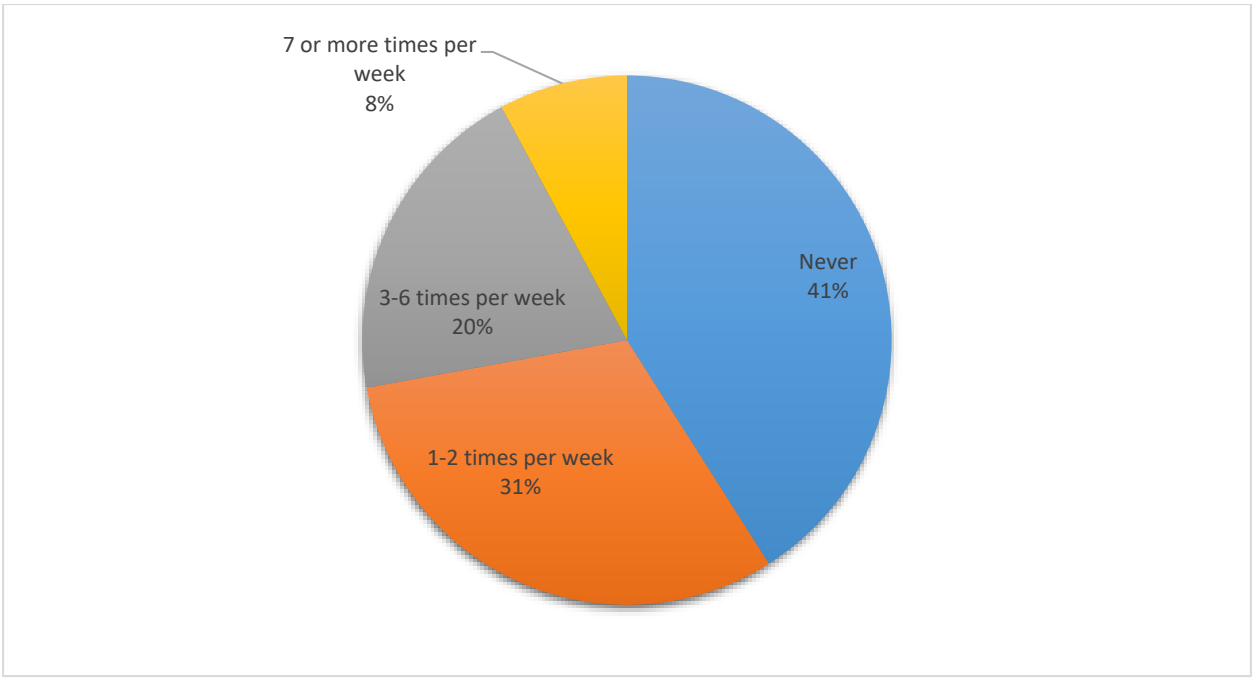
7.3 Household Members Under Age 15

Figure 67. Number of Household Members Under Age 15



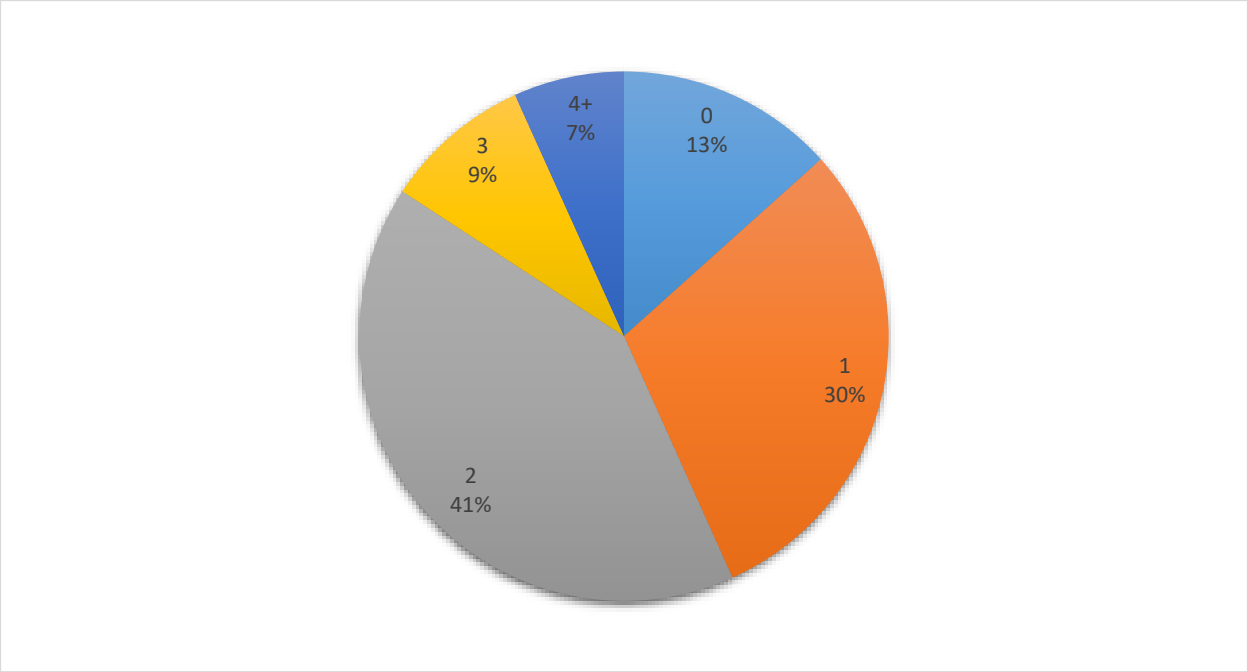
7.4 Chauffeuring Frequency

Figure 68. Chauffeuring Frequency



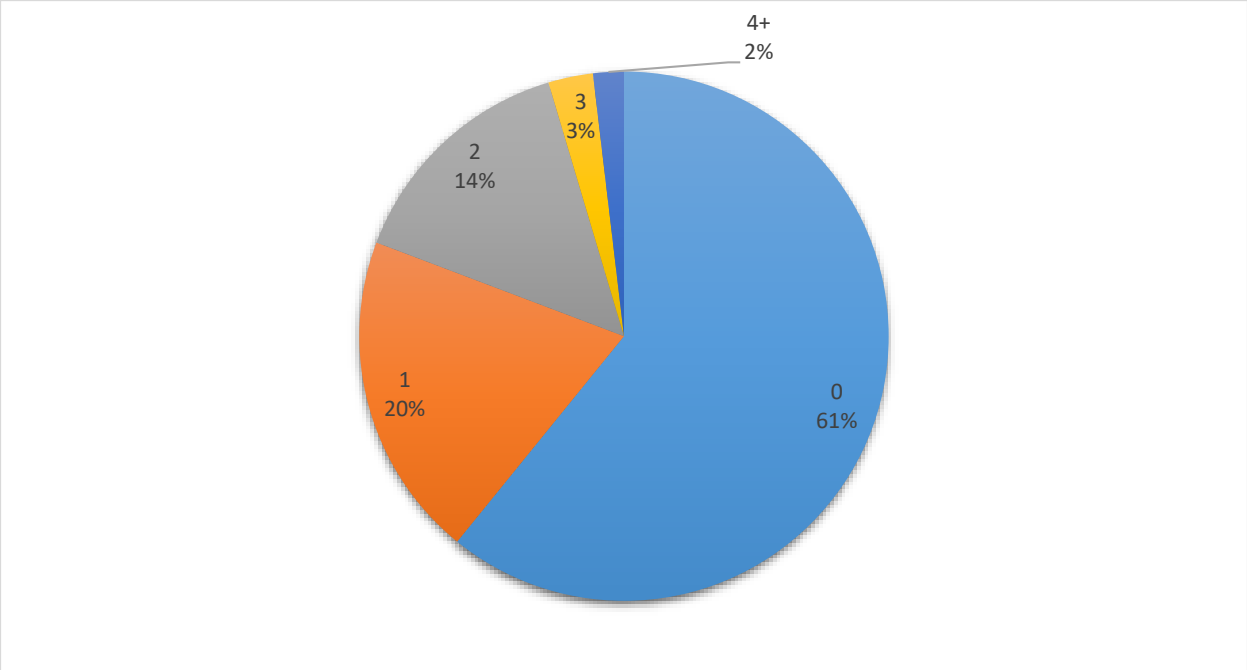
7.5 Number of Employed Persons

Figure 69. Number of Employed Persons in Household



7.6 Number of Post-Secondary Students

Figure 70. Number of Post-Secondary Students in Household



7.7 Household Income

Figure 71. Household Income

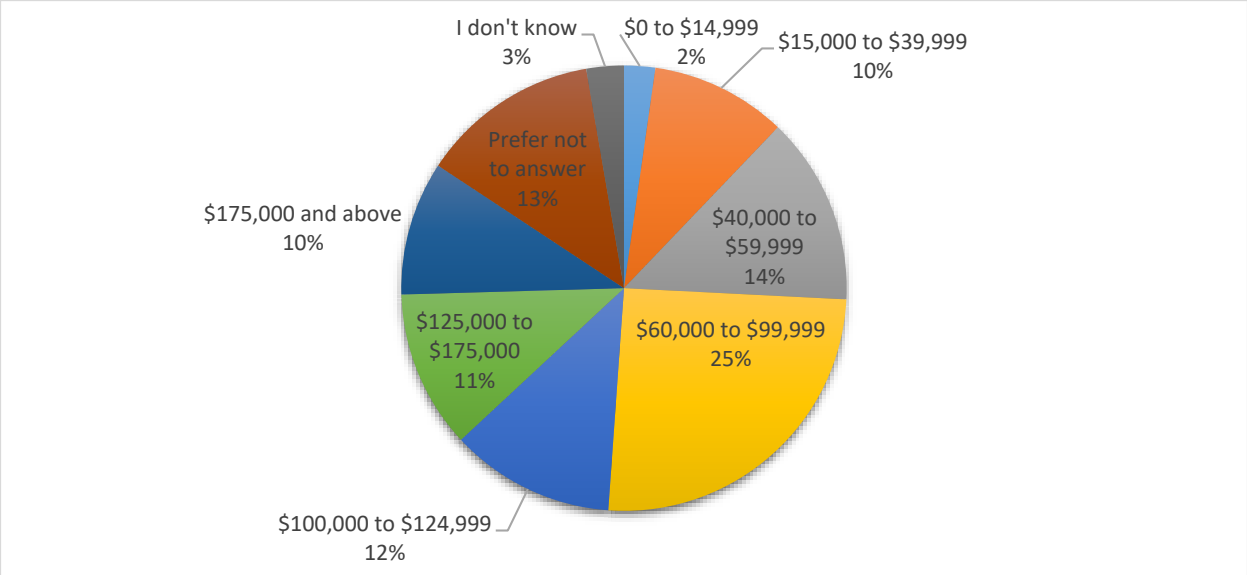
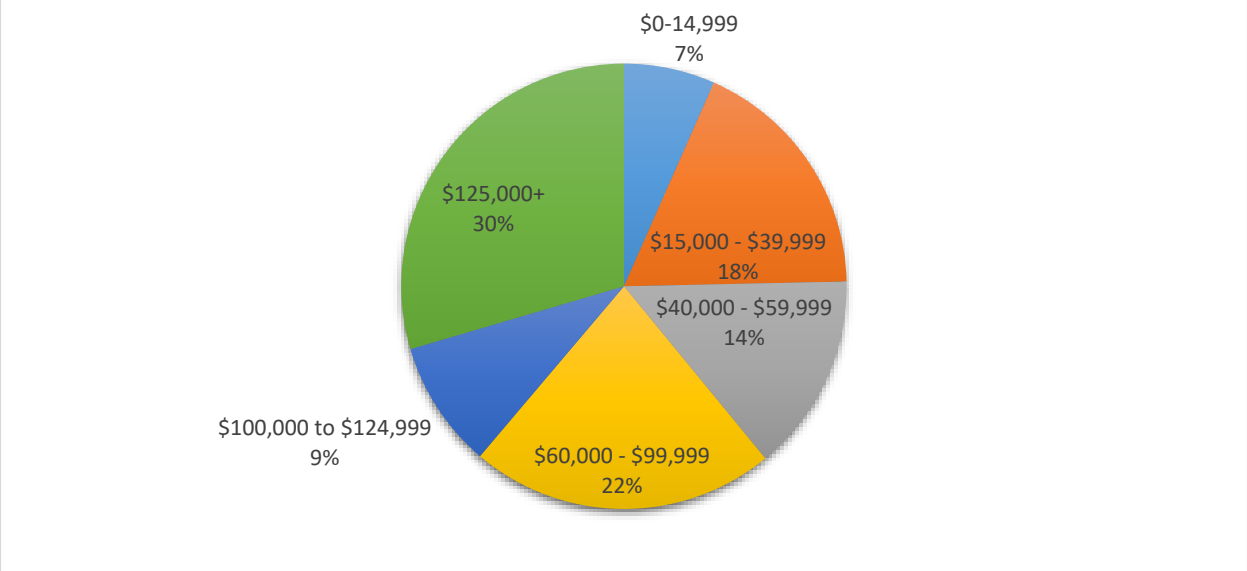


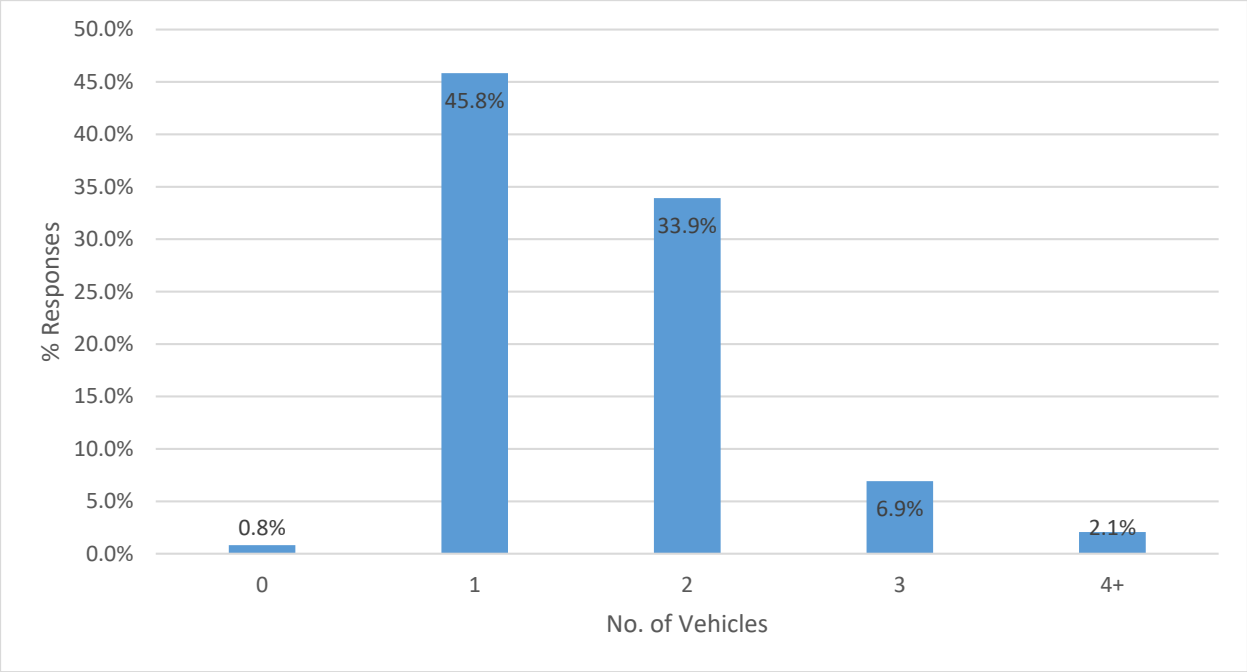
Figure 72. GTHA Household Income in 2011 Census



Our sample appears to be somewhat under-representative of the lower end ($0-39, 999) and higher end ($125, 000+) of household incomes in the GTHA, although there could be an effect of the "prefer not to answer" and "I don't know" survey responses masking a disproportionate share of responses from these extremes.

7.8 Vehicles per Household

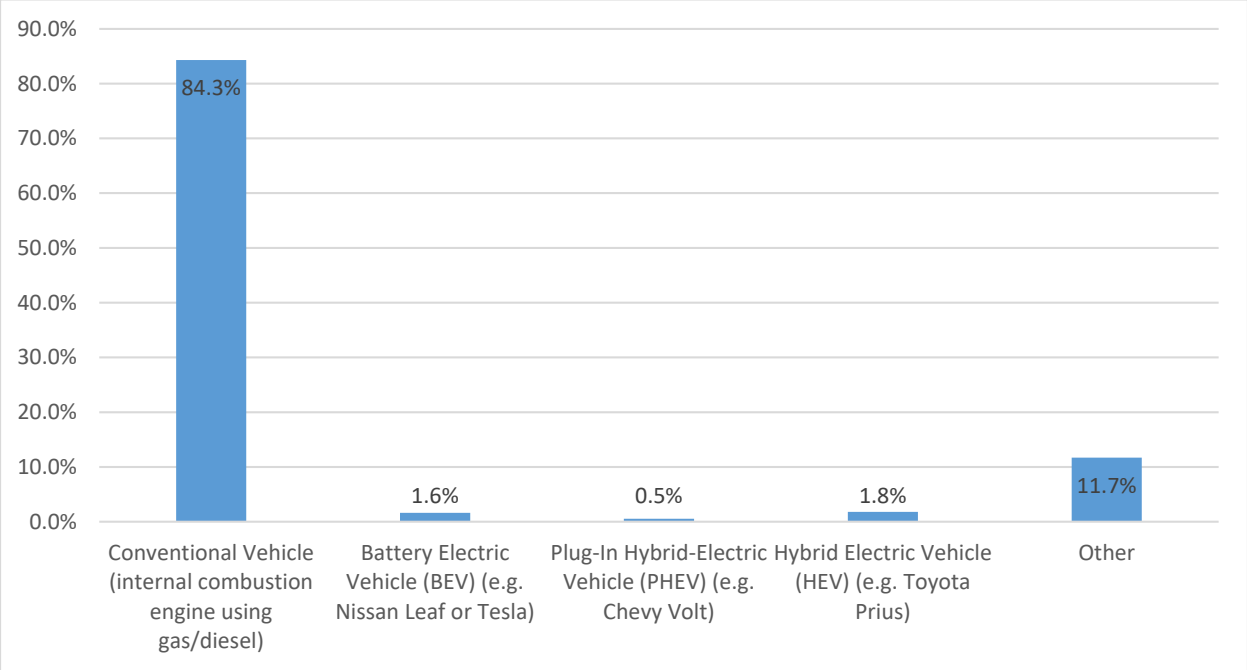
Figure 73. Number of Vehicles Per Household



8.0 Vehicle and Daily Travel

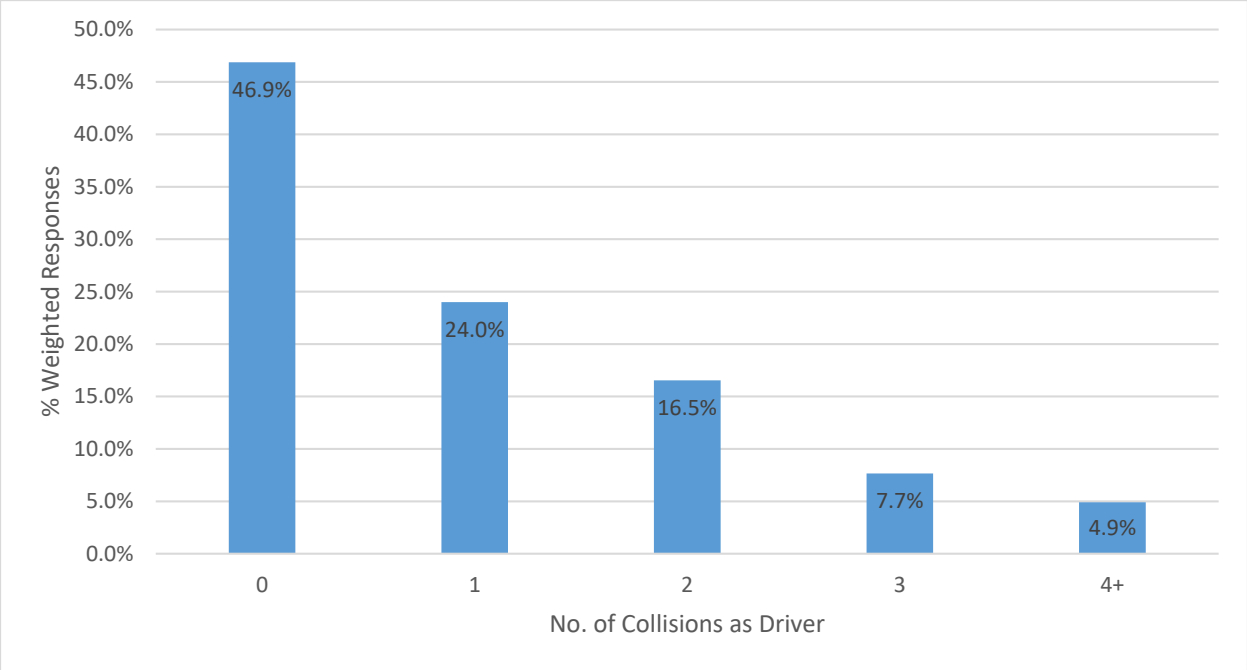
8.1 Primary Vehicle Type

Figure 74. Primary Vehicle Type



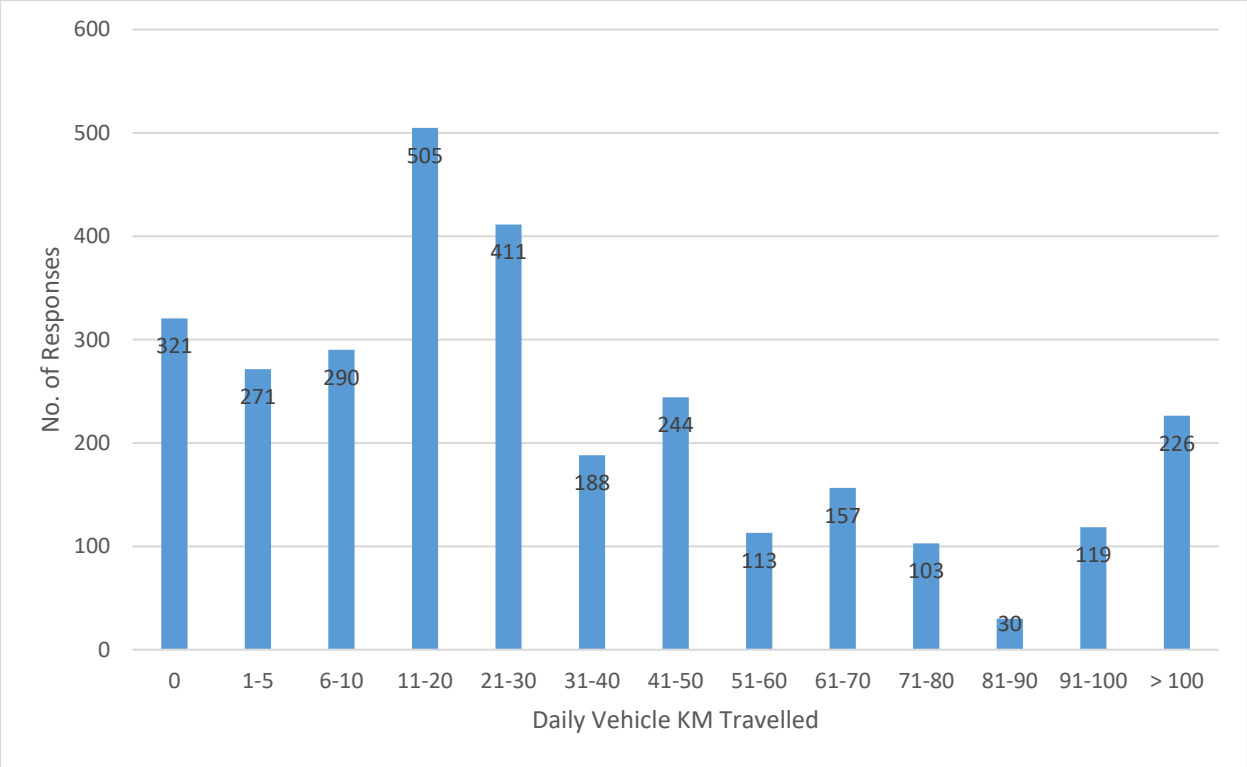
8.2 Number of Collisions

Figure 75. Number of Collisions as Driver



8.3 Distance Travelled

Figure 76. Daily Vehicle KM Travelled



9.0 General Attitudes

9.1 Individual Preferences

Table 3. Individual Preferences

Attitude	Strongly Agree	Agree	Neither	Disagree	Strongly Disagree
I always plan things in advance.	22.8%	57.4%	14.8%	4.5%	0.5%
I'm very protective of my personal space.	25.9%	56.1%	14.6%	3.0%	0.5%
I like to be in control.	19.1%	55.3%	21.3%	3.9%	0.4%
If I'm traveling to a meeting, I allow extra time in case my trip is delayed	35.2%	51.1%	10.2%	3.2%	0.3%
Driving a car gives me a sense of control	21.1%	47.3%	24.0%	5.7%	1.9%
Having a car gives me a great sense of freedom	33.9%	48.3%	13.2%	2.9%	1.7%
I'm often one of the first people to try out a new product	9.1%	26.4%	36.0%	24.5%	4.0%
I like to work hard and play hard	14.3%	44.4%	31.8%	8.7%	0.8%
I live a hectic life	10.1%	30.2%	31.9%	24.6%	3.2%