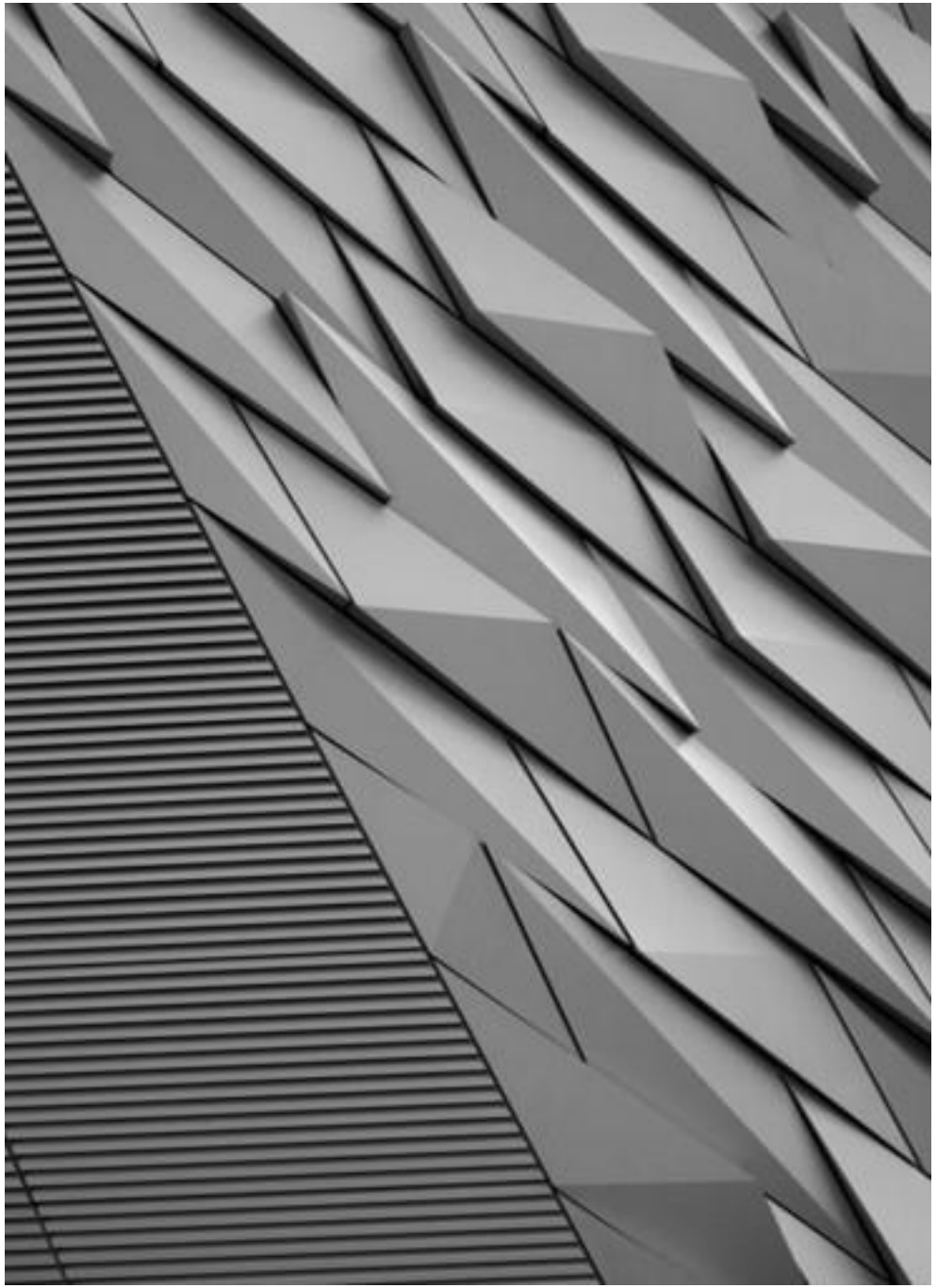
Triangle Travel Trend Analysis

Based on 2016, 2018, and 2021 Household Travel Surveys

Institute for Transportation Research and Education,
North Carolina State University

February, 2022

Table of Contents



Triangle Recurring Household Travel Survey

Unweighted households, people and trips, after processing and cleaning.

	2016	2018	2021
	4,169	1,498	1,120
	9,207	3,119	2,188
	38,065	12,249	12,326
	March & April	October & November	February & March

Recurring Household Travel Survey was launched. Relatively large dataset was collected in order to calibrate the TRM v6.1 model. Subsequent survey waves are smaller sample sizes as suggested by best-practice industry standards.

Second survey wave. Sample ensured low-income households, zero-car households, and larger households were oversampled to include a sufficient number of these often under-surveyed household.

The survey was postponed from fall to spring due to the COVID pandemic. A new survey collection method involving the optional use of smart phones was also implemented.

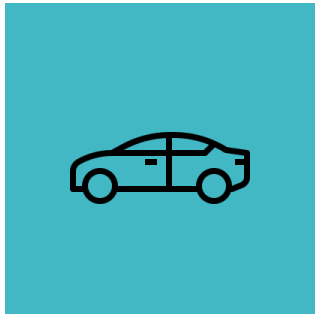
Overall Trip Statistics[1]

	2016	2018	2021
Total Person Trips	7,058,973	6,857,412	4,293,700
Total Vehicle Trips	5,762,139	5,717,259	3,843,879
Average Trip Length (all modes)	6.1	6.2	5.0
Average Trip Length (auto)	7.0	7.0	5.4
Average Daily Trips per Household	10.8	9.8	5.7
Average Daily Trips per Person	4.4	4.0	2.4

1 - Using weighted and expanded survey data.

Key Takeaways by Travel Mode

Generally, mode of travel has remained stable across the Triangle region in the past 5 years, though the COVID pandemic did have a significant impact on transit.



Automobile

Automobile is still the dominant mode in the Triangle.

Transit

Transit ridership declined by 90% in 2021 due to the pandemic.

Bike

The predominance of travel by bicycle is seen for trips between one and six miles.

Pedestrian

Walking trips consistently show up as an important means of travel for trips less than one mile.

Other

During this time period we saw an emergence of new modes like e-scooters, e-bikes and hover boards.

Demographics

This section provides an overview of the household and population characteristics in the Triangle region.

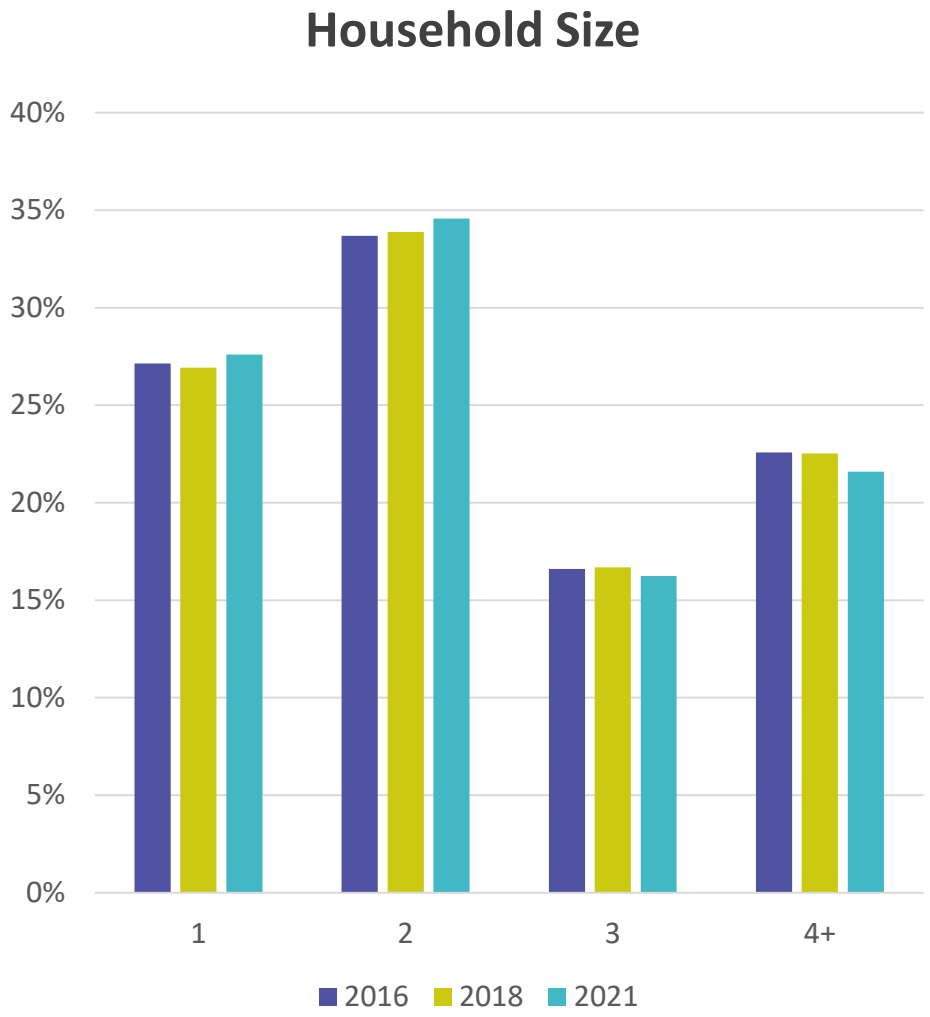
Triangle Demographics

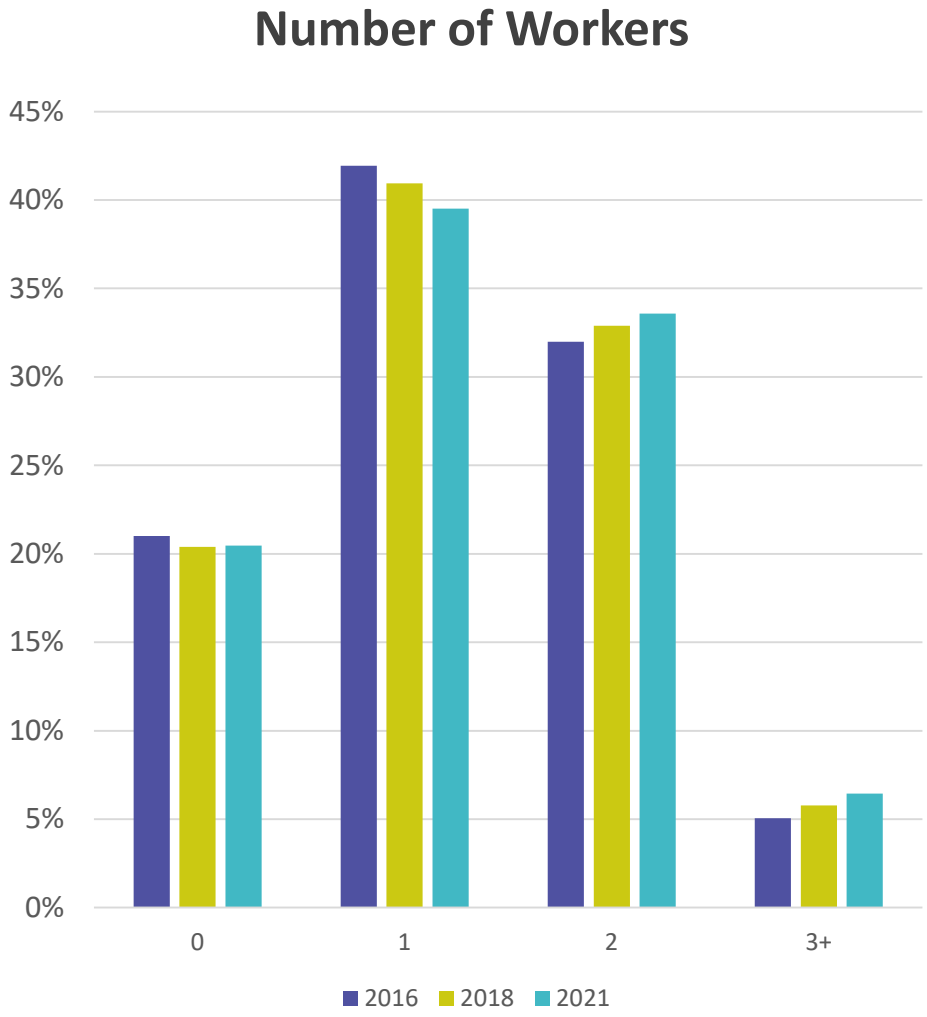
Average household metrics have remained stable across the years.

	2016	2018	2021
Persons per Household	2.47	2.46	2.36
Workers per Household	1.22	1.25	1.26
Drivers per Household	1.77	1.80	1.75
Vehicles per Household	1.84	1.90	1.88
Vehicles per Worker	1.51	1.52	1.50
Vehicles per Driver	1.04	1.05	1.08

Household Characteristics

Size & Workers

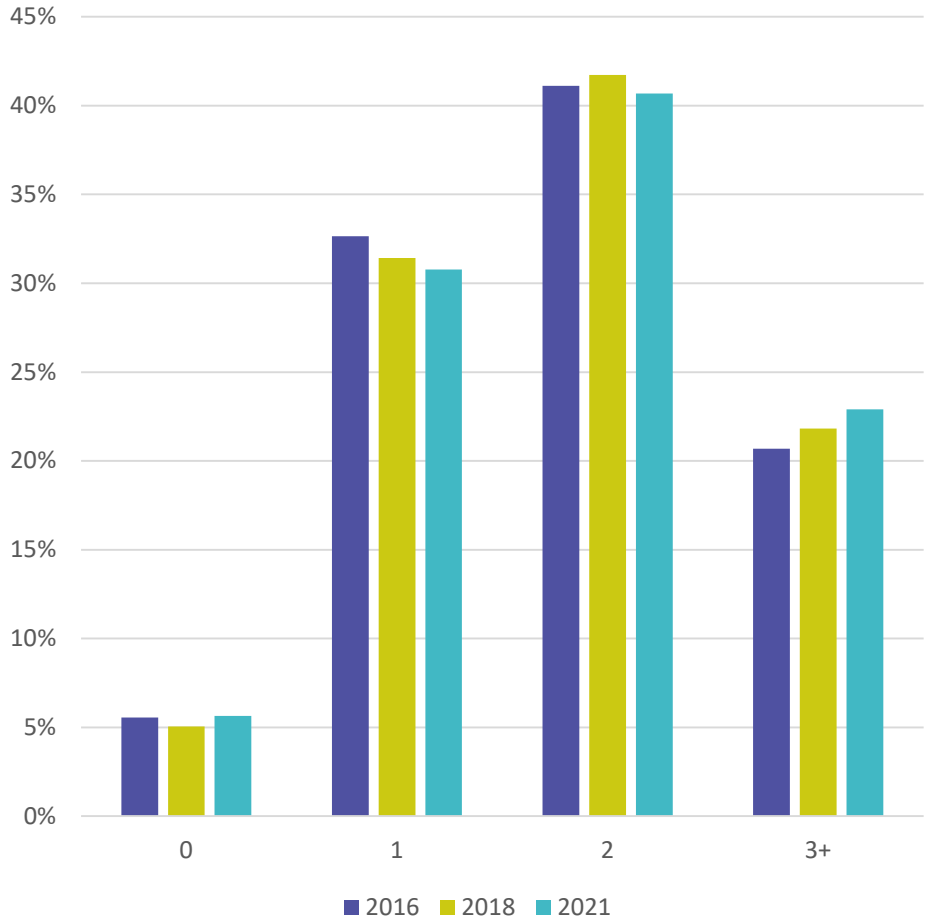




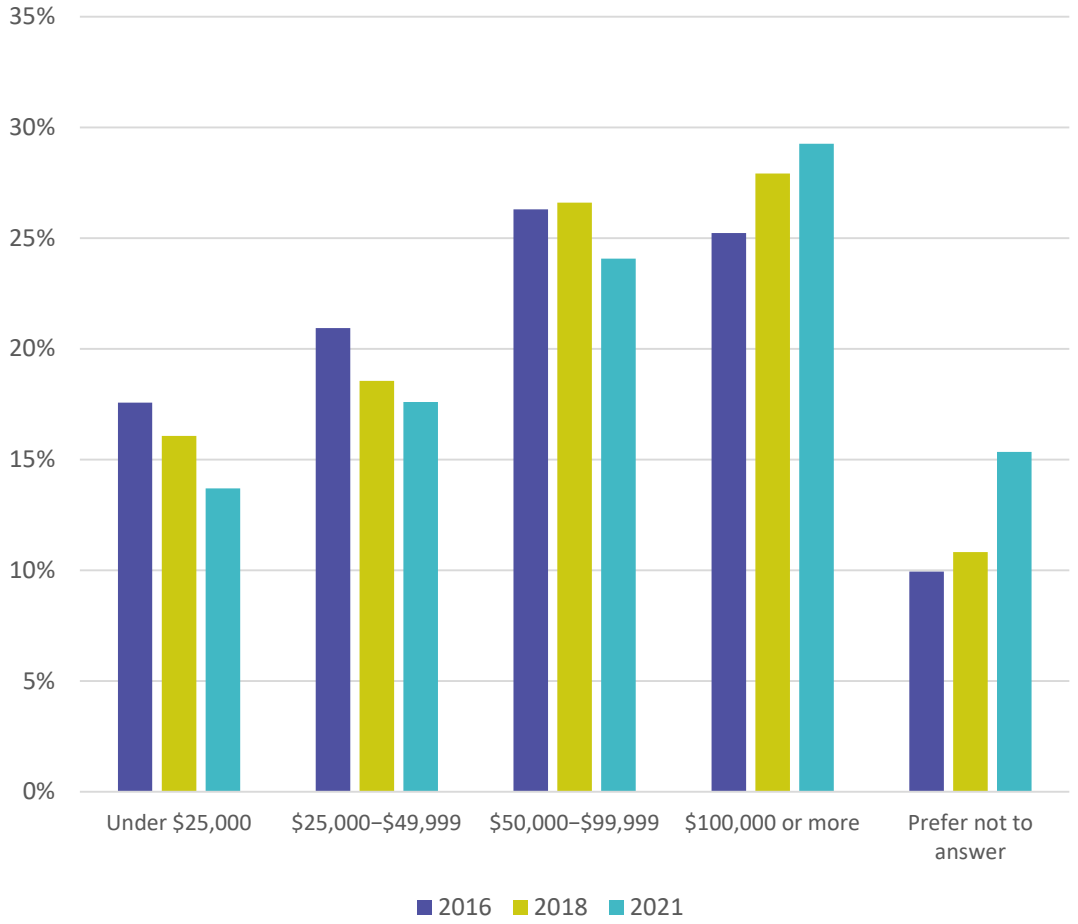
Household size is stable while the number of workers per household has shown an upward trend.

Auto Ownership & Income

Auto Ownership



Income Group



Zero-vehicle households remain stable while households with 3+ vehicles increased over time. Household income within the Triangle region is also increasing over the years.

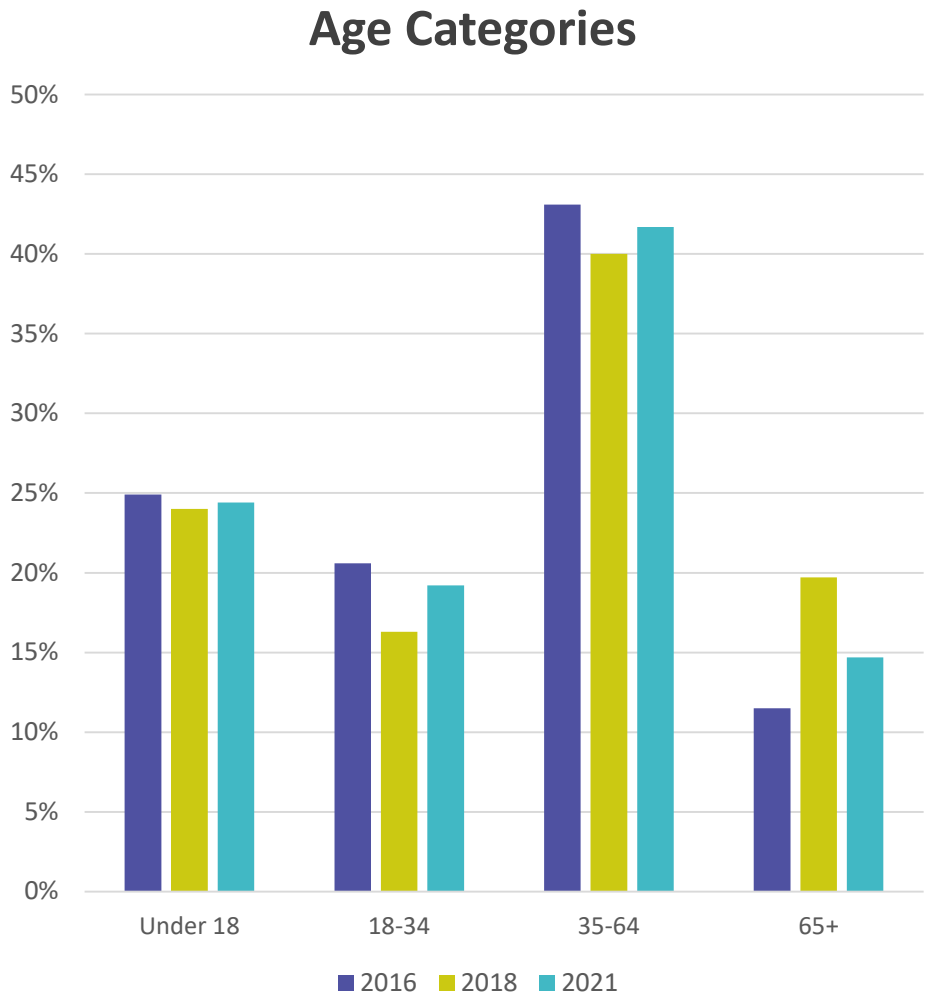
Workers by Auto Ownership

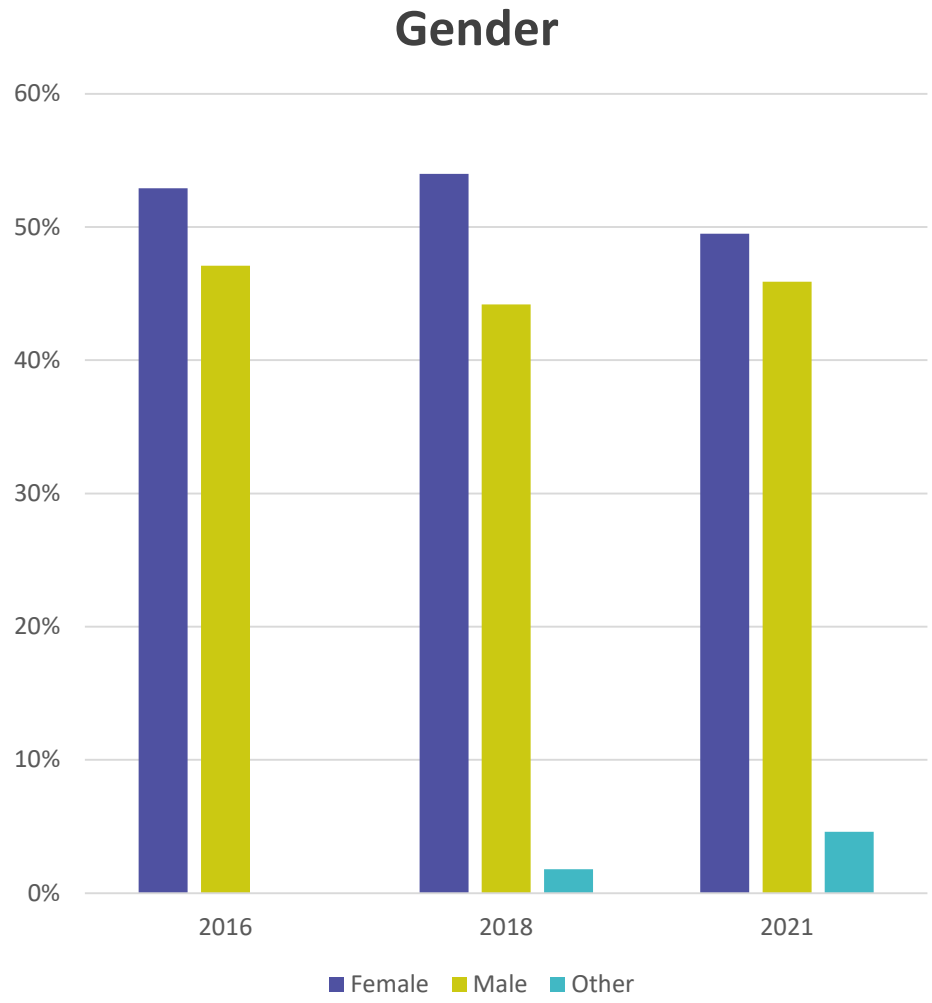
Number of Workers	2016				2018				2021			
	Number of Vehicles											
	0	1	2	3+	0	1	2	3+	0	1	2	3+
0	3%	10%	6%	2%	3%	11%	5%	1%	3%	9%	7%	2%
1	2%	20%	15%	6%	2%	18%	15%	6%	2%	18%	14%	5%
2	0%	3%	19%	9%	0%	3%	20%	10%	0%	4%	20%	10%
3+	NA	0%	1%	4%	NA	1%	1%	4%	NA	0%	1%	6%

The percentage of households with a given number of workers and vehicles has remained fairly stable in the past 5 years.

Person-level Characteristics

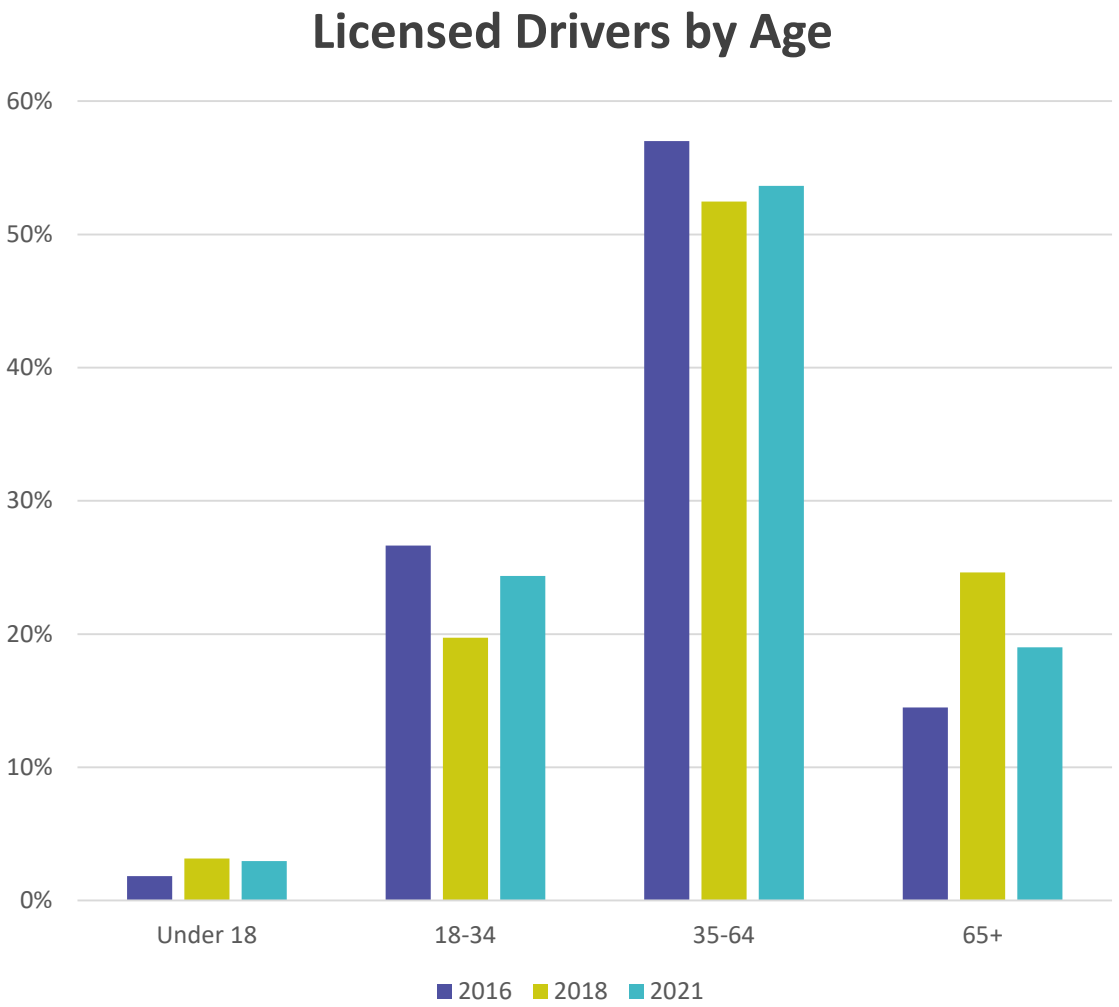
Age & Gender

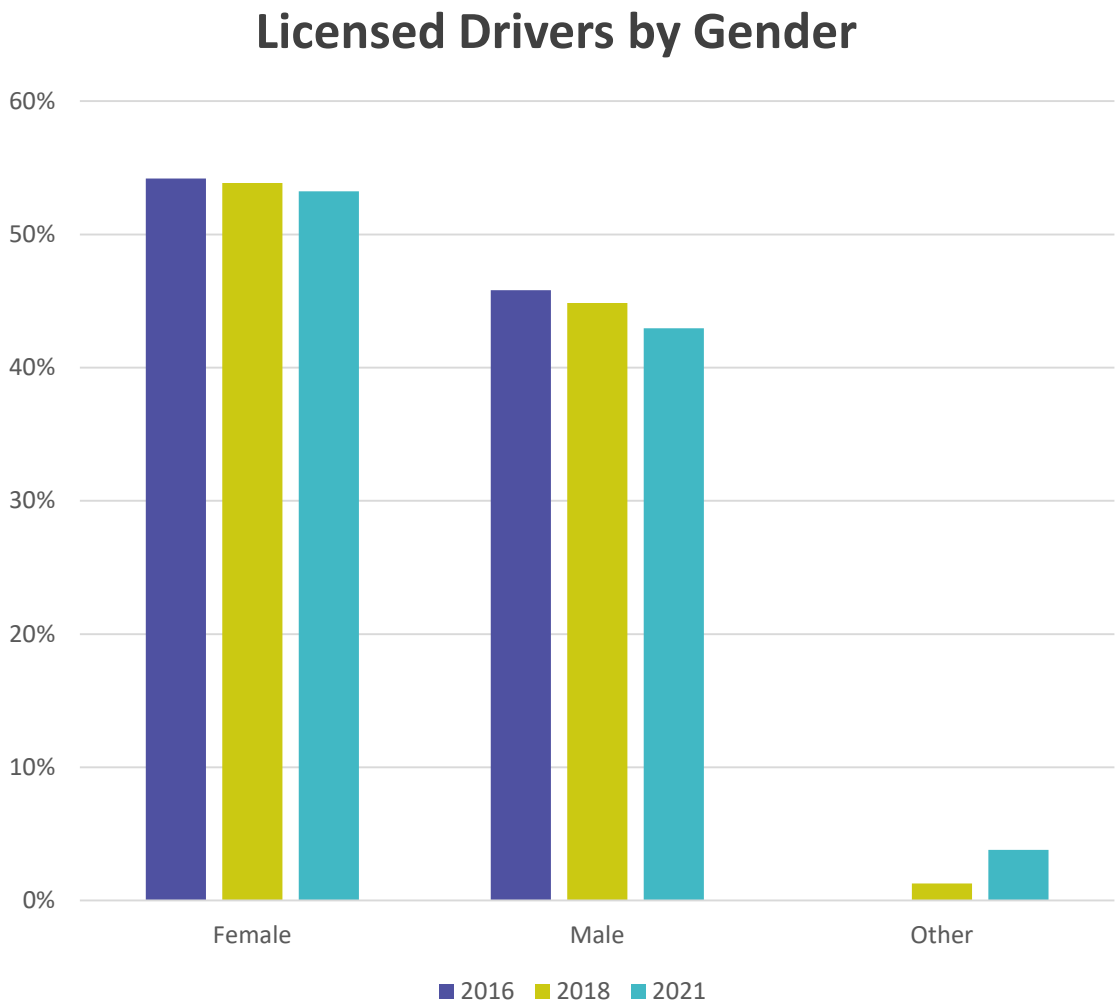




The distribution of survey data by age shows some lumpiness in the various age categories, likely attributed to small sample sizes and the fact that age is not a control factor in the data weighting and expansion. Even so, seniors are a growing segment of the Triangle's population. Also, in 2018, survey data became more inclusive with new non-binary gender categories.

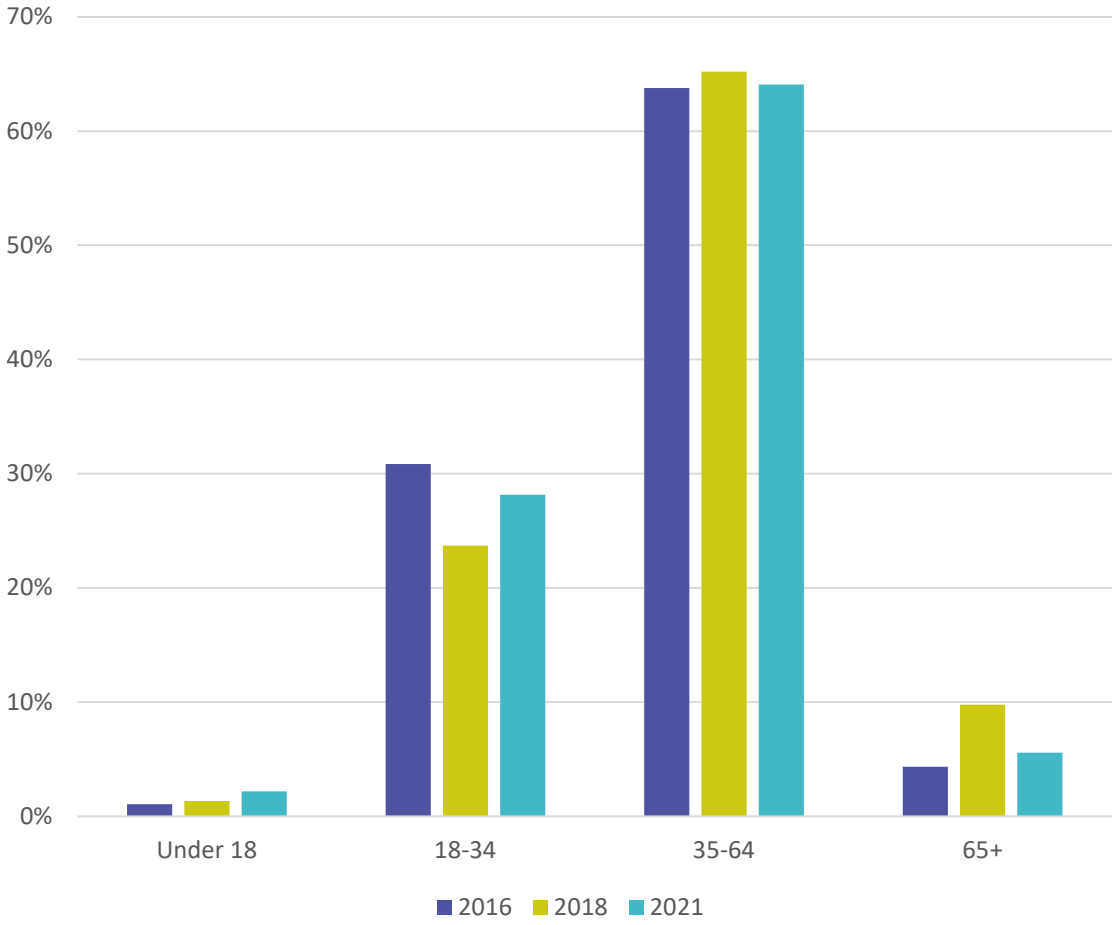
Drivers


Licensed Drivers by Age
60%
50%
40%
30%
20%
10%
0%
Under 18
18-34
35-64
65+
2016
2018
2021

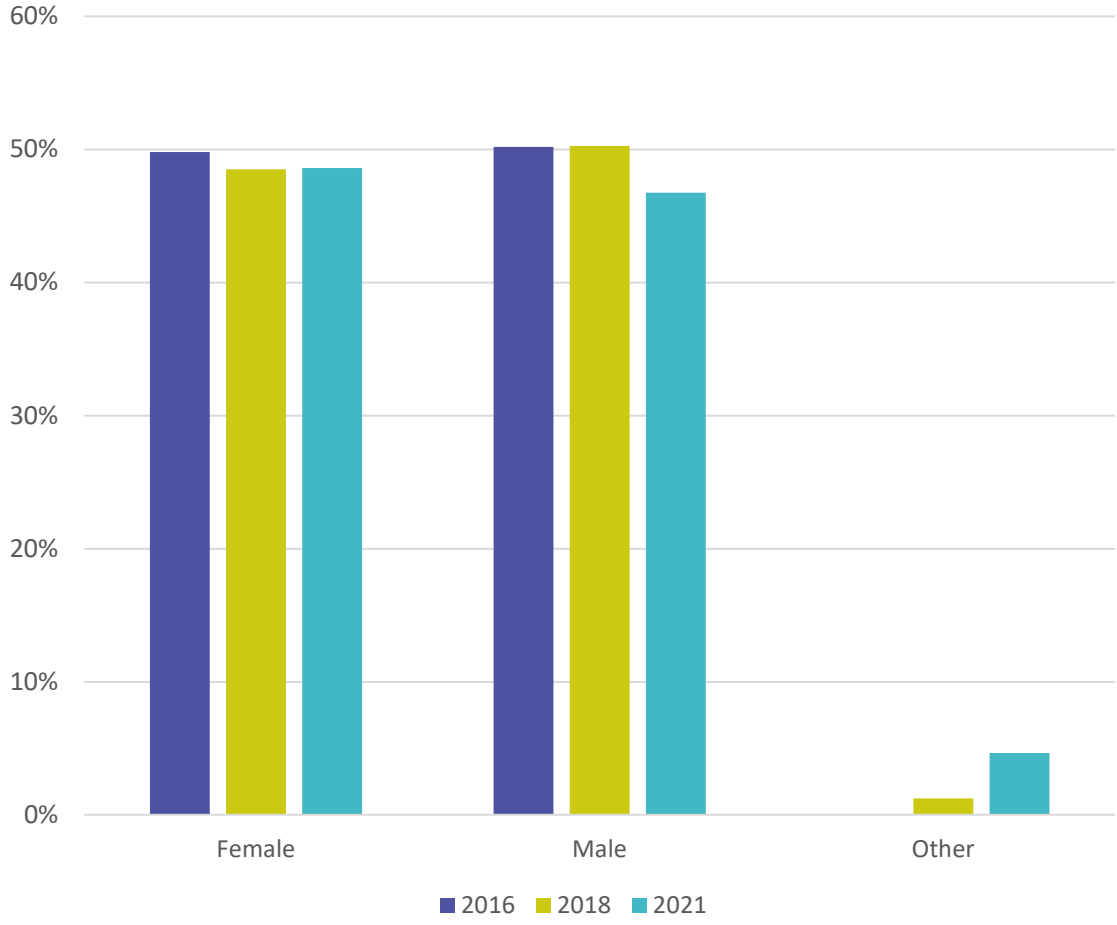

Licensed Drivers by Gender
60%
50%
40%
30%
20%
10%
0%
Female
Male
Other
2016
2018
2021

Workers

Workers by Age



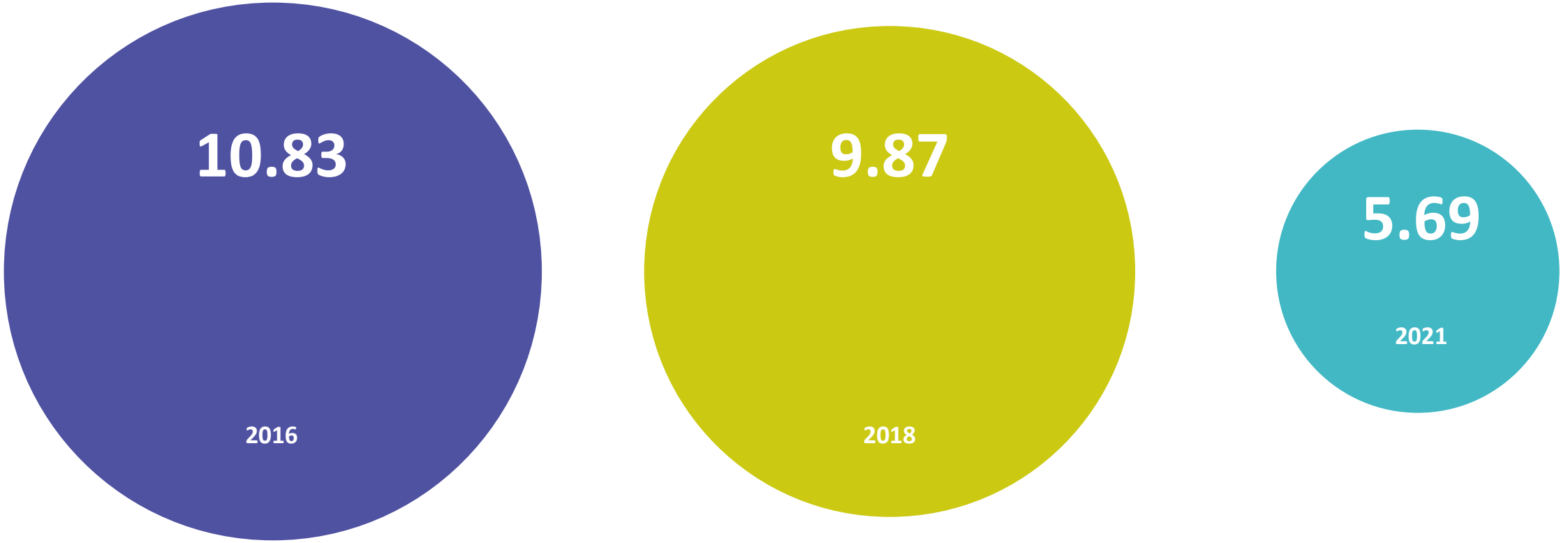
Workers by Gender



Household Travel

This section shows details of household level trips including why people travel and how it varies based on income groups, household size and auto ownership.

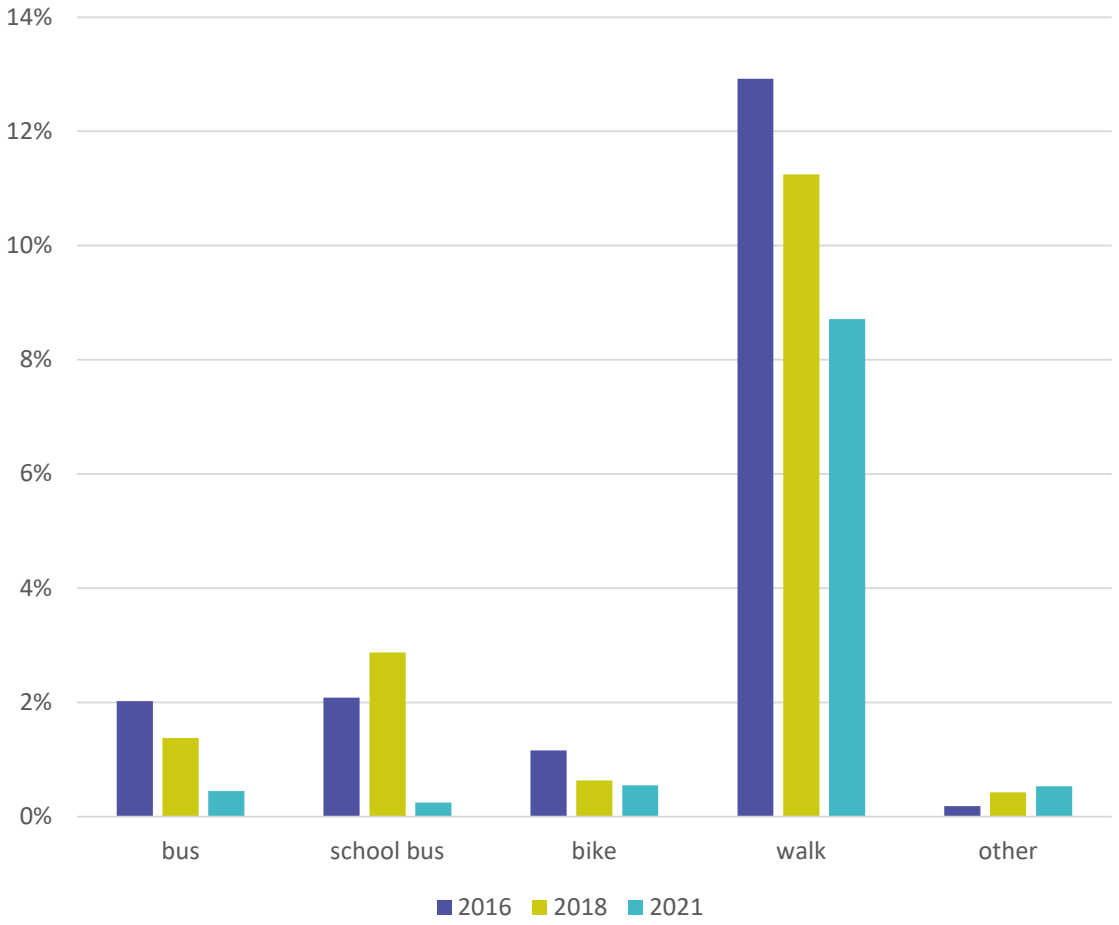
Average Daily Trips by Household



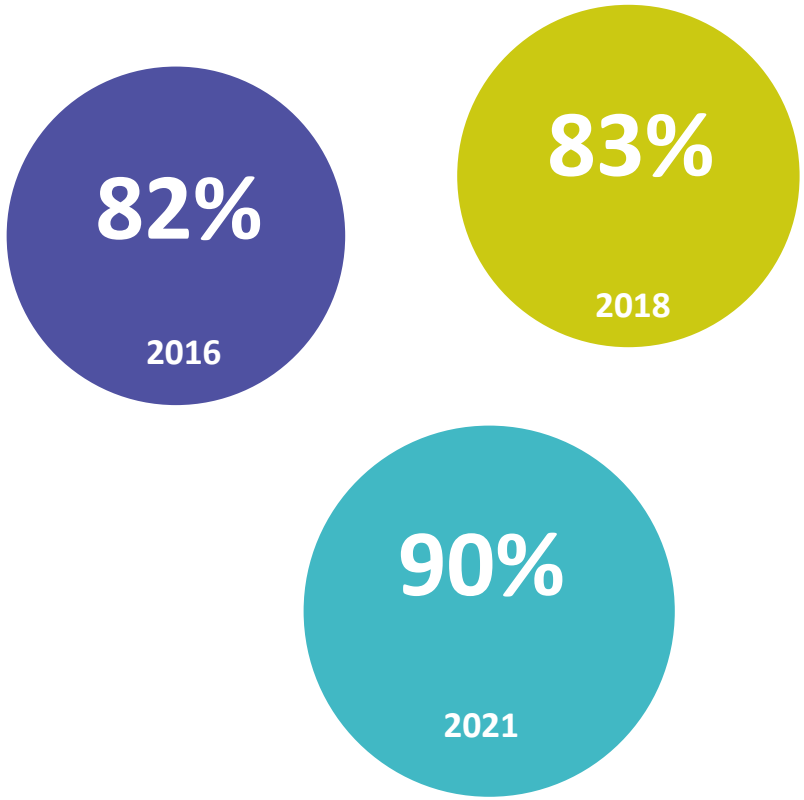
The impact of the COVID pandemic is clearly seen in the reduction of average daily trips by household.

Person Trips by Mode of Travel

Non-Auto Modes

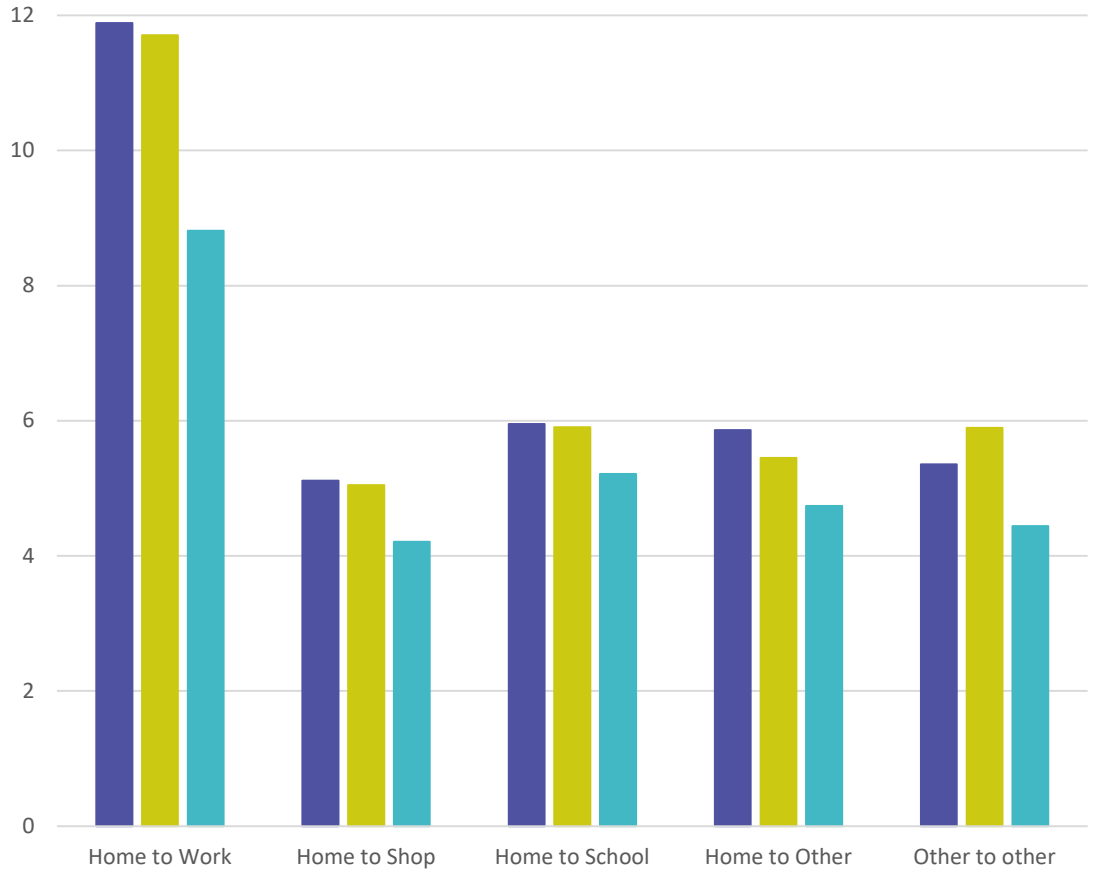


Auto Mode



While overall travel decreased during the pandemic, the share of trips made by people traveling in autos increased.

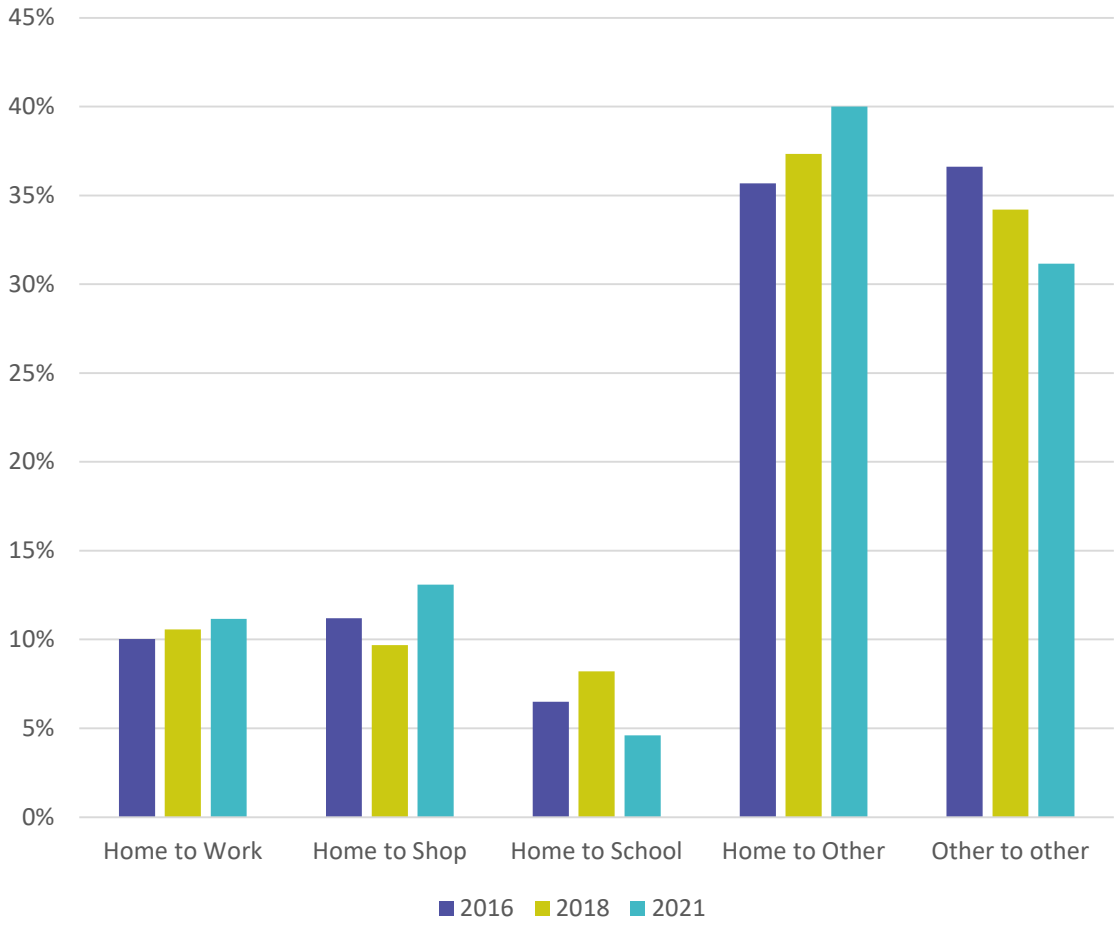
Average Trip Lengths



Average Lengths	2016	2018	2021
Home to Work	11.89	11.71	8.81
Home to Shop	5.11	5.05	4.21
Home to School	5.95	5.90	5.21
Home to Other	5.86	5.45	4.74
Other to Other	5.35	5.89	4.44

Trip lengths for all trip types declined in the pandemic. The most dramatic decline is for home to work trips.

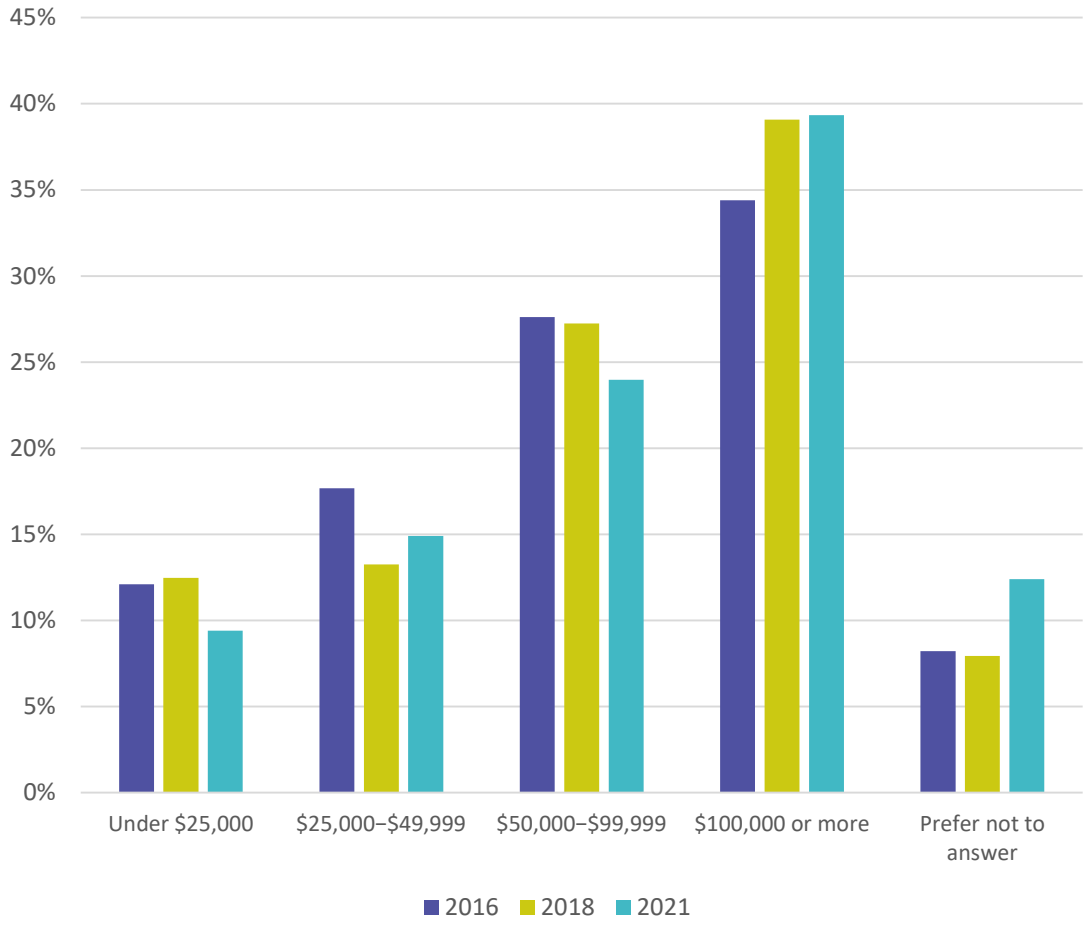
Reason for Travel



Average Trips	2016	2018	2021
Home to Work	1.06	1.03	0.63
Home to Shop	1.19	0.94	0.74
Home to School	0.69	0.80	0.26
Home to Other	3.79	3.63	2.25
Other to Other	3.89	3.33	1.76

The reasons people travel remain fairly stable over time, though the average number of trips per day decreased during the pandemic. The largest decrease was for school trips, and the second largest was for trips that neither began nor ended at home.

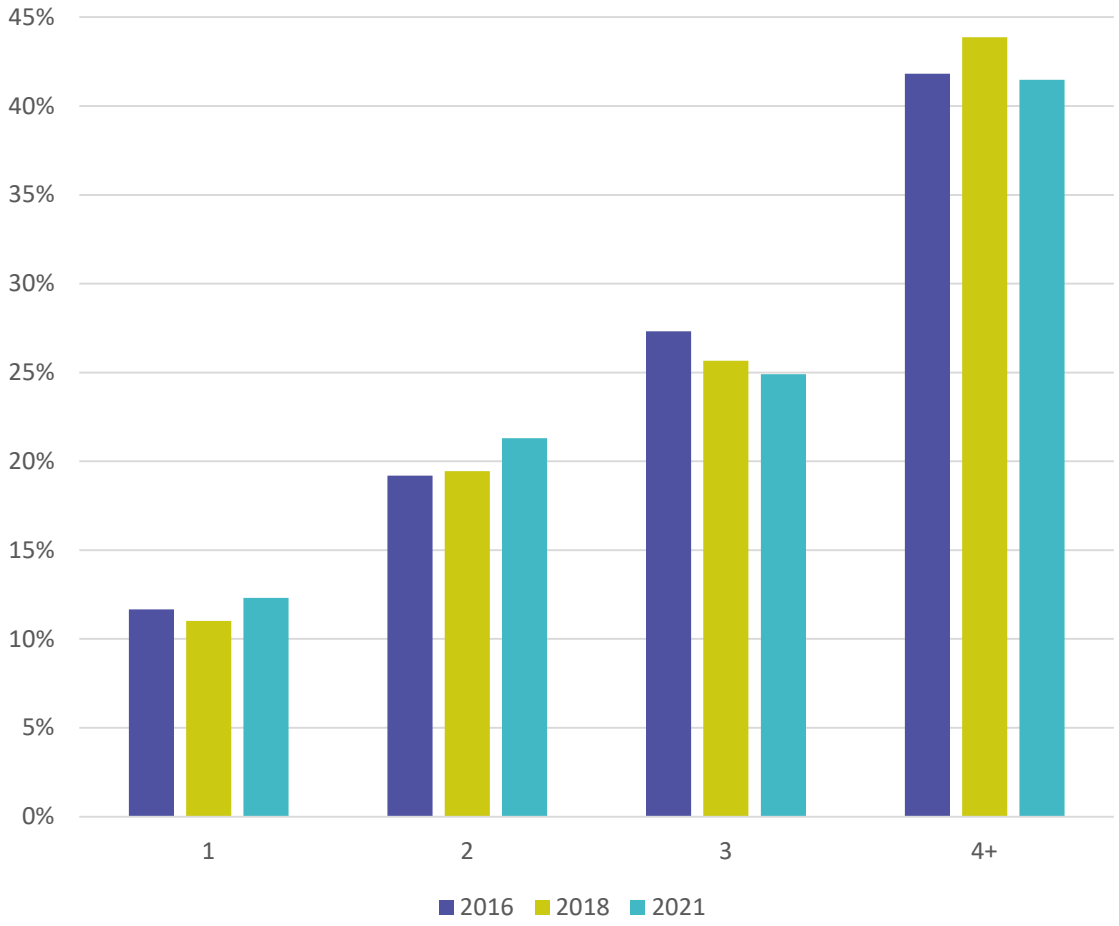
Travel by Income Groups



Average Trips	2016	2018	2021
Under $25,000	7.46	7.66	3.90
$25,000-$49,000	9.14	7.05	4.81
$50,000-$99,000	11.37	10.11	5.66
$100,000 or more	14.76	13.82	7.65
Prefer not to answer	8.95	7.25	4.59

While the percentage of trips made by households with income greater than $100K increased during pandemic, the average number of trips per day is about half of what it was in 2016.

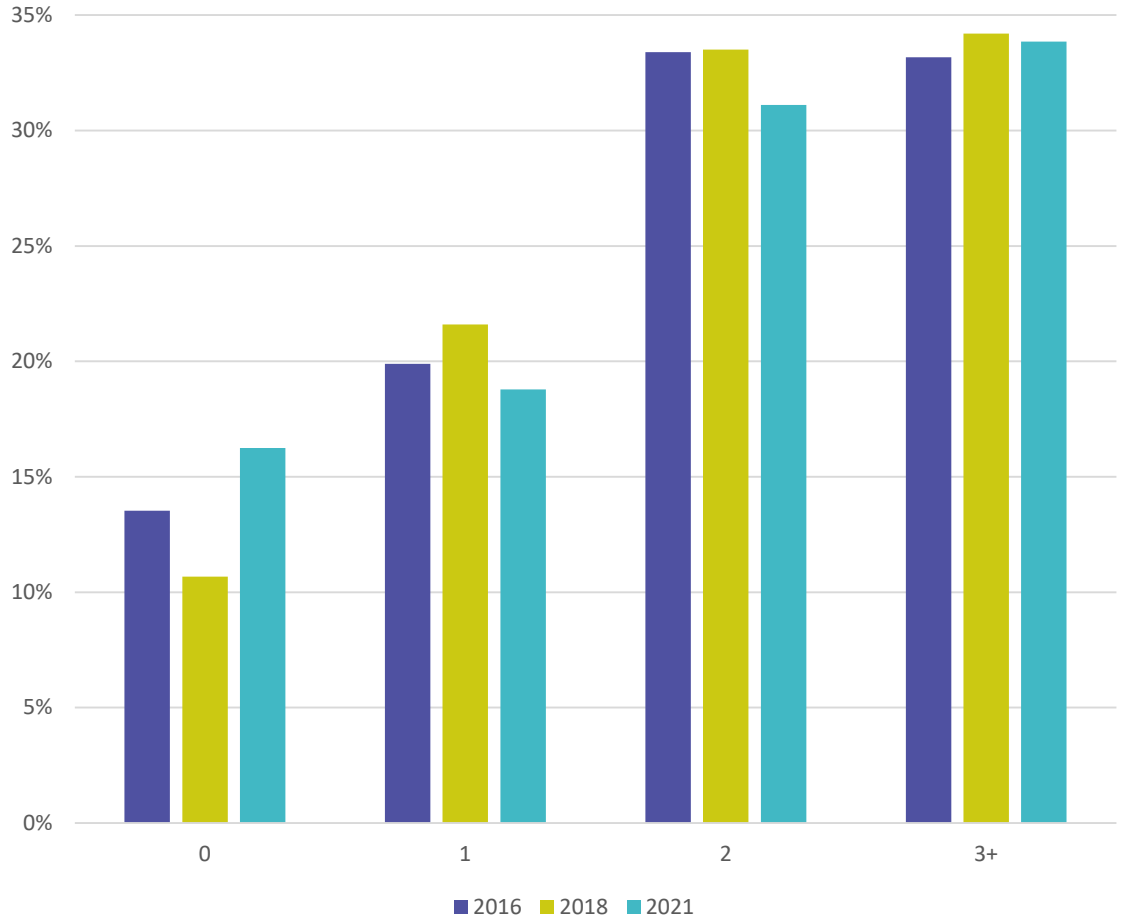
Travel by Household Size



Average Trips	2016	2018	2021
One-person	5.35	4.58	2.95
Two-people	8.81	8.10	5.10
Three-people	12.54	10.68	5.96
Four+ people	19.18	18.27	9.93

Across all years, one-person households average slightly more trips on a per person basis. However, in terms of total trips, larger households make more trips due to the greater number of people in the household.

Travel by Auto Ownership



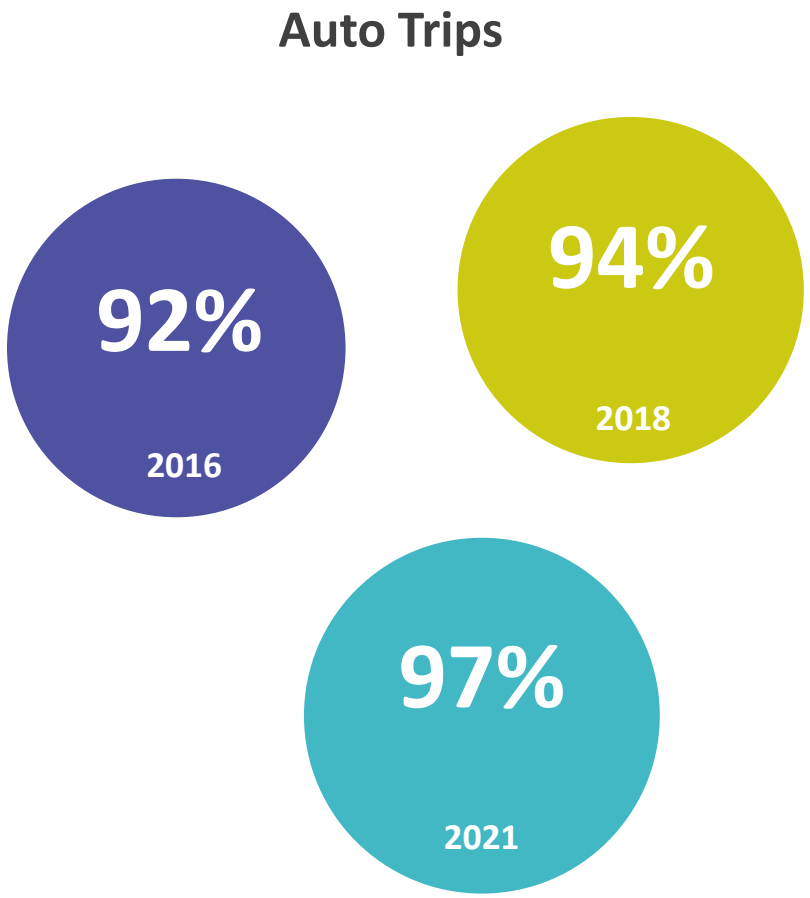
Average Trips	2016	2018	2021
Zero autos	5.26	3.66	3.41
One auto	7.74	7.41	3.94
Two autos	12.99	11.50	6.53
Three+ autos	12.91	11.74	7.10

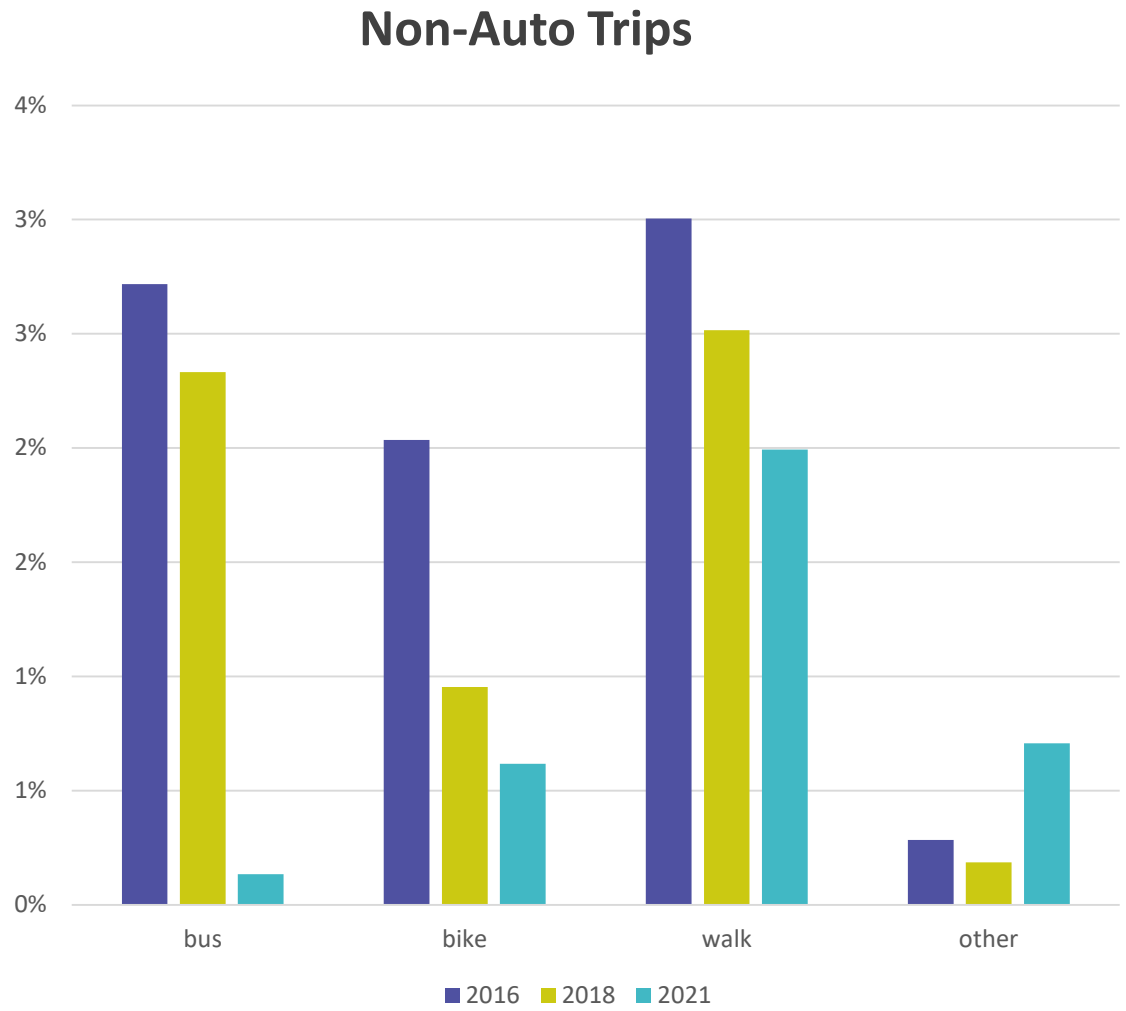
In the auto dominant Triangle region, households that do not own a vehicle have limited mobility in comparison to households with vehicles. Prior to the pandemic, auto ownership had the greatest impact on average trips for 1-auto households. As the number of autos in a household increases, total trips increase; however, the impact of the additional autos on trip making declines.

Person Travel

This section focuses on why and how people travel.

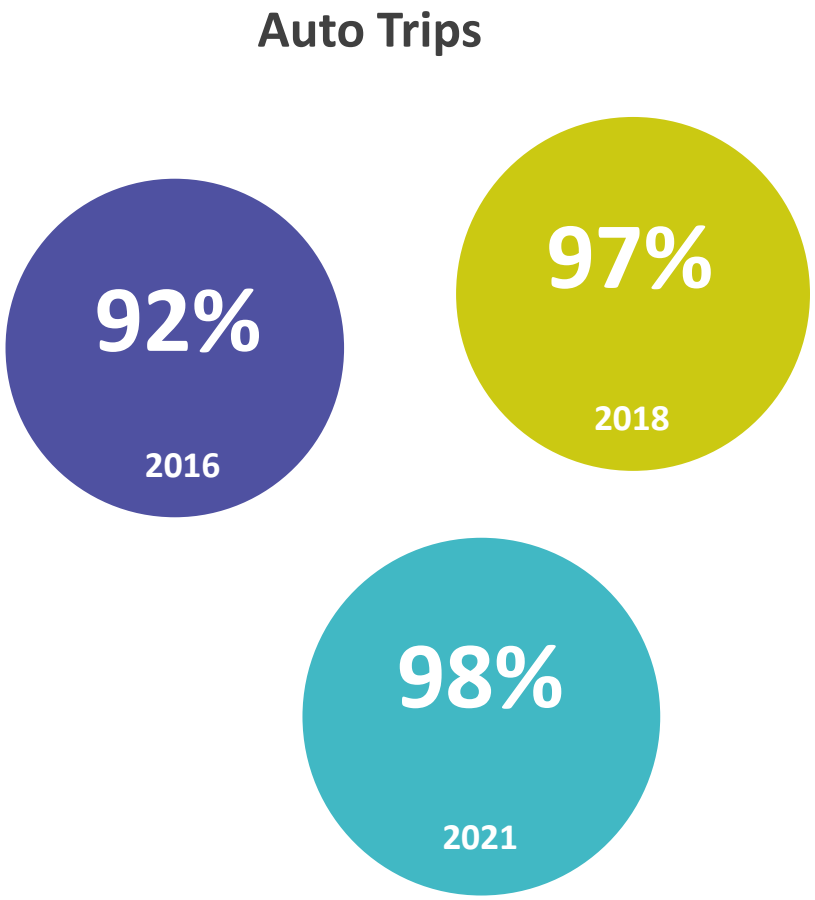
Travel for Work

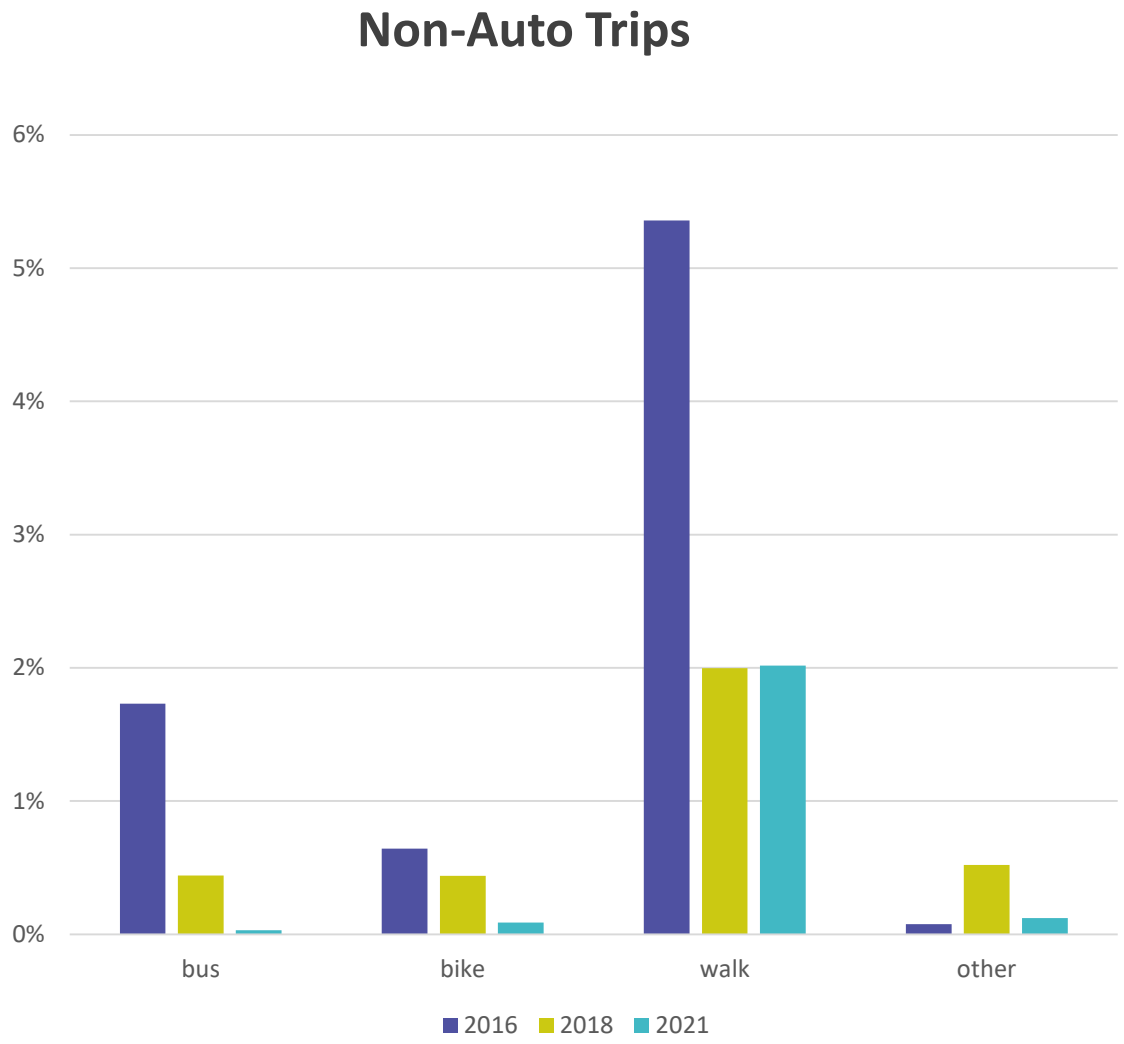




During the pandemic the share of auto trips for work travel increased. This is not because total auto trips increased, but because the region experienced a very large decrease in bus ridership. The decrease in bus ridership is likely because of a reduction in overall trips, as well as a reduction in bus service.

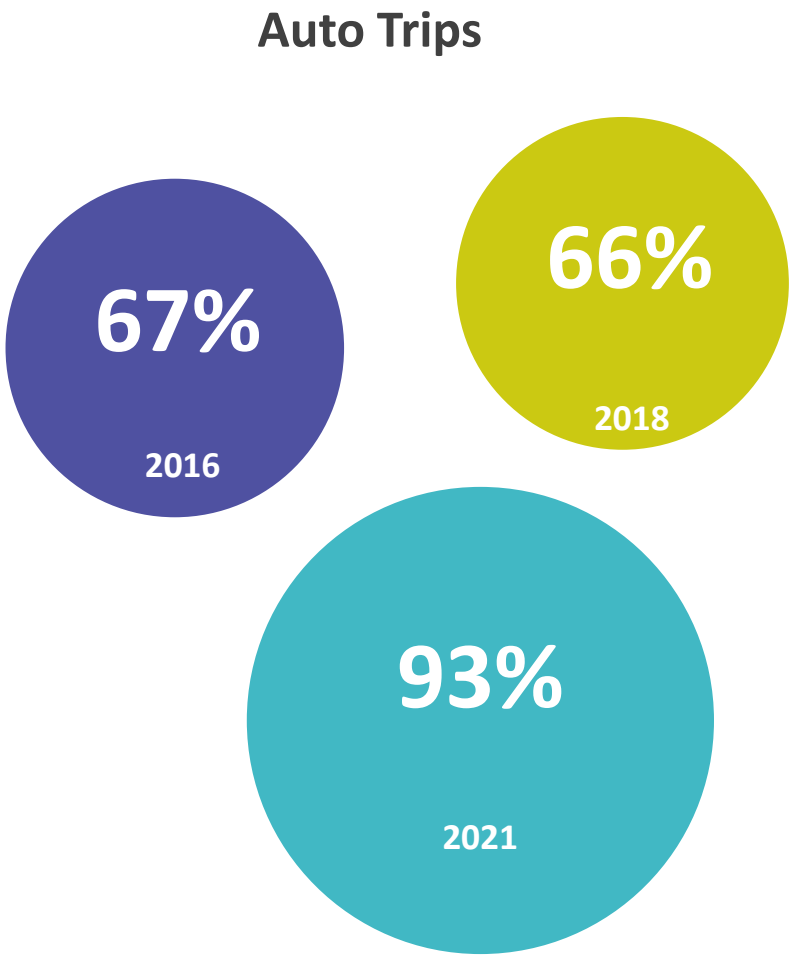
Travel for Shopping

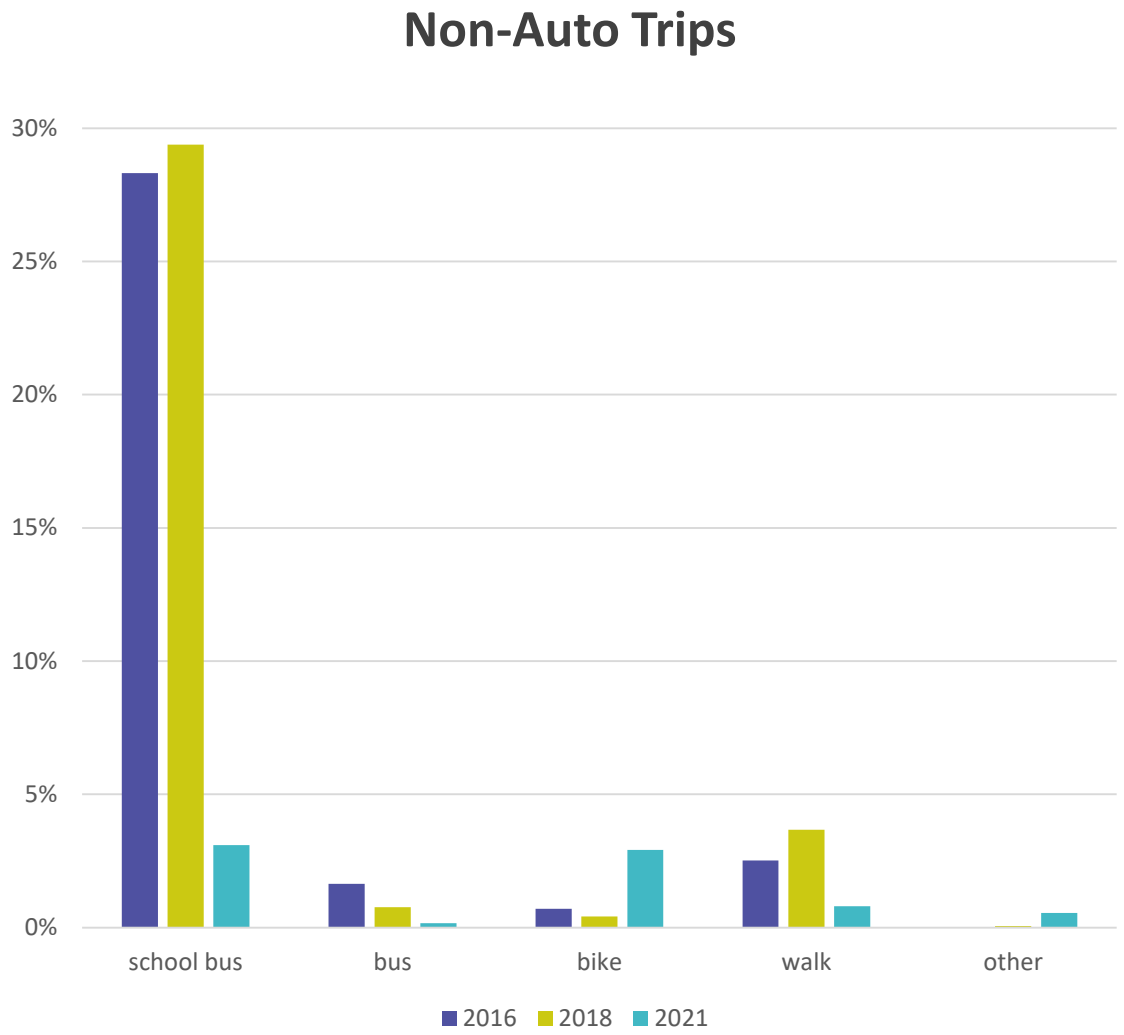




The share of shopping trips by auto increased during the pandemic as a result in decreased shopping trips by other modes. For shopping trips not made by auto, walking is the second most favored mode.

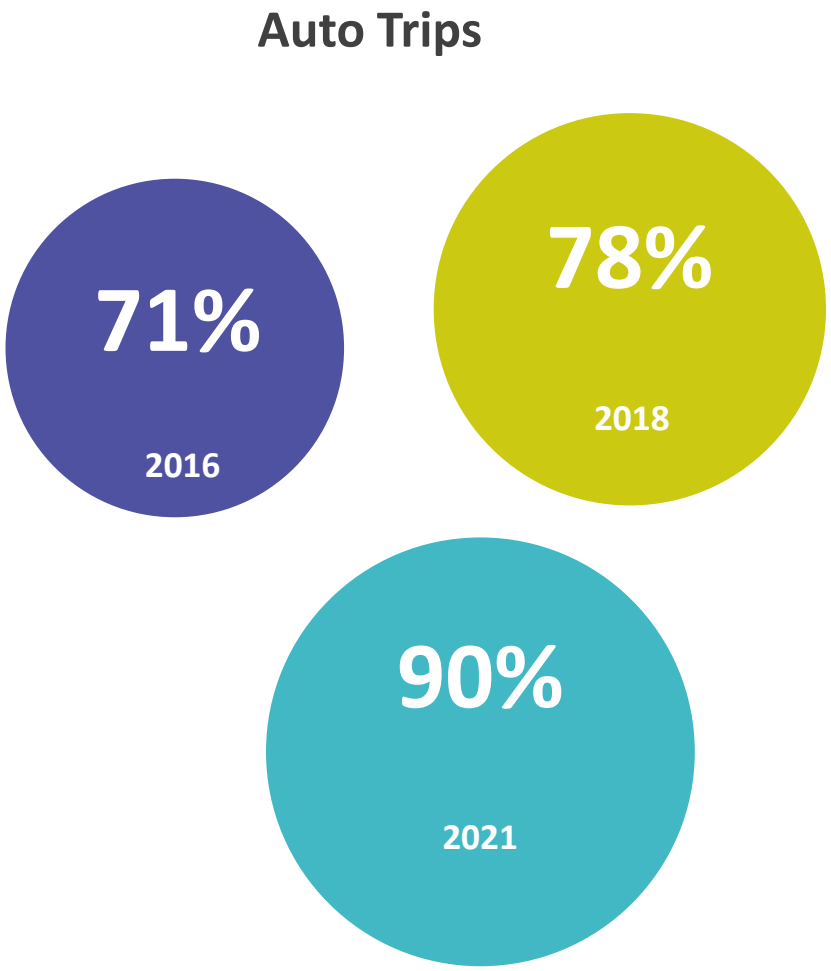
Travel for School

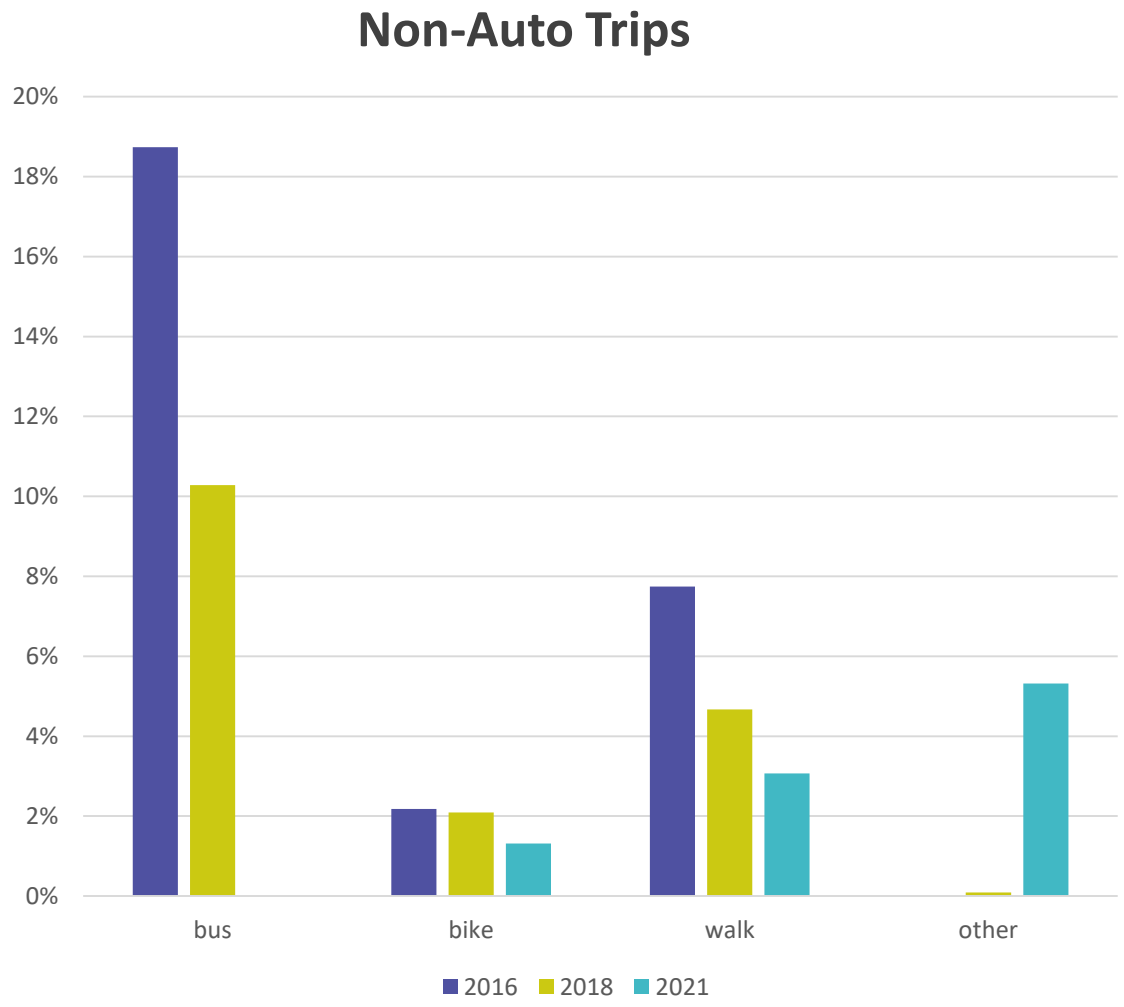




Auto trips were a greater percentage of school trips in 2021. This is not the result of an increase in auto trips, but a decrease in trips by other modes. Similarly, even though the percentage of bike trips is increasing, the actual number of trips decreased.

Travel for University

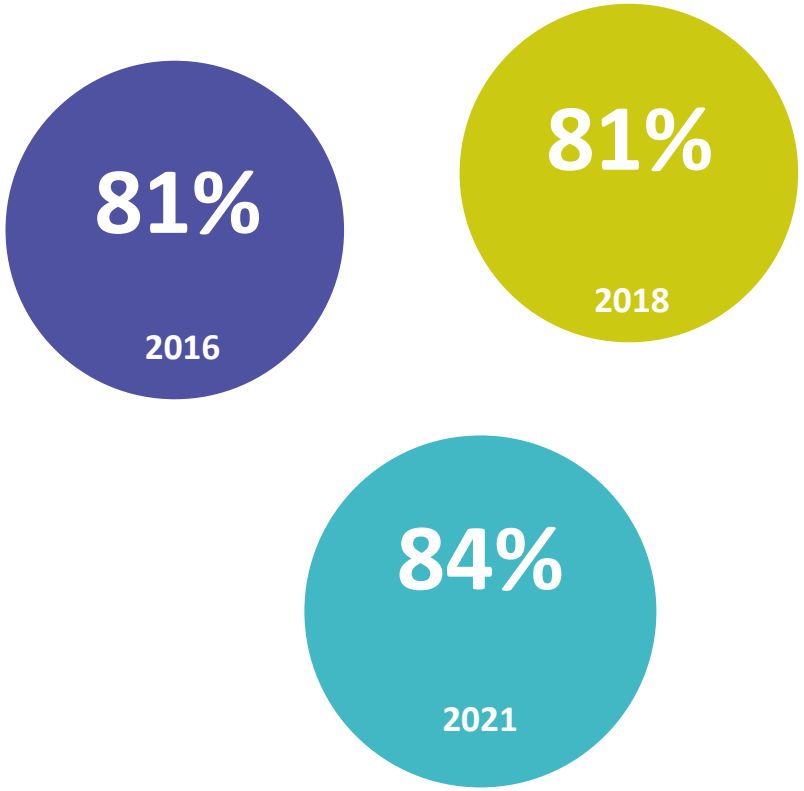




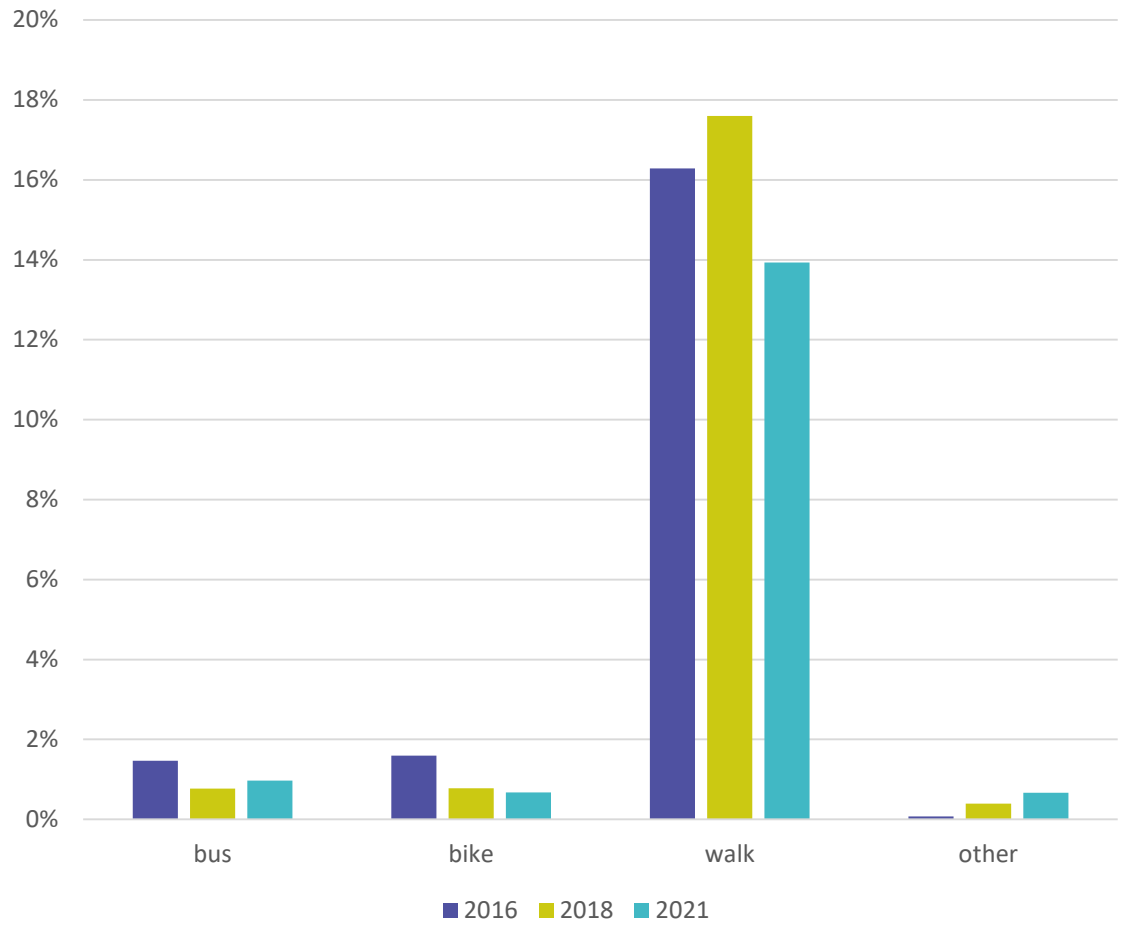
Similar to school trips, university trips were also significantly impacted by the pandemic. Classes shifted to online and university transit systems were not running normal operations.

Travel for Other Reasons – Home to Other

Auto Trips

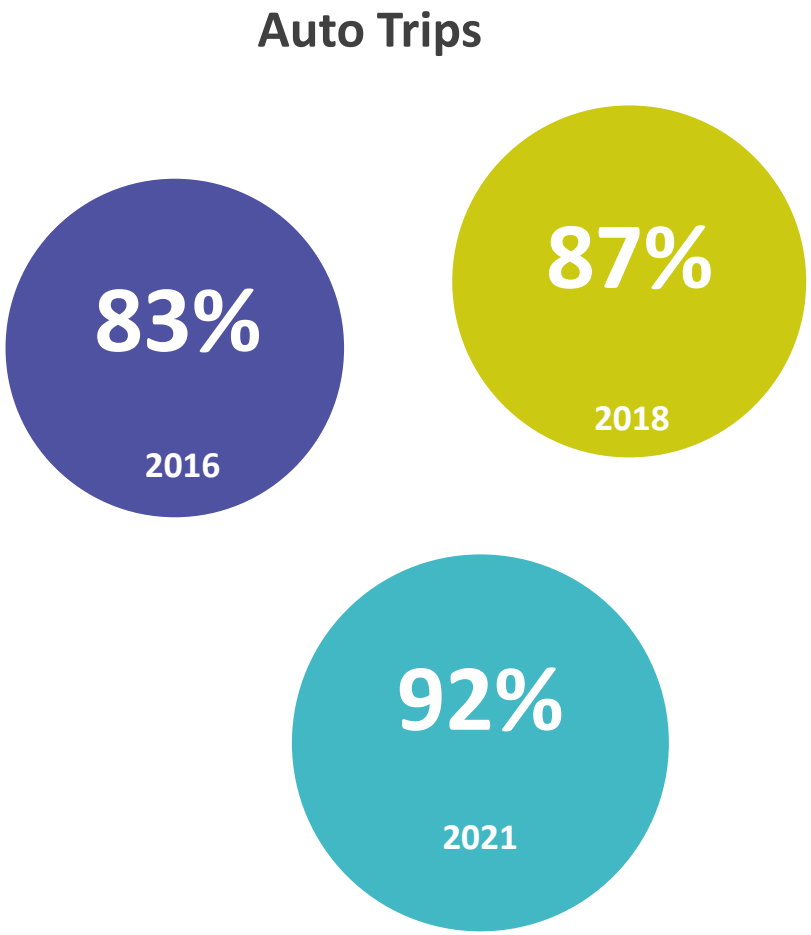


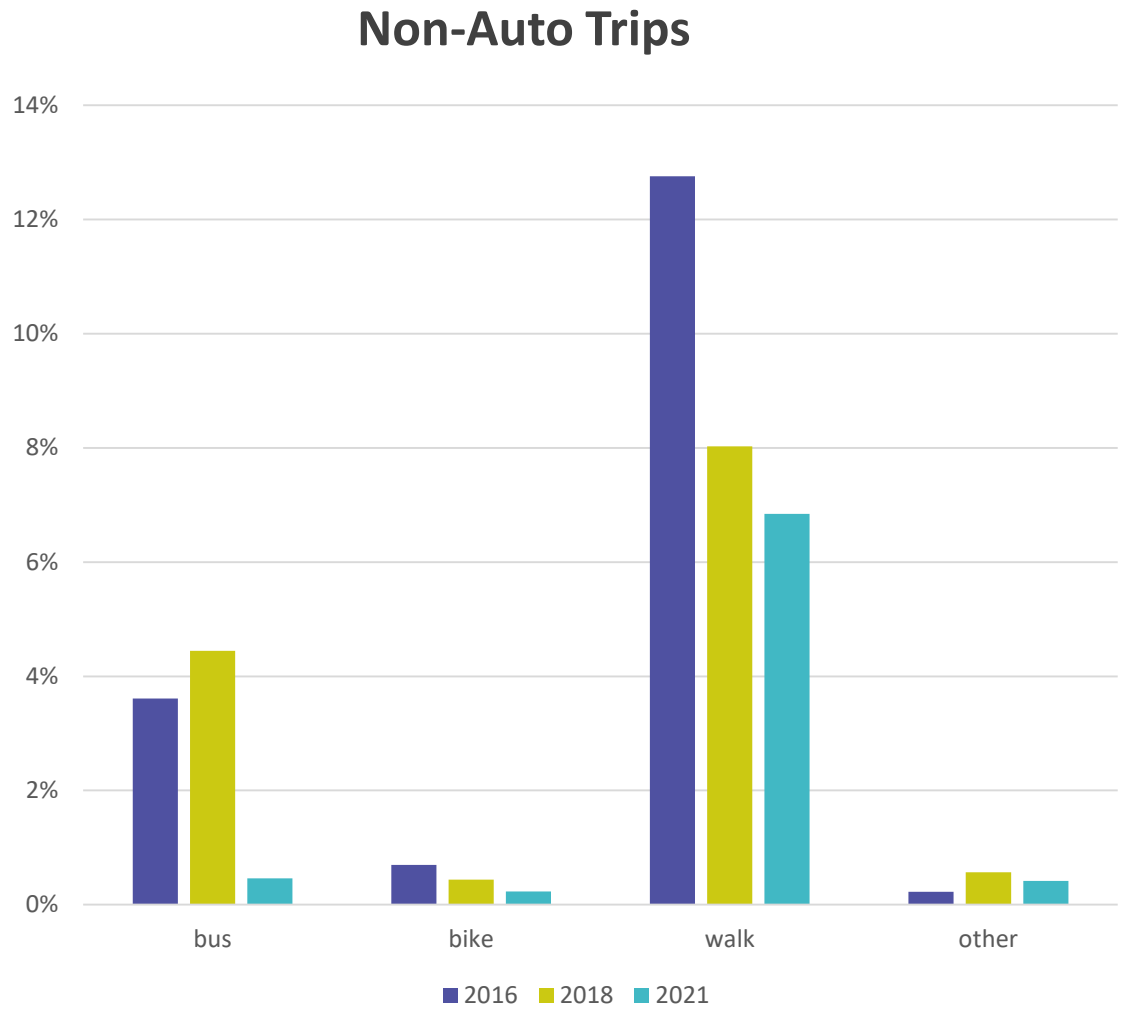
Non-Auto Trips



At close to 15% of the overall mode share, walking trips are most competitive for trips made from home for activities like recreation, social, religious, dining and medical.

Travel for Other Reasons – Other to Other





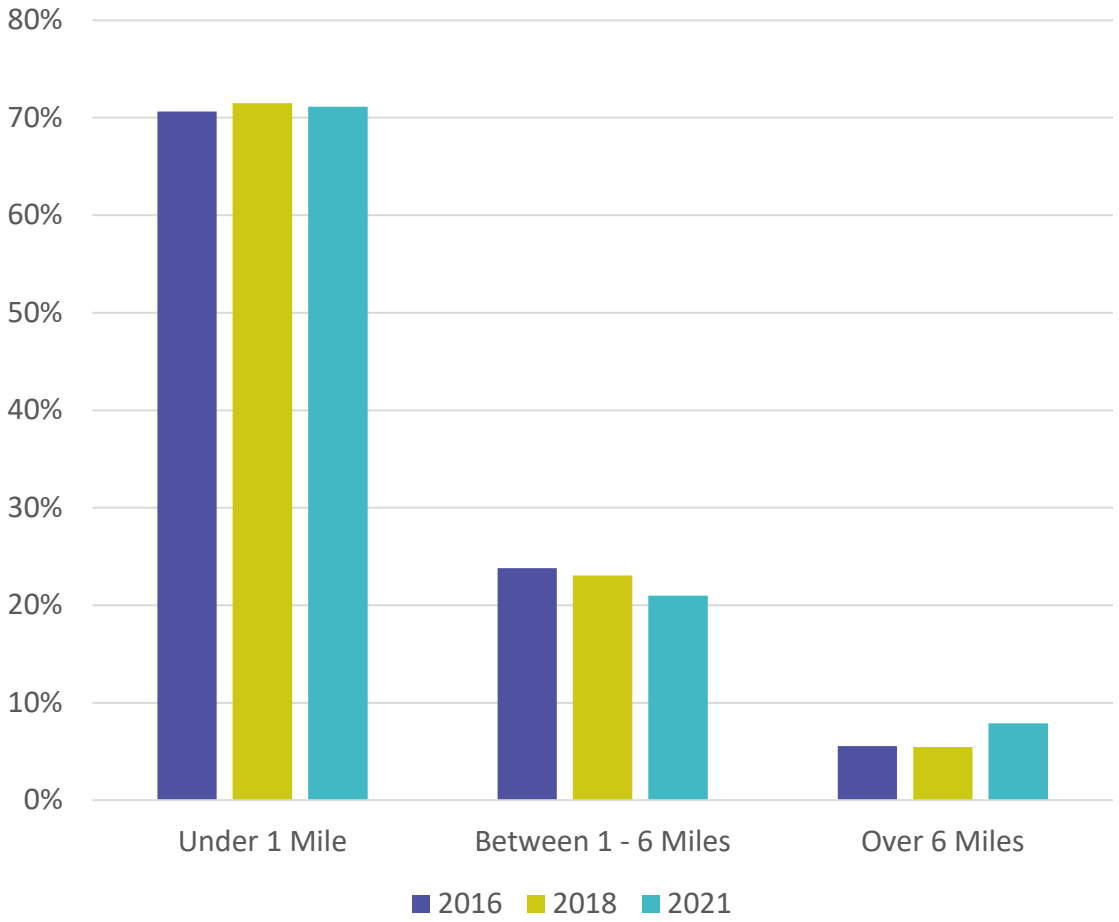
Trips that neither start nor end at home are often short distance trips. These trips are good candidates for walking.

Other Travel Metrics

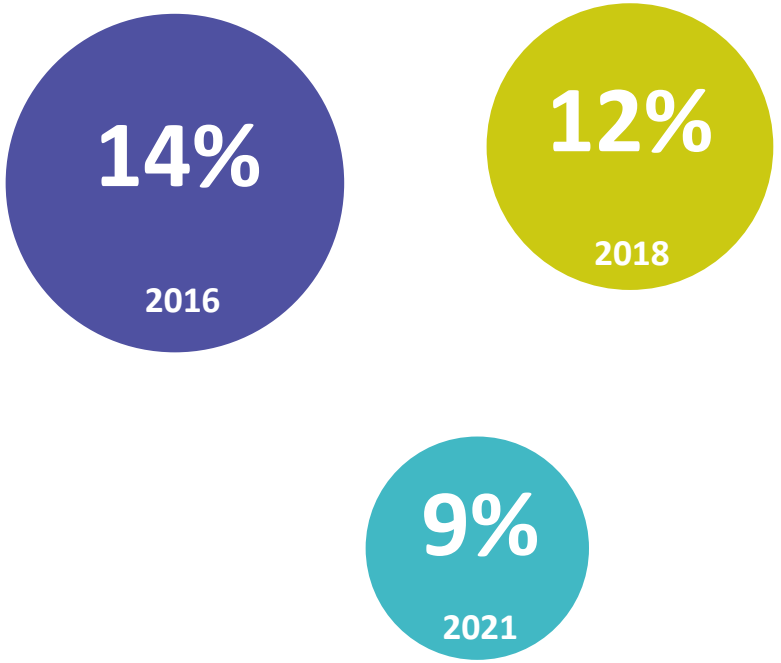
This section focuses on special travel patterns – non-motorized trips, travel by seniors, work related travel, and travel post pandemic.

Non-motorized Trips

Distance Traveled



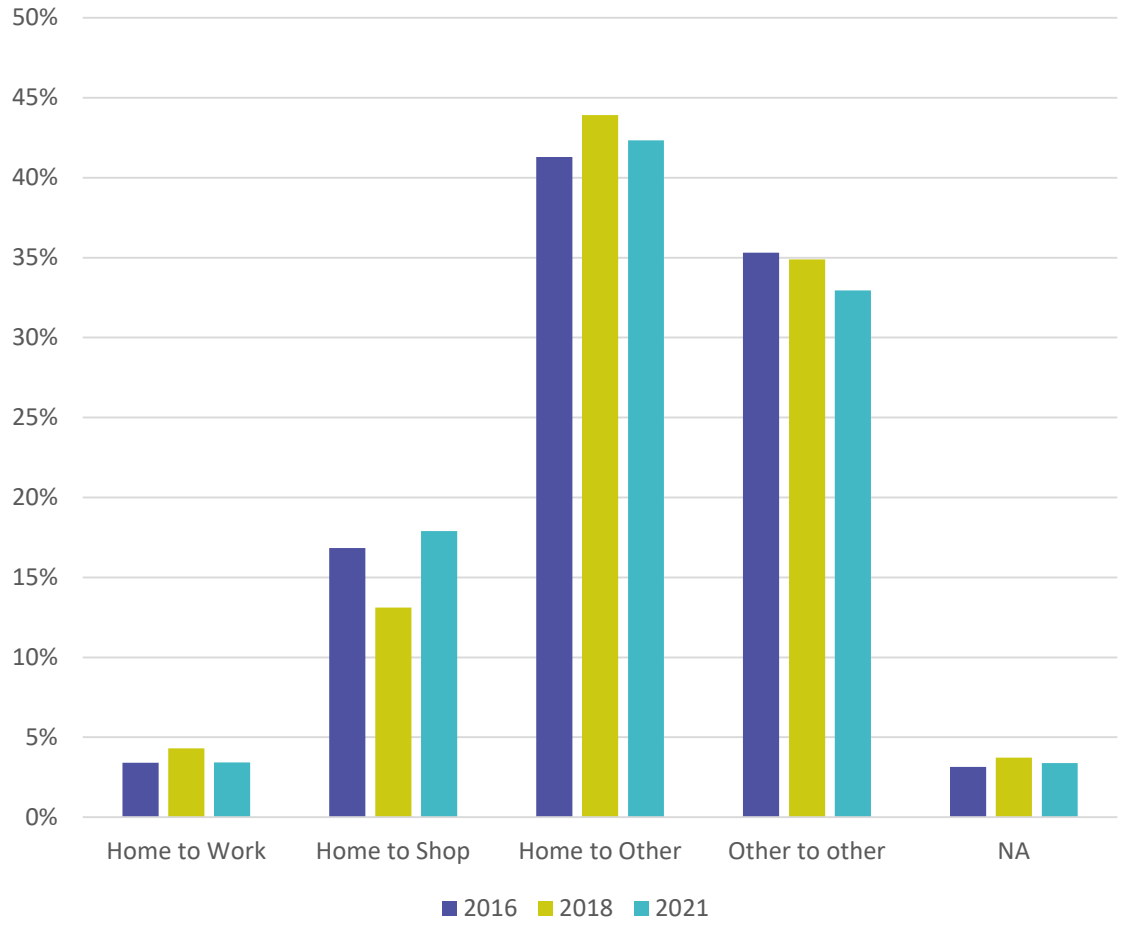
Share of Total Trips



During the pandemic, even with the decline in non-motorized travel for non-recreational trips, trips under 1 mile remain highly competitive for non-motorized modes.

Travel by Seniors

Reason for Travel by Seniors



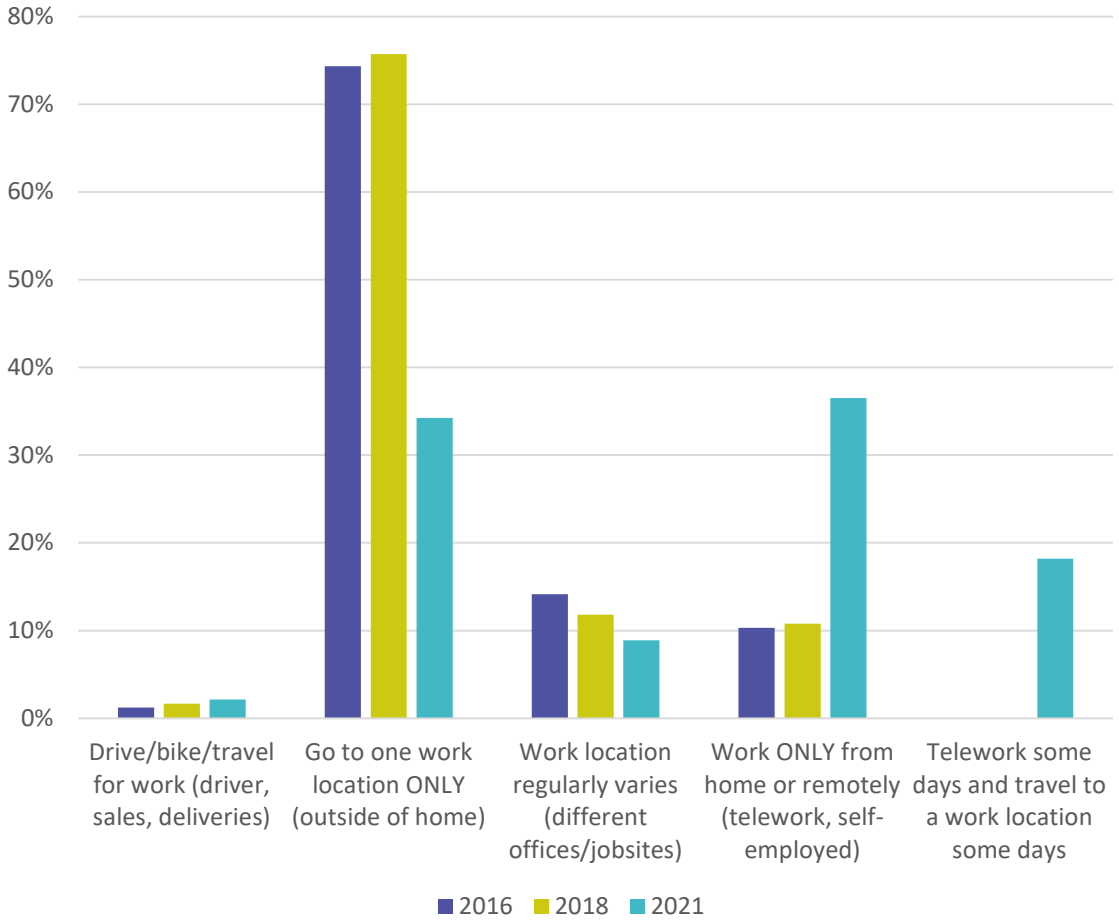
Mode of Travel by Seniors

	2016	2018	2021
Auto	84.0%	82.7%	91.9%
Bus	1.6%	0.5%	1.1%
Bike	0.3%	0.2%	0.0%
Walk	13.8%	15.8%	6.8%
Other	0.3%	0.8%	0.2%

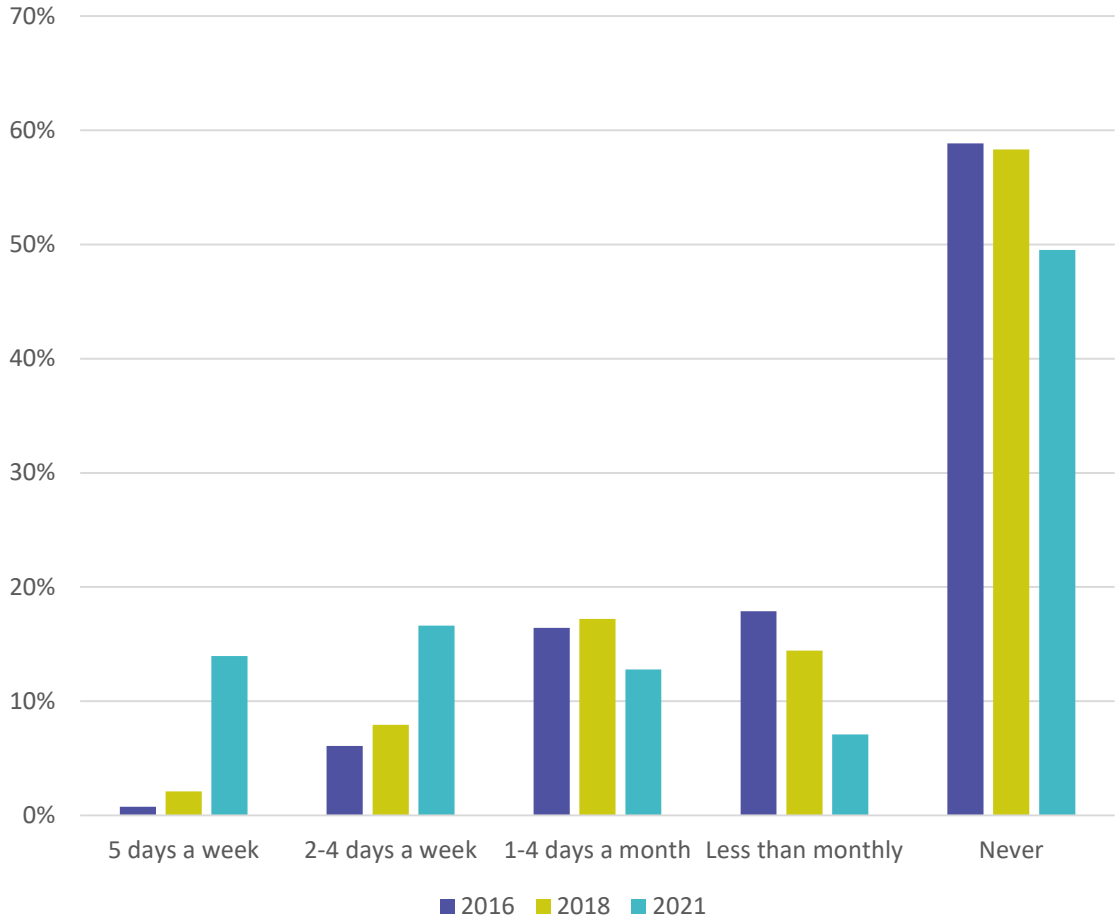
As with other travelers in the Triangle, seniors are heavily dependent on the auto. This poses challenges to transportation planners as age-related restrictions may limit seniors' ability to drive.

Work Related

Location



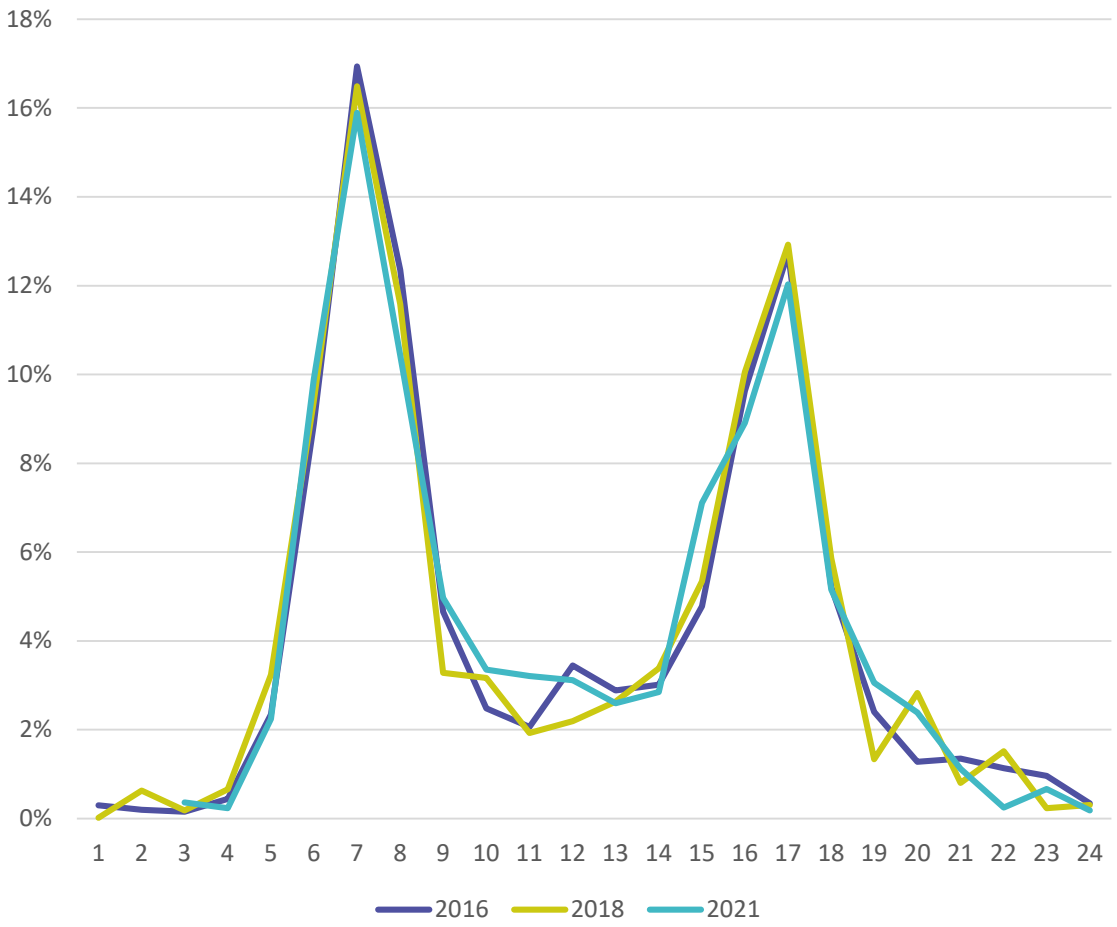
Telecommute Frequency



The pandemic had a major impact on the way people work, with the majority of workers who could work from home, doing so. Future data will provide insight into what new work patterns could mean for commuting in the Triangle.

Work Related

Time of Day



Average Trip Length

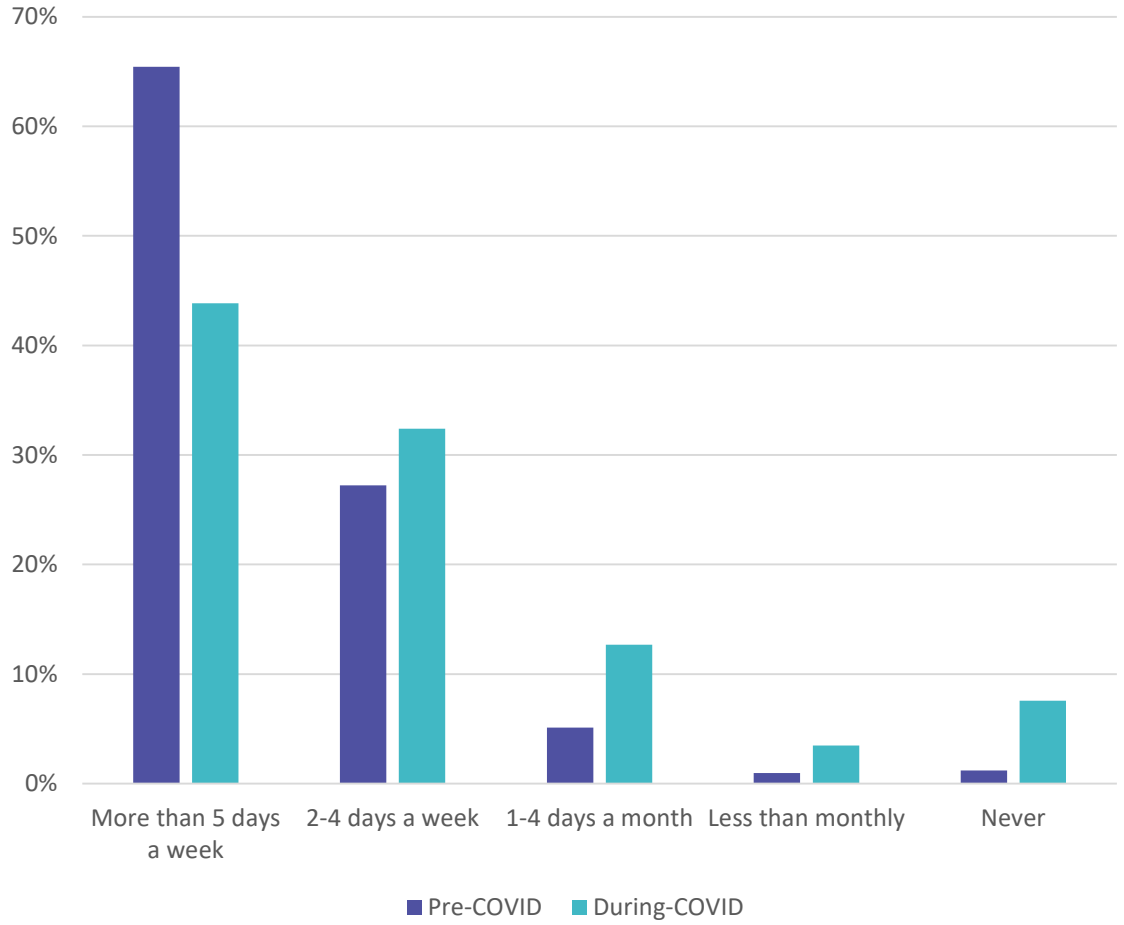
Commute Mode	2016	2018	2021
Auto	12.46	12.14	8.93
Bus	8.77	10.31	n/a
Bike	3.94	2.40	n/a
Walk	1.91	1.09	2.41

During the pandemic, overall trips to work declined. Those who were still traveling for work continued to travel mostly during the peak periods, yet for shorter distances. There was also an increase in midday work-related travel.

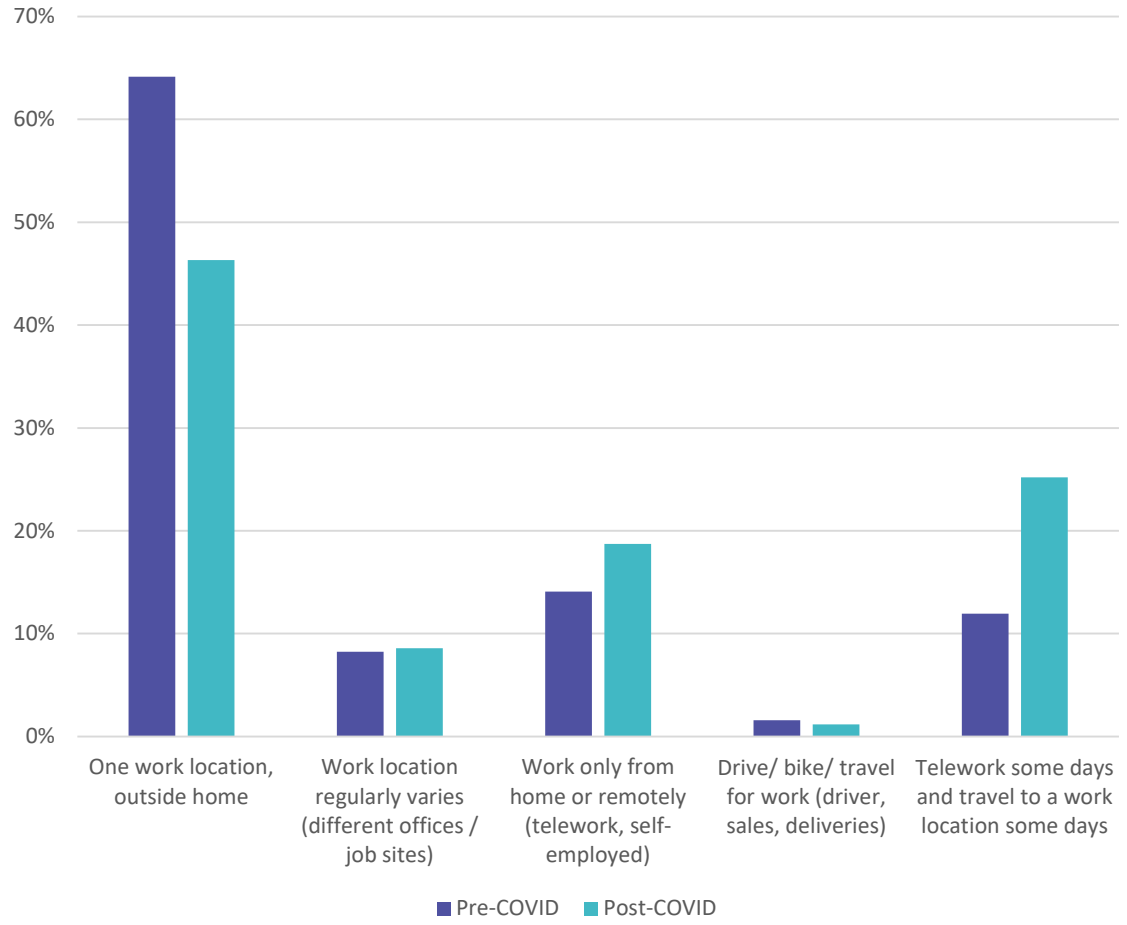
* The sample size was too small to report an average transit and bike trip length in 2021.

Travel Post Pandemic

Commute Frequency



Work Location



Based on survey data collected in the Triangle, the pandemic shifted perceptions about teleworking and will likely have a lasting impact on commuting and work related travel.

* Note that this is based off of the 2021 survey which included questions about participant's lives pre-COVID, during-COVID, and post-COVID.

This study was conducted by the Institute for Transportation Research and Education at NC State University. The work was sponsored by the North Carolina Department of Transportation, Capital Area Metropolitan Planning Organization, Durham Chapel Hill Carrboro Metropolitan Planning Organization and Go Triangle. RSG completed all three survey efforts.

About the surveys:

To support transportation planning in the Triangle region, travel behavior survey data is collected every other year. This recurring survey effort started in 2016 with 4,194 households. The sample size for subsequent years is smaller, with survey data from 1,498 households in 2018, and 1,120 households in 2021. Data collection was delayed from the fall of 2020 to the spring of 2021 due to the COVID-19 pandemic. Data collection covers the entire Triangle region which includes Durham, Orange, Wake, Chatham, Franklin, Granville, Harnett, Johnston, Nash and Person counties. The benefit of a recurring travel survey is the ability to track travel behavior changes overtime. A challenge of the recurring survey is the smaller sample size which can cause lumpiness in the data and influence trend analysis for any given year.

ITRE

CAMPO
NC Capital Area Metropolitan Planning Organization

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

DCHC
Metropolitan Planning Organization
Planning Tomorrow Today

GO Triangle

RSG
the science of insight