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Mobility on Demand (MOD) Sandbox Demonstration: Pinellas Suncoast Transit Authority (PSTA) Public-Private-Partnership for Paratransit *Evaluation Report*

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Metric Conversion Table

SYMBOL	WHEN YOU KNOW	MULTIPLY BY	TO FIND	SYMBOL
LENGTH				
in	inches	25.4	millimeters	mm
ft	feet	0.305	meters	m
yd	yards	0.914	meters	m
mi	miles	1.61	kilometers	km
VOLUME				
fl oz	fluid ounces	29.57	milliliters	mL
gal	gallons	3.785	liters	L
ft^3	cubic feet	0.028	cubic meters	m^3
yd^3	cubic yards	0.765	cubic meters	m^3
NOTE: volumes greater than 1000 L shall be shown in m^3				
MASS				
oz	ounces	28.35	grams	g
lb	pounds	0.454	kilograms	kg
T	short tons (2000 lb)	0.907	megagrams (or "metric ton")	Mg (or "t")
TEMPERATURE (exact degrees)				
^oF	Fahrenheit	5 (F-32)/9 or (F-32)/1.8	Celsius	^oC

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14. ABSTRACT

This report presents the results of an independent evaluation of the Pinellas Suncoast Transit Authority (PSTA) Public-Private-Partnership for Paratransit Demonstration project, part of the Federal Transit Administration (FTA) Mobility on Demand (MOD) Sandbox program. PSTA currently spends around 10% of its operating budget to provide service to over 12,500 eligible customers of its Americans with Disabilities Act (ADA)-mandated paratransit service, performing over 275,000 annual paratransit trips through its Demand Response Transportation (DART) Program. DART's lack of flexibility and pick-up time reliability are general complaints from paratransit customers. In addition, it is anticipated that paratransit services will need to be expanded to meet the demand in growth of an aging population, which will increase costs. To increase the cost-effectiveness and efficiency of paratransit services while improving customer mobility and accessibility throughout Pinellas County, Florida, the project aimed to develop an integrated platform that provided on-demand curb-to-curb paratransit service through partnerships with Lyft, United Taxi, Care Ride, Wheelchair Transport, and Goin Software. The evaluation of the PSTA Public-Private-Partnership for Paratransit project assessed its effect on user wait times, travel times, accessibility, and mobility and its impact on system operating cost and payment methods. Overall, the results of the analysis showed that the pilot program provided an efficient paratransit service and improved the mobility and accessibility of customers within Pinellas County. The evaluation supported the hypotheses that the service accommodated diversified trip purposes and increased the flexibility of departure times for its users. Most hypotheses within this evaluation were supported, and the project produced lessons learned that may advance the design and implementation of similar projects in the future.

15. SUBJECT TERMS
Mobility on Demand, MOD, sandbox, paratransit, evaluation, mobility platform, transportation network company, TNC

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Abstract

This report presents the results of an independent evaluation of the Pinellas Suncoast Transit Authority (PSTA) Public-Private-Partnership for Paratransit Demonstration project, part of the Federal Transit Administration (FTA) Mobility on Demand (MOD) Sandbox program. PSTA currently spends around 10% of its operating budget to provide service to over 12,500 eligible customers of its Americans with Disabilities Act (ADA)-mandated paratransit service, performing over 275,000 annual paratransit trips through its Demand Response Transportation (DART) Program. DART's lack of flexibility and pick-up time reliability are general complaints from paratransit customers. In addition, it is anticipated that paratransit services will need to be expanded to meet the demand in growth of an aging population, which will increase costs. To increase the cost-effectiveness and efficiency of paratransit services while improving customer mobility and accessibility throughout Pinellas County, Florida, the project aimed to develop an integrated platform that provided on-demand curb-to-curb paratransit service through partnerships with Lyft, United Taxi, Care Ride, Wheelchair Transport, and Goin Software. The evaluation of the PSTA Public-Private-Partnership for Paratransit project assessed its effect on user wait times, travel times, accessibility, and mobility and its impact on system operating cost and payment methods.

Overall, the results of the analysis showed that the pilot program provided an efficient paratransit service and improved the mobility and accessibility of customers within Pinellas County. The evaluation supported the hypotheses that the service accommodated diversified trip purposes and increased the flexibility of departure times for its users. Most hypotheses within this evaluation were supported, and the project produced lessons learned that may advance the design and implementation of similar projects in the future.

Executive Summary

The Federal Transit Administration (FTA) is leading an initiative, the Mobility on Demand (MOD) Sandbox Program, to explore how public transportation agencies could incorporate new technologies that complement and support the traditional functions of public transportation. One of the projects in the MOD Sandbox Program was the Pinellas Suncoast Transit Authority (PSTA) Public-Private- Partnership for Paratransit Demonstration. PSTA partnered with Lyft, United Taxi, Care Ride, Wheelchair Transport, and Goin Software to develop and demonstrate an approach to more efficient and cost-effective paratransit.

PSTA currently provides service to over 12,500 eligible customers of Americans with Disabilities Act (ADA)-mandated paratransit, performing over 275,000 annual paratransit trips through its Demand Response Transportation (DART) Program. Paratransit operations cost around 10% of the agency's operating budget. With an aging population fueling demand for paratransit services, PSTA will need to continue to increase providing funding for paratransit services for the foreseeable future. In addition, DART customers have generally complained about the service's lack of flexibility and pick-up time reliability, which negatively affected their overall experience.

A primary goal of the PSTA Public-Private-Partnership for Paratransit MOD (PSTA MOD) pilot was to deploy and demonstrate a more cost-efficient paratransit service while improving customers' mobility and accessibility throughout Pinellas County, Florida. The project was intent on improving scheduling time for paratransit users, where users could summon paratransit services on the same day with responsiveness similar to taxi and Transportation Network Company (TNC) services. Prior to the project, paratransit services had typically required scheduling times further in advance (e.g., a day in advance). Also prior to the project, users could only call by phone to schedule rides. The project enabled access to the mobility service through a smartphone app, which was provided through the Goin app. This app connected users to other mobility providers, including taxi and TNC vehicles though an integrated platform that provided on-demand curb-to-curb paratransit service from multiple transportation providers. The demonstration period began in June 2019 and ended in September 2020.[1]

This report presents the results of the independent evaluation of the PSTA Public-Private-Partnership for Paratransit project as implemented in Pinellas County, Florida. The project was one of 11 MOD Sandbox Demonstrations partially funded by FTA. The independent evaluation (IE) was sponsored by the USDOT Intelligent Transportation Systems Joint Program Office (ITS JPO) and FTA. The evaluation was guided by 13 hypotheses analyzed using Before and

[1] Activity data collection for this evaluation was conducted between June and December 2019.

After survey data, app activity data, and expert (stakeholder/project partner) interview data. The results of the evaluation are summarized below.

Hypothesis 1(a): Users of the PSTA system report that they have greater mobility with the new system.

Hypothesis 1(a) was evaluated using Before and After survey data; individuals were asked to rate their mobility before using the PSTA MOD system and to report changes in their mobility after participating in the pilot. Also, trip activity data were used to analyze user activity using PSTA MOD.

Analysis of responses from the Before survey showed that 77% of 86 respondents rated their general mobility within Pinellas County as 7 (out of 10) or higher; only 17% gave a rating of 5 or lower. Analysis of responses from the After survey showed that the PSTA MOD system increased the mobility of 82% of 153 pilot participants, with 4% reporting a decrease in their mobility and 10% reporting no change. Looking at 48 paired responses between the Before and After surveys, all individuals who previously reported a low mobility rating (less than or equal to 5) perceived an increase in their mobility as a result of using PSTA MOD. Similarly, the majority of individuals who previously gave a high mobility rating greater than or equal to 7 also perceived an increase in their mobility.

Analysis of the trip activity data showed that a greater number of users were conducting more trips per month over the duration of the pilot, suggesting that the PSTA MOD system increased the mobility of its users. The average number of trips per individual increased from 7 trips per individual in June 2019 to 11 trips per individual in December 2019, and the median number of trips per individual doubled over the duration of the pilot. Overall, the analysis supported Hypothesis 1 (a).

Hypothesis 1(b): The number of rides rises as a result of the project.

Hypothesis 1(b) was evaluated using After survey data; individuals were asked to report changes in their travel frequency after participating in the pilot. Trip activity data also were used to analyze the change in the number of trips using the PSTA MOD system over the duration of the pilot.

Analysis of the trip activity data showed that around 26% of users started using the PSTA MOD system in June 2019. The percentage then dropped to 7% and 5% for July and August 2019, respectively. In September 2019, another increase in new users was observed, when 34% of users took their first trips using the PSTA MOD system. Again, the number of new users decreased gradually over the months of October, November, and December 2019. However, analyzing the number of trips requested showed a continuous and significant increase on a monthly basis from June to October 2019. The number of trips requests from

October to December 2019 reached a plateau of around 3,400 trips per month. The overall increase in monthly trip requests was around 143% from June to December 2019.

Analysis of After survey responses showed that the PSTA MOD system increased the number of trips for 79% of 153 pilot participants; 3% reported a decrease in their number of trips and 17% reported no change. Overall, the analysis supported Hypothesis 1 (b).

Hypothesis 2: Users of the PSTA system report that they are more satisfied with the new system.

Hypothesis 2 was evaluated using Before and After survey data; individuals were asked to rate their perception of mobility before using PSTA MOD and to report changes in their perception after participating in the pilot. Before participating in the pilot, 89 respondents gave an average rating of 7 out of 10 for their satisfaction with PSTA DART services, specifically ADA Paratransit services such as Care Ride. As different demographic attributes might influence the perception of individuals, results were disaggregated by gender and showed that female respondents reported a lower average rating of 8 compared to males, who reported an average rating of 9.

The Before survey also asked respondents to rate their general mobility within Pinellas County; 77% of 86 respondents reported an average rating of 8, which was similar across male and female respondents. To evaluate the effect of the pilot on the satisfaction of users, results of the After survey showed that the PSTA MOD system significantly improved the mobility of 82% of 153 users. Comparing the perceptions of female and male users after using PSTA MOD, a greater majority of male users (89% of 38) perceived increases in mobility compared to female users (79% of 112). Overall, the analysis results supported Hypothesis 2.

Hypothesis 3: Calculated or projected spending on paratransit declines by the end of the project.

Hypothesis 3 was evaluated using DART's service operation data from annual National Transit Database (NTD) reports submitted by PSTA. The data showed that the demand-response service expanded from 2015 to 2019 to incorporate more vehicles, which led to an increase in operating expenses, fare revenues, and passenger trips. Comparing 2018 to 2019, fare revenues significantly increased by around 50% and operating expenses remained relatively constant. Similar results were observed when looking at operating expenses and fare revenues per passenger mile, per unlinked passenger trip, and per vehicle revenue mile. Although paratransit operating expenses remained relatively constant and fare revenues significantly increased from 2018 to 2019, this

result could not be singly attributed to PSTA MOD. Overall, the analysis was inconclusive for Hypothesis 3.

Hypothesis 4: Wait times decline for users.

Hypothesis 4 was evaluated using Before and After survey data; individuals were asked to rate and report their wait times for paratransit before using PSTA MOD and to report changes in their wait times after participating in the pilot.

Analysis of average wait times reported while using PSTA DART services showed that 42% of 60 respondents reported wait times less than or equal to 5 minutes and around 32% reported wait times greater than or equal to 15 minutes, leading to an average reported wait time of 10 minutes. On the other hand, analysis of average wait times reported while using the PSTA MOD system showed that around 15% of 147 respondents reported wait times less than or equal to 5 minutes and around 30% reported wait times greater than or equal to 15 minutes, leading to an average reported wait time of 11 minutes. Looking at paired responses of 30 individuals, around 37% reported a decrease in their wait times and 53% reported an increase and 10% reported no change. Overall, analysis of reported wait times showed mixed results that may be attributed to the difference in type of service offered before and after the pilot. PSTA DART service was a scheduled service, with wait time defined as the time that passes between a scheduled pick-up time and the time a vehicle actually departs. In contrast, PSTA MOD was an on-demand service, with wait time defined as the time that passes between a request for pick-up and the time a vehicle actually departs. Thus, a direct comparison between wait times reported in the Before and After surveys is not sufficient to determine a change in wait times. From another perspective, wait times can be defined as the time that passes between a person's need to make a trip and the time that trip can be fulfilled. For PSTA MOD, a rider was able to request a trip at any time without having to schedule in advance. In contrast, trips using PSTA DART services had to be scheduled at least one day in advance, except for recurring trips, which also had to be pre-approved. This means that PSTA MOD decreased the wait time of users from at least one day and offered a flexible on-demand service instead.

Survey results showed that the PSTA MOD system decreased the wait times for 50% of 147 pilot participants; 19% reported an increase in their wait times and 16% reported no change. Before the pilot, the average rating of wait times for PSTA DART services was 8 out of 10, with 72% of 106 individuals reporting a rating of 7 or higher and 20% reporting a rating less than or equal to 5. Overall, the analysis results supported Hypothesis 4.

Hypothesis 5: The quality of life will be improved due to the new system.

Hypothesis 5 was evaluated using Before and After survey data; individuals were asked to rate their perceptions of quality of life before using PSTA MOD and

to report changes in their quality of life after participating in the pilot. Survey results showed that the PSTA MOD system significantly enhanced the perception of quality of life for 88% of 152 pilot participants. Before the pilot, the average rating of quality of life was 7 out of 10, with 68% of 107 individuals reporting a rating of 7 or higher and 23% reporting a rating less than or equal to 5.

Looking at paired responses between the Before and After surveys, a majority of individuals who previously reported high ratings greater than or equal to 8 perceived significant increases in their quality of life as a result of using PSTA MOD. This suggests that the pilot was still able to exceed their initial expectations and enhance their quality of life from new aspects. Overall, the analysis results supported Hypothesis 5.

Hypothesis 6: Travel times decline or do not change.

Hypothesis 6 was evaluated using Before and After survey data; individuals were asked to rate and report their travel times for paratransit before using PSTA MOD and to report changes in their travel times after participating in the pilot. Trip activity data also were used to analyze travel times using PSTA MOD.

Analysis of Before and After survey responses showed that 81 individuals reported an average travel time of 22 minutes using PSTA DART services and 143 individuals reported that to be 20 minutes using PSTA MOD. Looking at paired responses of 35 individuals who reported their travel times before and after participating in the pilot, around 47% reported a decrease in their travel times, 29% reported an increase, and 24% reported no change. The average travel time reported by these 35 individuals was 23 minutes for PSTA DART services and 21 minutes for PSTA MOD. For more accurate measures of travel time using PSTA MOD, analysis of a trip activity dataset, which covered approximately 19,000 trips from June to December 2019 by around 745 users, showed that the average travel time was 16 minutes and 95% of the trips took less than 35 minutes.

Survey results showed that the PSTA MOD system decreased the travel times for 34% of 152 pilot participants; 30% reported an increase in their travel times and 27% reported no change. Before the pilot, the average rating of travel times for PSTA DART services was 8 out of 10, with 83% of 98 individuals reporting a rating of 7 or higher and 9% reporting a rating less than or equal to 5. Overall, the analysis results supported Hypothesis 6.

Hypothesis 7: E-wallet payments for paratransit improve the ease of paying for paratransit.

Hypothesis 7 was evaluated using Before and After survey data; individuals were asked to rate their payment processes for paratransit services before using PSTA MOD and to report changes in their payment processes after participating in the pilot. Trip activity data also were used to analyze user activity using PSTA MOD.

Analysis of responses from the Before survey showed that 78% of 77 respondents rated their payment processes for paratransit services such as Care Ride as 7 (out of 10) or higher; only 16% gave a rating of 5 or lower. Also, 73% of 88 respondents rated the process of scheduling trips with Care Ride as 7 (out of 10) or higher and only 20% gave a rating of 5 or lower. Analysis of responses from the After survey showed that PSTA MOD provided an easier payment process for 80% of 152 pilot participants; only 2% reported a more difficult payment process and 13% reported no change. When evaluating 34 paired responses from individuals who reported their payment experience before and after participating in the pilot, all individuals who previously reported a payment process rating less than or equal to 5 experienced an easier process as a result of using PSTA MOD. Similarly, the majority of individuals who previously gave a high payment process rating greater than or equal to 7 also reported an easier process as a result of using PSTA MOD.

Analysis of trip activity data showed an increase in the number of users and trips per month, which suggests that the system provided a user-friendly payment process. Overall, analysis results supported Hypothesis 7.

Hypothesis 8: The spatial diversity of locations to which users travel increases.

Hypothesis 8 was evaluated using After survey data; individuals were asked to report changes in their traveled distances after participating in the pilot. Trip activity data also were used to analyze the change in the spatial distribution of trips using PSTA MOD over the duration of the pilot.

Analysis of the trip activity data showed that all destination locations were spread at an average distance of 7.1 miles from the global centroid. For trips aggregated on a monthly level, the average distance between monthly trips and the global centroid was almost constant, at approximately 7 miles. This showed that there was no skewness or variable concentration in trip locations from month to month. In fact, trips were spread over all Pinellas County soon after the pilot's launch and maintained that spatial distribution over the following months. This was confirmed by analyzing the change in the local centroid of trips on a monthly level, which showed that its location did not significantly change over the pilot duration.

Analysis of After survey responses showed that the PSTA MOD system increased the distances traveled for 62% of 153 pilot participants; only 2% reported a decrease in their distances traveled and 34% reported no change. The activity data confirmed this result and showed that the average Euclidean distance between trip origins and destinations increased by around 10% over the duration of the pilot. Overall, the analysis results supported Hypothesis 8.

Hypothesis 9: The accessibility and mobility of persons using wheelchairs improves.

Hypothesis 9 was evaluated using Before and After survey data; individuals were asked to rate their perceptions of accessibility and mobility before using PSTA MOD and to report changes in their perceptions after participating in the pilot. Before participating in the pilot, 18 wheelchair users gave an average rating of 8 out of 10 for their ability to access locations within Pinellas County. Similarly, in the Before survey, 13 wheelchair users gave an average rating of 8.5 for their ability to access locations using PSTA services, and 12 wheelchair users gave an average rating of 8 for their mobility within Pinellas County. Comparing the ratings by wheelchair users and non-users, results were generally insignificant, but non-users gave a slightly higher average rating for accessibility within Pinellas County.

Survey results showed that the PSTA MOD system significantly improved the mobility and accessibility of 63% of 16 wheelchair users; 75% of these users perceived an increase in their ability to get to a variety of places as a result of participating in the pilot. Comparing the perceptions of wheelchair users and non-users after using PSTA MOD, a greater majority of non-users perceived increases in accessibility and mobility. Overall, the analysis results supported Hypothesis 9.

Hypothesis 10: The trip purpose of system users is diversified to include a greater number of trip purposes than before the system implementation.

Hypothesis 10 was evaluated using Before and After survey data; individuals were asked to report their trip purposes while previously using PSTA DART services and after using the new PSTA MOD system. Users also were asked about their general travel needs and their perception of access to a variety of activities after participating in the pilot. Before and After survey results show that both systems were equally used for a variety of trip purposes such as access to health services, restaurants/bars, other social/recreational activities, shopping, and errands. Other significant travel needs reported by users before participating in the pilot included going to places of worship and commuting to work or school.

Looking at frequent users in the After survey, specifically those who used PSTA MOD at least once per week, their most conducted trip purposes included commuting to/from work, going to/from places of worship, commuting to/from school, going to/from food shopping, running non-shopping errands, going to/from the gym, going to/from medical/health services, and going to/from social/recreational activities. Using before and after paired responses of travel frequencies for the different trip purposes, it was possible to construct matrices that show the shift in travel frequencies as a result of participating in the pilot. Results show significant increases in travel using the PSTA MOD system for

access to/from medical/health services, restaurants/bars, social activities, shopping in general, and errands. Also, After survey results showed that the pilot significantly increased participation in a variety of activities for 70% of 153 users. This shows that the PSTA MOD system met users' travel needs and provided them with access to a diversified number of trip purposes. Overall, the analysis results supported Hypothesis 10.

Hypothesis 11: The spread of travel times increases as a result of the system.

Hypothesis 11 was evaluated using Before and After survey data; individuals were asked to report their scheduled pick-up times for paratransit before using PSTA MOD and to report changes in their flexibility of departure after participating in the pilot. Trip activity data also were used to analyze travel times using PSTA MOD.

Analysis of Before survey responses showed that around 78% of 27 individuals scheduled a pick-up before 12:00 noon and around 41% requested trips at or before 8:30 AM. For accurate measures of trip request times using PSTA MOD, analysis of an activity dataset showed that request times were almost uniformly distributed throughout the day, with the highest activity happening around 12:00 noon.

Survey results showed that the PSTA MOD system increased the flexibility of departure times for 77% of 153 pilot participants; only 7% reported a decrease in their flexibility and 13% reported no change. Overall, the analysis results supported Hypothesis 11.

Hypothesis 12: Lessons from project implementation can inform future project and system designs and implementation.

Prior to the MOD Sandbox, PSTA had a very fragmented on-demand mobility offering for customers that required travelers to call a taxi directly or download a separate TNC app. The ability to choose a mode in this earlier system was dependent on smartphone access. Interviewees noted a number of metrics for measuring program success; key metrics identified included the number of riders, number of trips, overall cost (e.g., cost per trip and program cost), reduced dispatch and wait times, and rider satisfaction. However, interviewees noted that cost metrics may need to be redefined as PSTA switched to fareless paratransit. Multiple project partners reported that the MOD Sandbox was instrumental in testing this new service model.

The partners interviewed had a number of recommendations and lessons learned both for FTA and for developing and managing public-private mobility partnerships. First, insurance for wheelchair-accessible vehicles (WAV) has a high cost and is difficult to get. FTA should explore establishing a national WAV

insurance program (similar to the Federal Emergency Management Agency's national flood insurance program) to help increase insurance availability and reduce costs. Second, lack of national data standards creates a number of technical challenges, as data fields do not align across service providers. For example, a difference in the number or type of alphanumeric characters allowed in a data field can delay or prevent partnerships from forming. Interviewees expressed a desire that FTA lead the industry in establishing data standards to ensure compatibility and enable faster partnership formation and service deployment. Third, interviewees emphasized the need to balance expectations with desired outcomes when working with TNCs and other third-party providers. What may work in one city may not work elsewhere due to differences in rider density that could impact driver availability and response times. Fourth, interviewees emphasized the importance of getting partners working together early. They noted that a partnership is more likely to succeed if it has a commitment from the top of an organization. Last, interviewees noted that service provider and vendor integration need to be in written agreement at the outset so all partners understand capabilities and limitations and are held accountable with respect to project timelines and deliverables. These and other lessons learned can potentially help advance similar initiatives within other transit systems.

The report that follows presents the detailed findings of the evaluation of the PSTA paratransit project. Table ES-1 presents a summary of the findings.

Table ES-1 *Summary of Findings*

	Hypothesis	Status	Key Finding
1(a)	Users of the PSTA system report that they have greater mobility with the new system.	Supported	Survey data showed that around 82% of 153 pilot participants perceived an increase in their mobility as a result of using PSTA MOD. Trip activity data confirmed this result and showed that the average number of trips per individual per month using PSTA MOD continuously increased over the pilot duration.
1(b)	The number of rides rises as a result of the project.	Supported	Trip activity data showed that the number of rides per month using PSTA MOD continuously increased over the pilot duration to reach an overall increase of 143% by December 2019. Survey data confirmed this result and showed that around 79% of 153 pilot participants experienced an increase in their travel frequency.
2	Users of the PSTA system report that they are more satisfied with the new system.	Supported	The PSTA MOD system significantly enhanced the satisfaction of 82% of 153 users with mobility overall. This was evident among 89% of 38 male users as compared to 79% of 112 female users.
3	Calculated or projected spending on paratransit declines by the end of the project.	Inconclusive	Paratransit operating expenses remained relatively constant and fare revenues significantly increased from 2018 to 2019, but this result cannot be singly attributed to PSTA MOD.

	Hypothesis	Status	Key Finding
4	Wait times decline for users.	Supported	Around half of pilot participants experienced shorter wait times while a minority perceived longer ones as a result of the pilot.
5	The quality of life will be improved due to the new system.	Supported	The PSTA MOD system significantly enhanced the quality of life of 88% of 152 users.
6	Travel times decline or do not change.	Supported	Around 60% of 152 pilot participants experienced a decline or no change in their travel times and paired survey data showed a 2-minute decrease in the average travel time as a result of using PSTA MOD.
7	E-wallet payments for paratransit improve the ease of paying for paratransit.	Supported	Around 80% of 152 pilot participants experienced an easier payment process as a result of e-wallet payments for PSTA MOD. Trip activity data also showed an increase in the number of users and trips per month which suggests that the system provided a user-friendly payment process.
8	The spatial diversity of locations to which users travel increases.	Supported	Trip activity data showed that PSTA MOD constantly served diverse locations while the average trip distance increased by around 10% over the pilot duration. Survey data confirmed that around 62% of 153 pilot participants experienced an increase in their traveled distances.
9.	The accessibility and mobility of persons using wheelchairs improves.	Supported	The PSTA MOD system significantly improved the mobility and accessibility of 63% of 16 wheelchair users.
10	The trip purpose of system users is diversified to include a greater number of trip purposes than before the system implementation.	Supported	The PSTA MOD system provided users with access to a greater number of diversified trip purposes which met their needs. Specifically, increases in travel were most evident for access to/from medical/health services, restaurants/bars, social activities, shopping in general, and errands.
11	The spread of travel times increases as a result of the system.	Supported	Around 77% of 153 pilot participants experienced an increase in their flexibility of departure times and PSTA MOD activity data showed that trip request times were uniformly spread throughout the day.
12	Lessons from project implementation can inform future project and system designs and implementation.	Supported	The project produced a number of lessons learned as they related to insurance needs, data standardization, and negotiations that can be applied to similar projects in the future.

Section 1 Introduction

Overview of MOD Sandbox Demonstrations

The Federal Transit Administration (FTA)'s Mobility on Demand (MOD) effort developed around a vision of a multimodal, integrated, automated, accessible, and connected transportation system in which personalized mobility is a key feature. FTA selected 11 MOD Sandbox Demonstration projects that are testing strategies that advance the MOD vision. In partnership with public transportation agencies, the MOD Sandbox is demonstrating the potential for new innovations to support and enhance public transportation services by allowing agencies to explore partnerships, develop new business models, integrate transit and MOD solutions, and investigate new, enabling technical capabilities.

The evaluation of each project's benefits and impacts will guide the future implementation of innovations throughout the country. Broadly, MOD Sandbox projects take several approaches, including the development of new or improved trip planners, integration of new mobility services with traditional public transportation functions, and implementation of new integrated payment and incentive structures for travel using public transportation. Several Sandbox projects focus on improving first/last mile access to public transportation through collaboration with private sector operators, including bikesharing, carsharing, ridesourcing/Transportation Network Company (TNC), and other shared mobility operators.

More information about the MOD Sandbox Program can be found at https://www.transit.dot.gov/research-innovation/mobility-demand-mod-sandbox-program. In addition, Table 1-1 provides a summary of all projects in the MOD Sandbox Program.

Table 1-1 *Overview of MOD Sandbox Projects*

Region	Project	Description
Chicago	Incorporation of Bikesharing Company Divvy	Releases updated version of Chicago Transit Authority's (CTA) existing trip planning app. New version incorporates Divvy, a bikesharing service, and allows users to reserve and pay for bikes within the app.
Dallas	Integration of Shared-Ride Services into GoPass Ticketing Application	Releases updated version of Dallas Area Rapid Transit's (DART) existing trip planning app. Updated version incorporates shared-ride services to provide first/last-mile connections to public transportation stations and allows users to pay for services within the app.
Los Angeles and Puget Sound	Two-Region Mobility on Demand	Establishes partnership between Via and LA Metro. Via provides first/last-mile connections for passengers going to or leaving from transit stations. There is a companion project in Seattle, WA.
Phoenix	Smart Phone Mobility Platform	Releases updated version of Valley Metro's existing trip planning app. New version updates trip planning features and enables payments.

Region	Project	Description
Pinellas County (Florida)	Paratransit Mobility on Demand	Improves paratransit service by combining services from taxi, ridesourcing/TNCs, and traditional paratransit companies.
Portland	Open Trip Planner Share Use Mobility	Releases updated version of TriMet's existing multimodal app. New version provides more sophisticated functionality and features, including options for shared mobility.
San Francisco Bay Area	Bay Area Fair Value Commuting (Palo Alto)	Reduces SOV use within Bay Area through commuter trip reduction software, a multimodal app, workplace parking rebates, and first/last-mile connections in areas with poor access to public transportation.
	Integrated Carpool to Transit (BART System)	Establishes partnership between Scoop and Bay Area Rapid Transit (BART). Scoop matches carpoolers and facilitates carpooling trips for passengers going to or leaving from BART stations with guaranteed parking.
Tacoma	Limited Access Connections	Establishes partnerships between local ridesourcing companies/ TNCs and Pierce Transit. Ridesourcing companies provide first/last-mile connections to public transportation stations and park-and-ride lots with guaranteed rides home.
Tucson	Adaptive Mobility with Reliability and Efficiency	Builds integrated data platform that incorporates ridesourcing/TNC and carpooling services to support first/last-mile connections and reduce congestion.
Vermont	Statewide Transit Trip Planner	Releases new multimodal app for VTrans that employs fixed and flexible (non-fixed) transportation modes to route trips in cities and rural areas.

An independent evaluation (IE) is required by Federal public transportation law (49 U.S.C. § 5312(e)(4)) for demonstration projects receiving FTA Public Transportation Innovation funding. The IE for the MOD Sandbox Demonstration projects was sponsored by the USDOT Intelligent Transportation Systems Joint Program Office (ITS JPO) and FTA.

This report focuses on the independent evaluation of the Pinellas Suncoast Transit Authority (PSTA) Public-Private-Partnership for Paratransit (PSTA MOD) project, aimed at providing a cost-effective and efficient paratransit service while improving the mobility and accessibility of its customers. The project utilized technology available through transportation network companies (TNCs) to develop an integrated platform that provided on-demand curb-to-curb paratransit service from multiple transportation providers. The evaluation of this project involved exploring a number of hypotheses surrounding the project's impact on user wait times, travel times, accessibility, and mobility and its effect on system operating cost and payment methods. Following a more detailed overview of the project, these hypotheses are explored in the sections that follow.

Evaluation Framework

For each of the 11 MOD Sandbox projects, the IE team developed an evaluation framework in coordination with the project team. The framework is a project-specific logic model that contains the following entries:

1. **MOD Sandbox Project** – denotes the specific MOD Sandbox project.
2. **Project Goals** – denotes each project goal for the specific MOD Sandbox project and captures what each MOD Sandbox project is trying to achieve.
3. **Evaluation Hypothesis** – denotes each evaluation hypothesis for the specific MOD Sandbox project. The evaluation hypotheses flow from the project-specific goals.
4. **Performance Metric** – denotes the performance metrics used to measure impact in line with the evaluation hypotheses for the specific MOD Sandbox project.
5. **Data Types and Sources** – denotes each data sources used for the identified performance metrics.
6. **Method of Evaluation** – denotes the quantitative and qualitative evaluation methods used.

Section 2

PSTA MOD Sandbox Project Summary

One of the projects in the MOD Sandbox Program was the PSTA Public-Private-Partnership for Paratransit Demonstration. PSTA partnered with Lyft, United Taxi, Care Ride, Wheelchair Transport, and Goin Software to develop and demonstrate an innovative approach to more efficient and cost-effective paratransit service while providing flexible and on-demand transportation.

The primary goal of the PSTA MOD demonstration was to deploy a more cost-effective and efficient means for paratransit customers to improve their mobility and access to activities throughout Pinellas County. PSTA currently provides service to over 12,500 eligible customers of their Americans with Disabilities Act (ADA)-mandated paratransit service, performing over 275,000 annual paratransit trips through its Demand Response Transportation (DART) Program. As reported in the 2017–2022 Pinellas County Transportation Disadvantaged (TD) Service Plan, over 10% of the total Pinellas County population has a disability and qualifies for TD services. A smaller subset of this population—those who meet the more restrictive requirements—also qualifies for DART services.

The partnerships PSTA has with Care Ride and United Taxi predates the MOD Sandbox demonstration. One partner in particular, United Taxi, has worked with PSTA for approximately 20 years, providing services for several small demand-responsive programs, all with different funding sources. Although PSTA has a number of existing paratransit and taxi partnerships in place, the MOD Sandbox enabled the agency to explore new partnerships with Lyft and the software vendor Goin. Prior to the MOD Sandbox, PSTA had a very fragmented on-demand mobility offering for customers that required travelers to call a taxi directly or download a separate TNC app.

Leveraging the growing influence and demand for on-demand transportation services in Pinellas County, PSTA expanded its existing partnerships with United Taxi, Wheelchair Transport, and Care Ride. With FTA funding, PSTA developed two new key partnerships with Lyft and Goin Software to develop and demonstrate a model that provided cost-effective, on-demand, curb-to-curb paratransit service. Lyft participated as an ambulatory on-demand service provider to complement the other existing three partners. Goin was the demonstration system integrator tasked with creating a single user interface for PSTA staff to assign paratransit trips to multiple providers from one software platform.

Prior to the MOD Sandbox project, paratransit users could only call to schedule rides by phone. Riders did not get a choice on their provider, which was exclusively Care Ride at the time. Goin, which developed the back-end dispatch system for PSTA, was instrumental in linking all of the modes together. The MOD Sandbox created a reservation and dispatch process where riders had the

ability to request a ride on their phone or call PSTA directly to book a ride with a dispatcher. When a ride is booked using the latter method, PSTA's dispatcher enters the traveler's origin and destination into the Goin platform, verifies the ride is within the service area, and then provides the traveler with a series of mobility options including estimated time of arrival. The dispatcher then assigns a ride to a traveler based on their personalized preferences and needs (e.g., a traveler prefers a particular mode or requires a wheelchair accessible vehicle, etc.). The dispatcher provides the rider with the name of the service, vehicle description, and driver name. Riders also have the option of calling the driver for updates, watching their pick-up on their smartphone, and/or receiving voice or text notifications. In doing so, both the telephone dispatcher and the software platform were critical to expanding mobility choices to those with limited access to broadband or smart phones by simplifying the process of making choices for the customer.

The PSTA MOD demonstration aimed to decrease paratransit costs while greatly improving DART riders' mobility and accessibility by providing on-demand trips. The evaluation was guided by 12 hypotheses analyzed using survey data, travel activity data, ridership data, paratransit operating expenses, payment data, and expert (stakeholder/project partner) interview data.

Project Timeline

The following timeline presents the main project milestones:

- **January 27, 2017** – Project execution date
- **June 2019** – Demonstration start/begin data collection
- **June 2020** – Preliminary and interim analysis/conduct final surveys and interviews
- **September 2020** – Demonstration complete/complete data collection
- **May 2021** – Final data analysis/complete independent evaluation
- **August 2021** – Expert interview summary/complete IE reporting and data submission

The PSTA team collected data relevant to this MOD Sandbox Demonstration between June 2019 and September 2020 and shared the data with the IE team to conduct the evaluation.

Section 3 Evaluation Approach, Planning, and Execution

The evaluation of each MOD Sandbox project was guided by an evaluation plan that was developed at the outset of the project. The evaluation plan was built primarily upon a logic model constructed by the IE team. The logic model had five basic components:

1. **Project Goal** – The stated goals of the project were defined from the proposal, project summary, and discussion with project team members.
2. **Evaluation Hypothesis** – Each project goal had a corresponding hypothesis. The hypothesis was a stated question that could be answered with a "Yes" or a "No" that was related to measuring the achievement of the associated project goal.
3. **Performance Metric** – Described the measurement that was proposed to be used to evaluate the hypothesis.
4. **Data Sources** – Data sources that followed from the performance metric and described the data type and source necessary to compute or evaluate the performance metric.
5. **Method of Evaluation** – Defined how the hypothesis would be evaluated; with the logic model, this was very general, declaring whether the evaluation would be completed via survey analysis, activity data analysis, time series analysis, or other methods.

The logic model was a table, with one row containing five cells, each populated with the components described above. The content of the logic model was also populated in advance of project implementation, where knowledge of the project trajectory and exact data collected was uncertain. The components of the logic model constructed for the evaluation of the Valley Metro project is presented as follows in Table 3-1.

Table 3-1 *Project Goals, Evaluation Hypotheses, Performance Metrics, and Data Sources for PSTA Paratransit Project*

Number	Project Goals	Evaluation Hypothesis	Performance Metric	Data Elements	Data Sources
1	Improve mobility of paratransit users with the PSTA system	(a) Users of the PSTA system report that they have greater mobility with the new system.	Ordinal scale response to mobility questions (compare Before and After survey), System activity data (frequency of use by user and location) before and after new system deployment	Survey data, travel activity data, ridership data	PSTA, mobility providers, and surveyed travelers
		(b) The number of rides rises as a result of the project.	Number of trips before and after implementation	Travel activity data	PSTA and mobility providers

Number	Project Goals	Evaluation Hypothesis	Performance Metric	Data Elements	Data Sources
2	Improve satisfaction of paratransit users with the PSTA system	Users of the PSTA system report that they are more satisfied with the new system.	Ordinal scale response to satisfaction questions (compare Before and After survey)	Survey data	PSTA (surveyed travelers)
3	Reduce spending on paratransit trips	Calculated or projected spending on paratransit declines by the end of the project.	Paratransit operating expenses before and after deployment	Paratransit operating expenses	PSTA
4	Reduce wait times for paratransit services	Wait times decline for users.	Measured wait times, wait times reported in surveys (compare Before and After survey)	Survey data, travel activity data	PSTA, mobility providers, and surveyed travelers
5	Improve quality of life for users	The quality of life will be improved due to the new system.	Ordinal scale response to quality-of-life questions (compare Before and After survey)	Survey data	PSTA and surveyed travelers
6	Improve (or do not worsen) travel times of users	Travel times decline or do not change.	Measured travel times	Travel activity data	PSTA and mobility providers
7	Make payments of paratransit easier for a broader population	E-wallet payments for paratransit improve the ease of paying for paratransit.	Ordinal scale response to ease of payment questions (compare Before and After survey), Payment collected via E-wallet and cash over time	Survey data, payment data	PSTA and surveyed travelers
8	Improve paratransit travelers' accessibility to the region	The spatial diversity of locations to which users travel increases.	Spatial distribution of destinations traveled by users	Travel activity data	PSTA and mobility providers
9	Improve the accessibility and mobility of persons using wheelchairs	The accessibility and mobility of persons using wheelchairs improves.	Ordinal scale response to accessibility and mobility questions among persons using wheelchairs (compare Before and After survey)	Survey data	PSTA (surveyed travelers)
10	Diversify trip purpose of system users	The trip purpose of system users is diversified to include a greater number of trip purposes than before the system implementation.	Count of trip purposes across the population	Survey data	PSTA (surveyed travelers)
11	Diversify travel times of users	The spread of travel times increases as a result of the system.	Distribution of travel times	Travel activity data	PSTA and mobility providers

Number	Project Goals	Evaluation Hypothesis	Performance Metric	Data Elements	Data Sources
12	Obtain lessons learned about project implementation	Lessons from project implementation can inform future project and system designs and implementation.	Qualitative documentation from stakeholder interviews	Qualitative documentation from stakeholder interviews	PSTA and project partners (interviewees)

The quantitative and qualitative evaluation methods used in the PSTA MOD evaluation included the following:

- Vehicle and travel activity data analysis
- Survey analysis
- Agency and system cost analysis
- Stakeholder interview summaries

The content of the logic model was translated into a data collection plan, which, in turn, was incorporated into a broader evaluation plan. The evaluation plan contains further details on the proposed data structures and analytical approaches to address each hypothesis. The evaluation plan was reviewed by project stakeholders and finalized towards the inception of the project. The project team then executed the project, working with the evaluation team to collect and transfer data at key junctures of the project. In the section that follows, background on the data collected in support of the evaluation is presented, followed by a presentation and discussion of the results from the evaluation.

Data Collected

A variety of datasets was used to conduct the evaluation. These datasets were collected in collaboration with the PSTA team and came in the form of survey data, travel activity data, paratransit operating expenses, payment data, as well as stakeholder interview data. A general description of the available datasets is presented below:

- Survey data – Pre- and post-study surveys were launched for system users within Pinellas County. The surveys were designed to ask questions about travelers' behavior patterns such as travel modes used, recent trip attributes, and perceptions of mobility and accessibility. Also, the After survey asked attributional impact questions which probe user response on how the pilot has influenced their travel behavior.
- Travel activity data of users and participating mobility suppliers – This dataset included different trip attributes such as origin, destination,

request time, pick-up time, completion time, and disability status of the user. Although the demonstration period was from June 2019 to September 2020, this dataset covered only the period from June to December 2019; thus, all activity data analysis results presented are based on this subperiod.

- Paratransit operating expenses and fare revenues – Paratransit service expenses and revenues were obtained from annual National Transit Database (NTD) reports submitted by PSTA covering the period from 2015 to 2019.
- Payment data (E-wallet and cash) – Payment data were available as part of the travel activity dataset.
- Stakeholder interview data – The evaluation team conducted expert interviews with several people who were directly connected to the project team and had deep knowledge of the project.

These datasets were applied to evaluate the hypotheses defined within the evaluation plan. In the sections that follow, these hypotheses are explored and evaluated using the data available.

Section 4 Evaluation Results

Hypothesis 1(a): Users of the PSTA system report that they have greater mobility with the new system.

Performance Metric	Key Finding
Ordinal scale response to mobility questions (compare Before and After survey), system activity data (frequency of use by user and location), before and after new system deployment	Survey data showed that around 82% of 153 pilot participants perceived an increase in their mobility as a result of using PSTA MOD. Trip activity data confirmed this result and showed that the average number of trips per individual per month using PSTA MOD continuously increased over the pilot duration.

The first part of this hypothesis explored whether the new paratransit system increased the mobility of its users. This hypothesis was evaluated using Before and After survey data about the perception of respondents of their mobility. In addition, trip activity data were used to analyze user activity using PSTA MOD.

The Before survey asked respondents to rate their general mobility within Pinellas County. Figure 4-1 shows that 77% of 86 respondents reported a rating of 7 (out of 10) or higher for their mobility within Pinellas County and 17% reported a rating less than or equal to 5, leading to an average rating of 8.

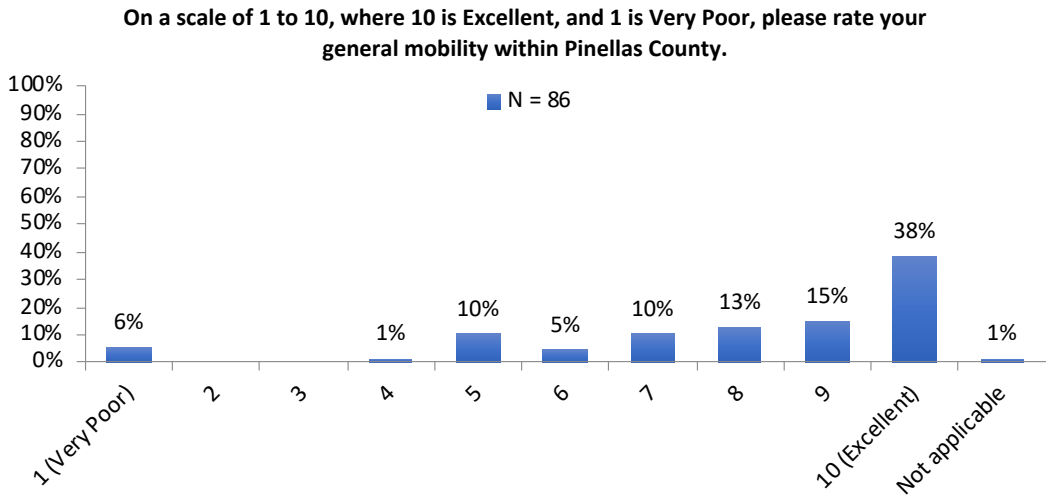


Figure 4-1 *Before Survey – Ratings of Mobility*

To evaluate the effect of the pilot on mobility, the After survey asked respondents to report how their general mobility within Pinellas County using PSTA services changed after using PSTA MOD. Figure 4-2 shows that as a result of using PSTA MOD, 82% of 153 respondents perceived an increase in their mobility; only 4% reported a decrease and 10% reported no change.

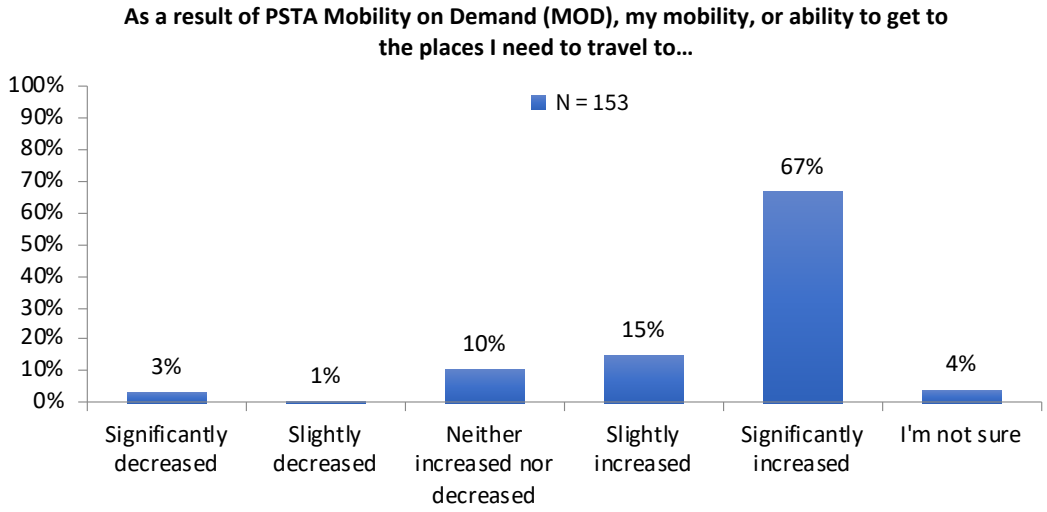


Figure 4-2 *After Survey – Effect of Pilot on Mobility*

Figure 4-3 shows paired responses of 48 individuals for questions presented in Figure 4-1 and Figure 4-2. All 10 individuals who previously gave low ratings (<=5) experienced increased mobility as a result of using PSTA MOD. Similarly, around 81% of 37 individuals who previously gave high ratings (>=7) experienced increased mobility; only 5% perceived a decrease and 11% perceived no change as a result of using PSTA MOD.

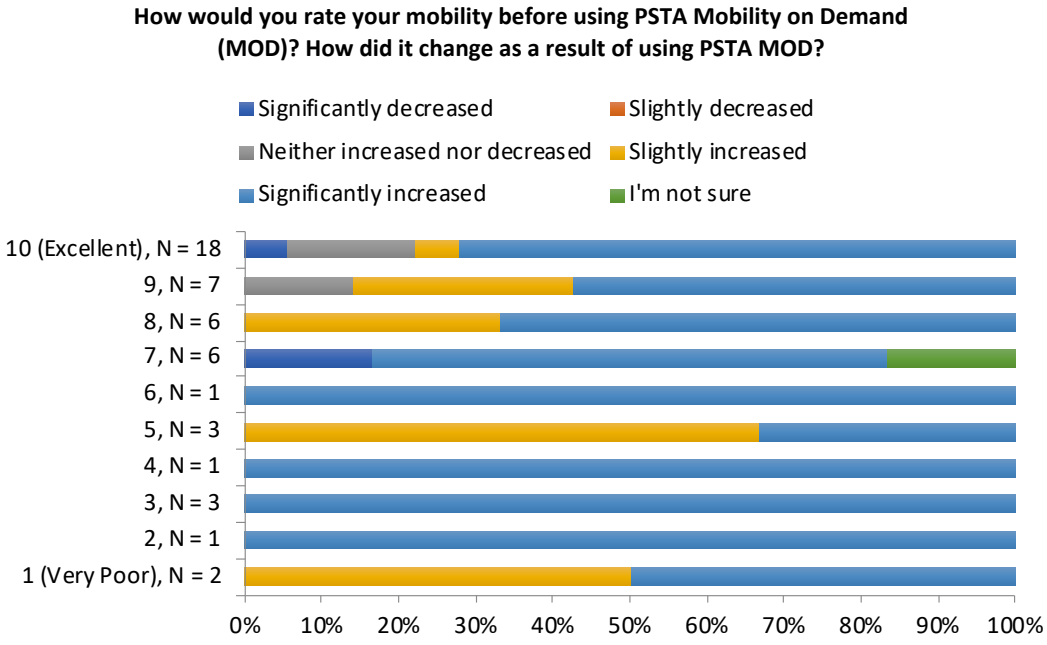


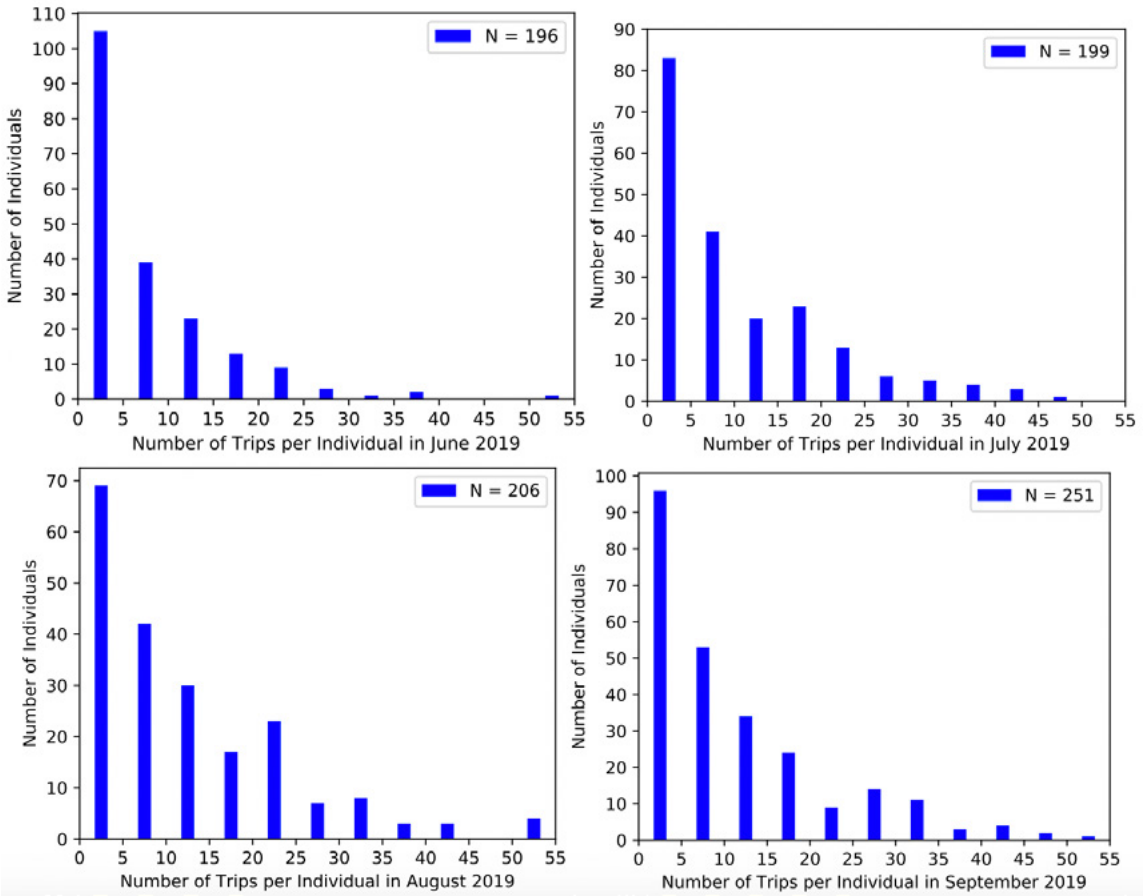
Figure 4-3 *Before/After Surveys – Perception of Mobility – Paired Responses*

From another perspective, a trip activity dataset was analyzed that covered about 19,000 trips from June 2019 to December 2019 by 745 users using PSTA MOD. Table 4-1 shows that over the pilot duration the average user used PSTA MOD for around 2 months and conducted 5 trips per week with an average trip duration of 17 minutes.

Table 4-1 *PSTA MOD Activity Data – User Level Metrics*

	Metric per User				
	Number of Trips	PSTA MOD Use Period (days)	Average Trip Euclidean Distance (mi)	Average Trip Duration (min)	Average Trips per Week
Mean	26	64	4.4	17	5
Median	10	25	3.7	15	4
75%	28	122	5.5	20	7
90%	78	197	8.3	26	14

To analyze the change in the mobility of users throughout the pilot, Figure 4-4 shows the distribution of trips per individual from June to December.



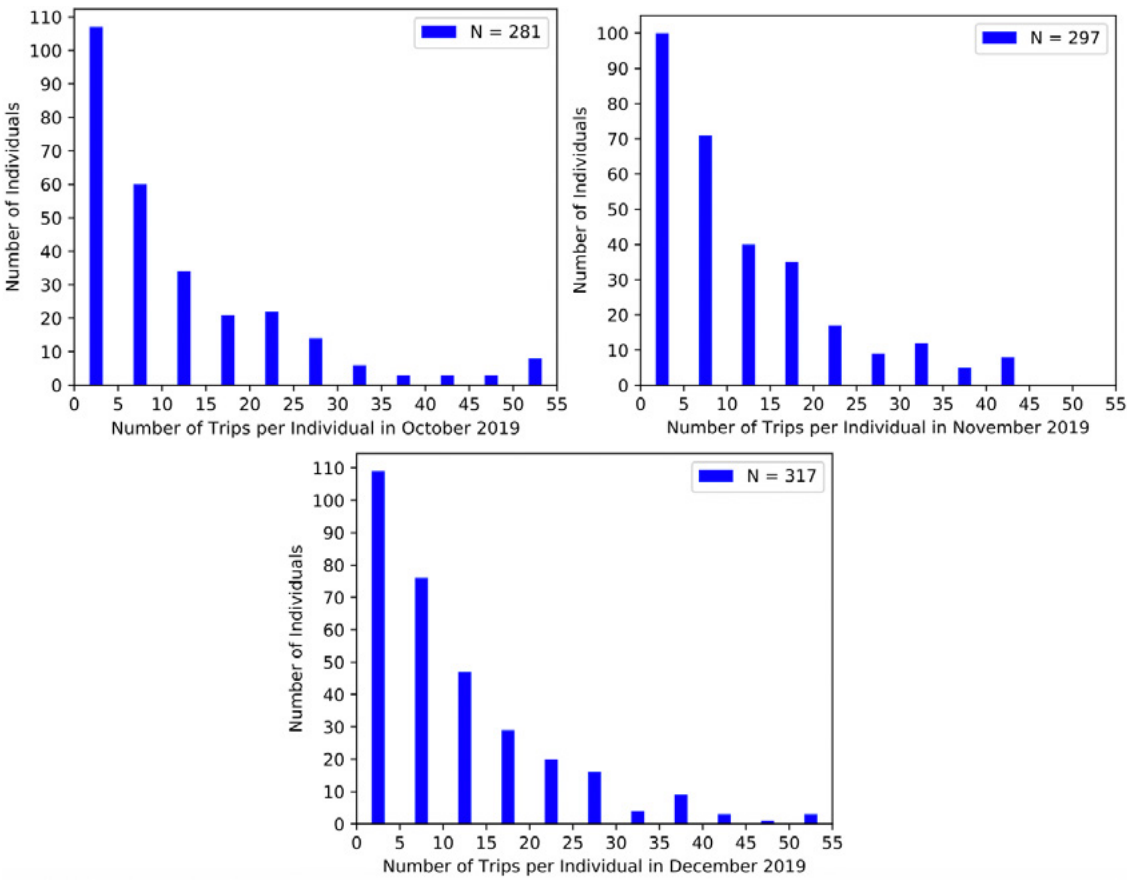


Figure 4-4 *PSTA MOD Activity Data – Distribution of Trips per Individual per Month*

The number of users each month increased over the duration of the pilot. This is evaluated more in detail in the second part of this hypothesis. However, a change in the distribution is evident and shows that more users were conducting more trips per month over the duration of the pilot. Table 4-2 shows the calculated descriptive statistics for each of the above distributions. The shift in the distribution to the right is validated by the average number of trips per individual that increased from 7 trips per individual in June to 11 trips per individual in December. The change in skewness is also proved by the median number of trips per individual which doubled over the duration of the pilot.

Overall, survey data showed that around 82% of 153 pilot participants perceived an increase in their mobility as a result of using PSTA MOD. Trip activity data confirmed this result and showed that the average number of trips per individual per month using PSTA MOD continuously increased over the pilot duration. Hypothesis 1 (a) is supported.

Table 4-2 *PSTA MOD Activity Data – Descriptive Statistics for Distributions of Trips per Individual per Month*

Month (2019)	Number of Users	Average Number of Trips per Individual	Median Number of Trips per Individual
June	196	7	4
July	199	10	7
August	206	12	9
September	251	11	7
October	281	12	7
November	297	11	8
December	317	11	8

Hypothesis 1(b): The number of rides rises as a result of the project.

Performance Metric	Key Finding
Number of trips before and after implementation	Trip activity data showed that the number of rides per month using PSTA MOD continuously increased over the pilot duration to reach an overall increase of 143 percentage points by December 2019. Survey data confirmed this result and showed that around 79% of 153 pilot participants experienced an increase in their travel frequency.

The second part of the Hypothesis 1 explored as part of the evaluation was whether the new paratransit system increased the number of rides. This hypothesis was evaluated using After survey data about the perception of respondents of their number of trips. In addition, trip activity data were used to analyze the change in the number of trips using PSTA MOD during the pilot.

The activity dataset covered 19,292 trips from June 2019 to December 2019 by 745 users. Figure 4-5 shows the number of new users per month, defined as the date of each user's first trip using PSTA MOD. Results show that around 26% of users took their first trips in June, after which the percentage of new users decreased to 7% and 5% in July and August, respectively. In September, another spike in new users was observed when 34% of users took their first trips using PSTA MOD. Similarly, this percentage decreased gradually over the months of October, November, and December.

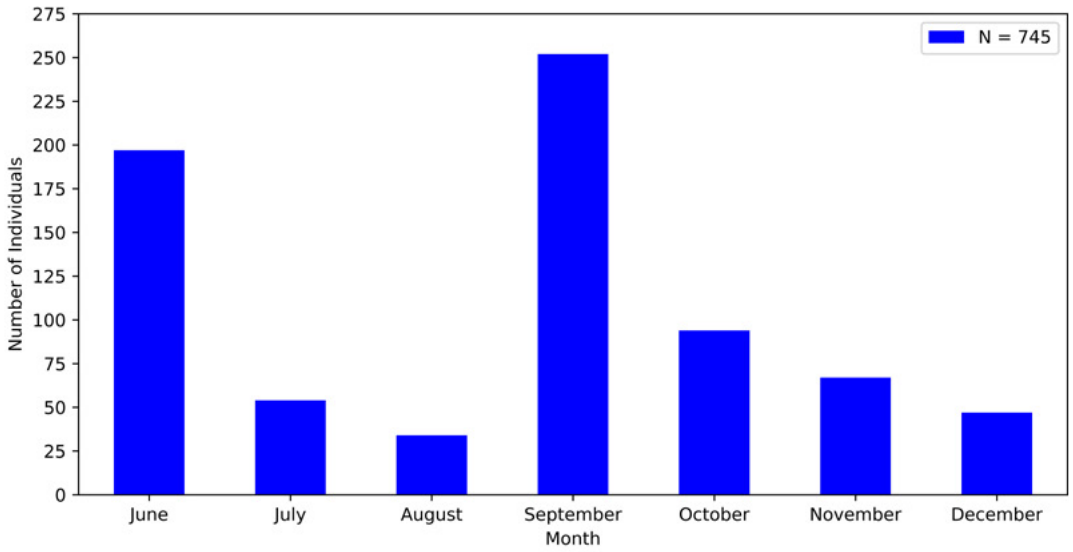


Figure 4-5 *PSTA MOD Activity Data – User's First Trip Distribution*

Looking at the number of trips conducted per month, Figure 4-6 shows a significant constant increase over the initial period of the pilot, masking the fluctuation of new users seen in Figure 4-5.

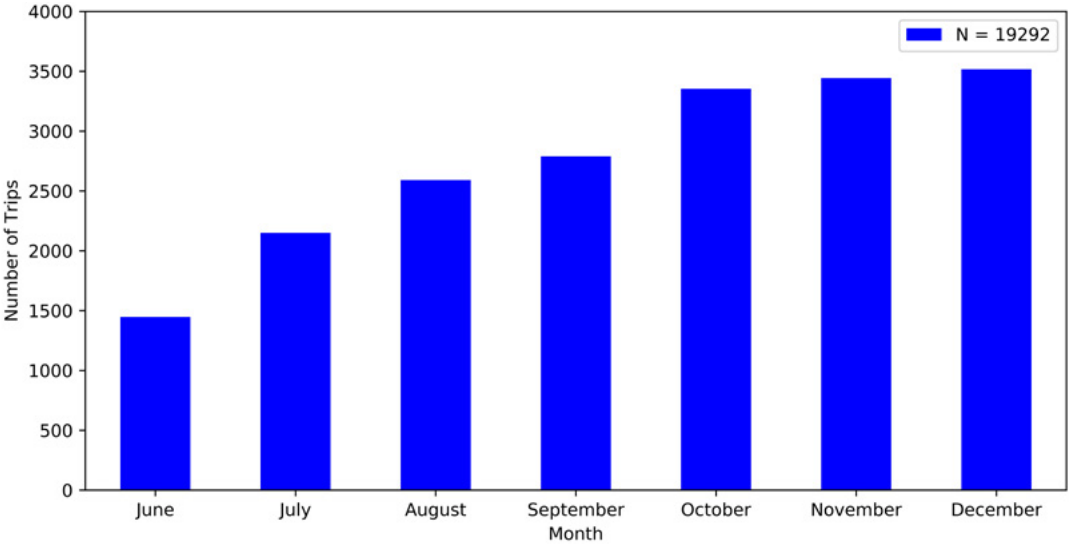


Figure 4-6 *PSTA MOD Activity Data – Trips Time Series*

Table 4-3 shows calculated statistics based on Figure 4-6, where a significant 49% increase in the number of trips requested is observed from June to July 2019. Continuous increases are observed over the next couple months, after which the number of trips per month reaches a steady state in October, at around 3,400 trips.

Table 4-3 *PSTA MOD Activity Data – Trips Time Series Statistics*

Month	Number of Trips	Percentage of Total Trips	Change from Previous Month
June 2019	1,447	7.5%	N/A
July 2019	2,150	11.1%	49%
August 2019	2,592	13.4%	21%
September 2019	2,789	14.5%	8%
October 2019	3,354	17.4%	20%
November 2019	3,442	17.8%	3%
December 2019	3,517	18.2%	2%

To evaluate the effect of the pilot on the number of trips requested, the After survey asked respondents to report how their trip frequency changed after using PSTA MOD. Figure 4-7 shows that 79% of 153 respondents perceived an increase in their number of trips as a result of the pilot; only 3% reported a decrease and 17% reported no change.

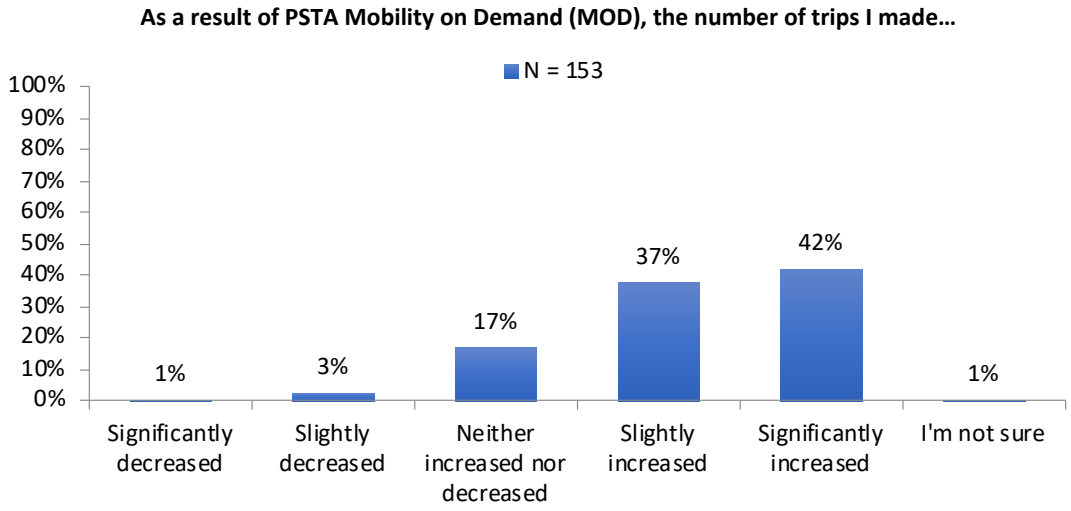


Figure 4-7 *After Survey – Effect of Pilot on Number of Trips*

Overall, trip activity data showed that the number of rides per month using PSTA MOD continuously increased over the pilot duration, reaching an overall increase of 143% by December 2019. Survey data confirmed this result and showed that around 79% of 153 pilot participants experienced an increase in their travel frequency. Hypothesis 1(b) is supported.

Hypothesis 2: Users of the PSTA system report that they are more satisfied with the new system.

Performance Metric	Key Finding
Ordinal scale response to satisfaction questions (compare Before and After survey)	The PSTA MOD system notably enhanced the satisfaction of 82% of 153 users with mobility overall. This was evident among 89% of 38 male users and 79% of 112 female users.

The second hypothesis explored as part of the evaluation was whether users of PSTA MOD were more satisfied with the new paratransit system. This hypothesis was evaluated using Before and After survey data about the satisfaction of individuals with the existing PSTA Demand Response Transportation (DART) services and the new PSTA MOD system. The Before survey asked respondents to rate their satisfaction with PSTA DART services, specifically ADA Paratransit services such as Care Ride. Figure 4-8 shows that 82% of 89 respondents reported a rating of 7 (out of 10) or higher; 9% reported a rating less than or equal to 5, leading to an average rating of 8.5.

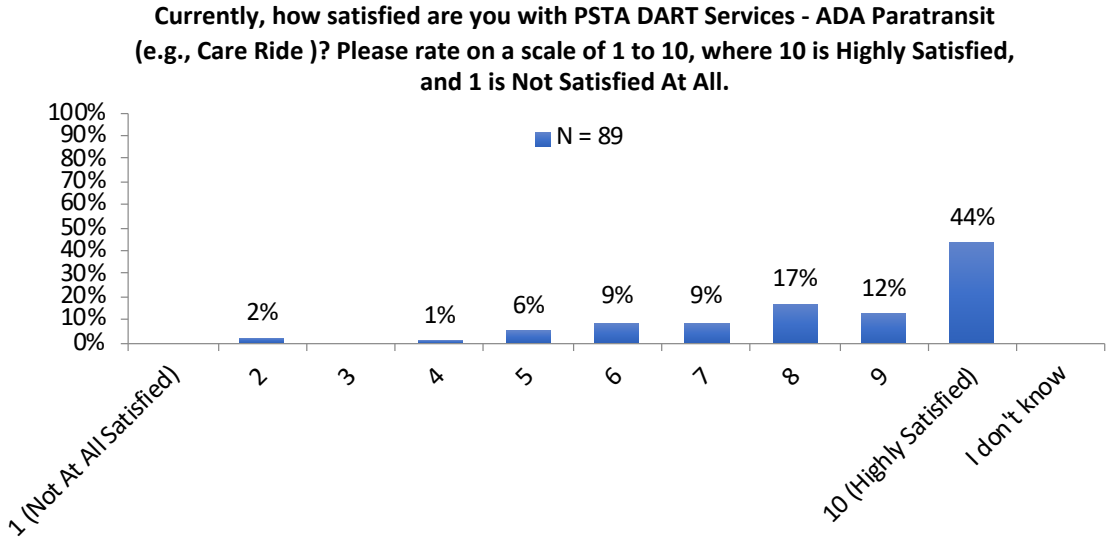


Figure 4-8 *Before Survey – Rating of PSTA DART Services*

Typically, perception might be influenced by different demographic attributes such as age, gender, race or ethnicity, education level, and income level. One association between satisfaction with PSTA DART and demographics was found with gender. The Before and After surveys received a significantly greater participation by females rather than males, as shown in Figure 4-9.

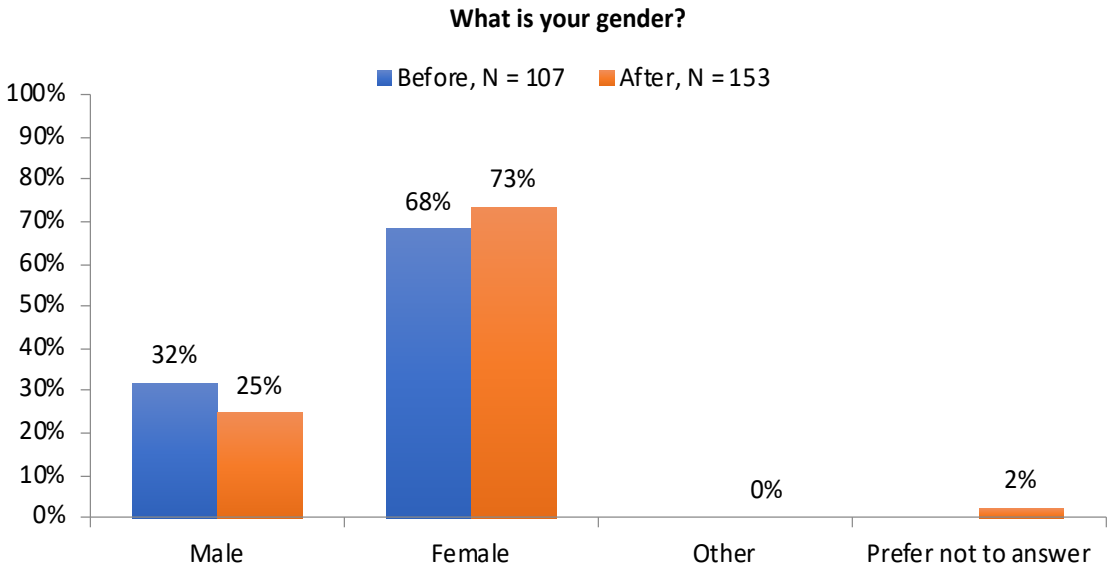


Figure 4-9 *Before/After Surveys – Gender*

To investigate if a correlation existed between gender and reported ratings, Figure 4-10 shows the results of Figure 4-8 disaggregated by gender. Females were overall less satisfied with PSTA DART services than males, giving an average rating of 8 as compared to males giving an average rating of 9.

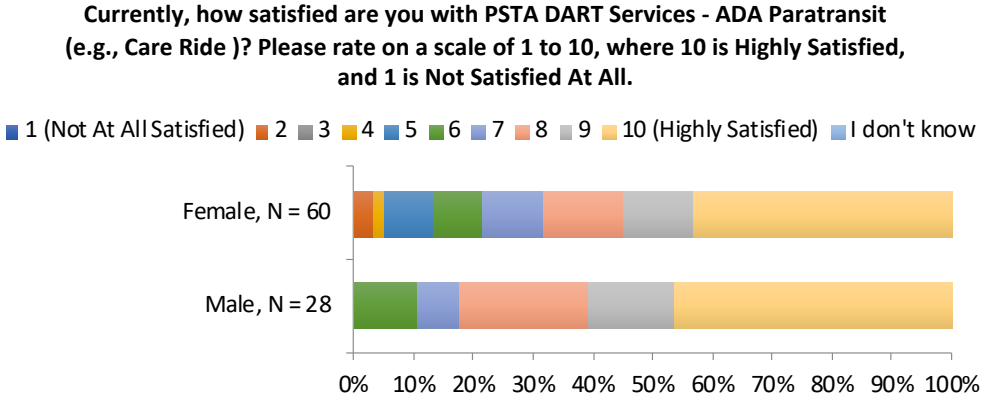


Figure 4-10 *Before Survey – Rating of PSTA DART Services – Disaggregated by Gender*

The Before survey also asked respondents to rate their general mobility within Pinellas County; 77% of 86 respondents reported a rating of 7 (out of 10) or higher and 17% reported a rating less than or equal to 5, leading to an average rating of 8. Figure 4-11 shows the results disaggregated by gender; both females and males reported an average rating of 8, but the distribution of female ratings included greater shares of high and low ratings.

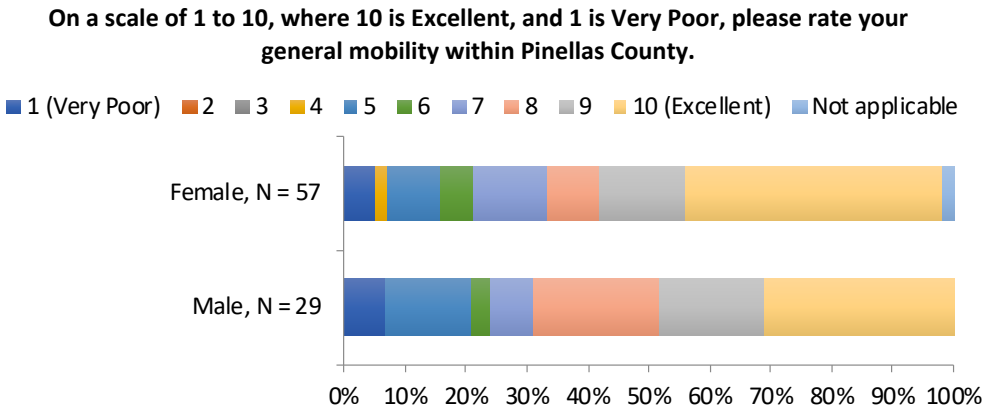


Figure 4-11 *Before Survey – Rating of Mobility – Disaggregated by Gender*

To evaluate the effect of the pilot on the satisfaction of users with mobility overall, the After survey asked respondents to report how their general mobility within Pinellas County changed after using PSTA MOD. As a result of using PSTA MOD, 82% of 153 respondents perceived an increase in their mobility. Figure 4-12 shows the results disaggregated by gender; a greater share of males (89% of 38) perceived an increase in mobility compared to that of females (79% of 112).

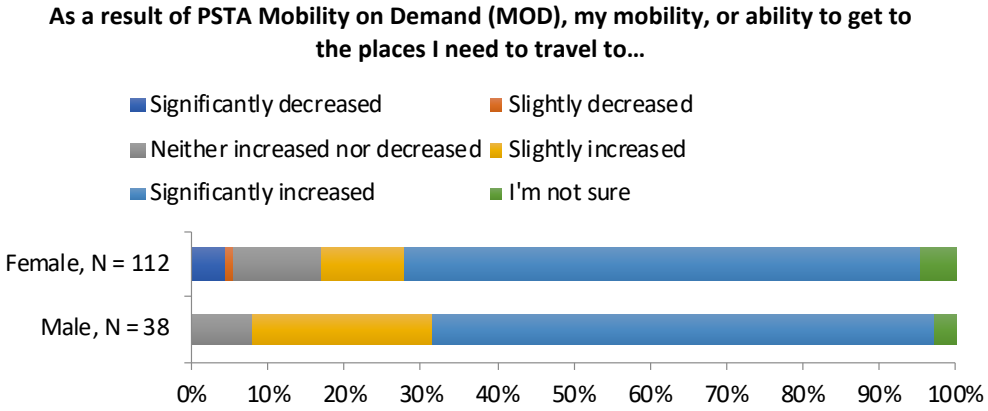


Figure 4-12 *After Survey – Effect of Pilot on Mobility – Disaggregated by Gender*

The PSTA MOD system significantly enhanced the satisfaction of 82% of 153 users with mobility overall. This was evident among 89% of 38 male users compared to 79% of 112 female users. Hypothesis 2 was found to be supported.

Hypothesis 3: Calculated or projected spending on paratransit declines by the end of the project.

Performance Metric	Key Finding
Paratransit operating expenses before and after deployment	Paratransit operating expenses remained relatively constant, and fare revenues significantly increased from 2018 to 2019, but this result cannot be solely attributed to PSTA MOD.

The third hypothesis explored whether the calculated or projected spending on paratransit declined by the end of the project. This hypothesis was evaluated using DART's service operation data from annual NTD reports submitted by PSTA covering the period from 2015 to 2019.

Table 4-4 shows the obtained data for different service operation metrics. It can be observed that the demand-response service expanded with time to incorporate more vehicles, which led to an increase in operating expenses, fare revenues, and passenger trips. This excludes 2016, when the decrease in operating expenses was likely due to a high amount of spare (or idle) vehicles (34.3%).

Table 4-4 *Demand-Response Operation Characteristics*

	2015	2016	2017	2018	2019
Operating Expenses	$4,694,195	$2,191,505	$4,760,425	$7,880,757	$8,055,686
Fare Revenues	$553,757	$643,857	$1,303,510	$1,049,857	$1,503,808
Annual Passenger Miles	836,937	900,849	1,835,799	2,139,491	2,146,222
Annual Unlinked Trips	166,384	173,236	331,144	367,642	362,583
Annual Vehicle Revenue Miles	1,710,150	1,786,727	4,831,766	3,639,892	3,913,390
Annual Vehicle Revenue Hours	64,984	71,294	256,934	262,932	298,039
Vehicles Available for Maximum Service	74	108	120	115	129
Vehicles Operated in Maximum Service	69	71	107	115	120
Percent Spare Vehicles	6.8%	34.3%	10.8%	0.0%	7.0%

Figure 4-13 shows the variation in operating expenses and fare revenues over time. Although fare revenues decreased in 2018, a significant 50% increase is seen from 2018 to 2019; operating expenses remained almost the same.

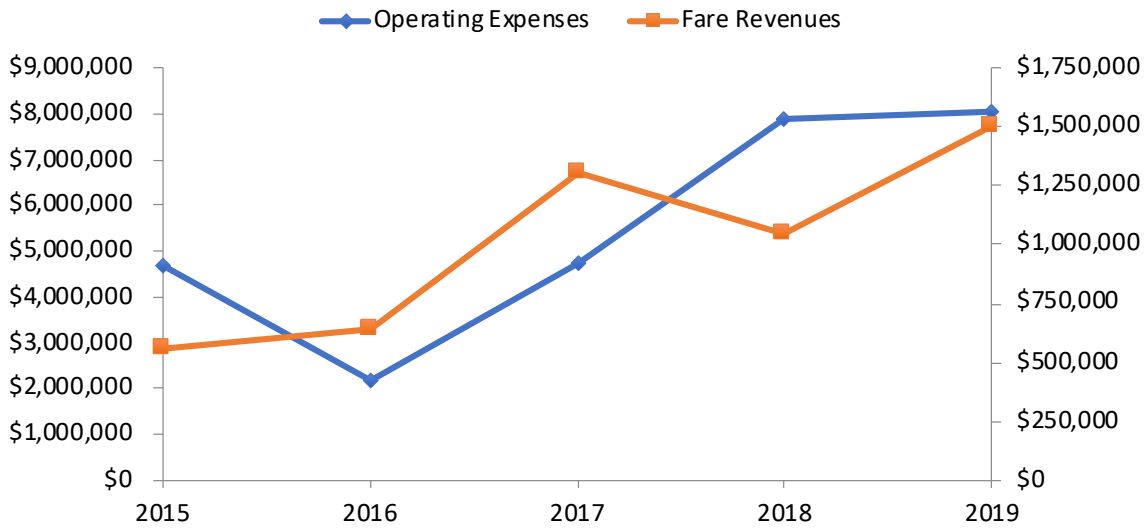


Figure 4-13 *Demand-Response Operation Characteristics*

Similar trends are observed in Figures 4-14, 4-15, and 4-16, which show operating expenses and fare revenues per passenger mile, per unlinked passenger trip, and per vehicle revenue mile.

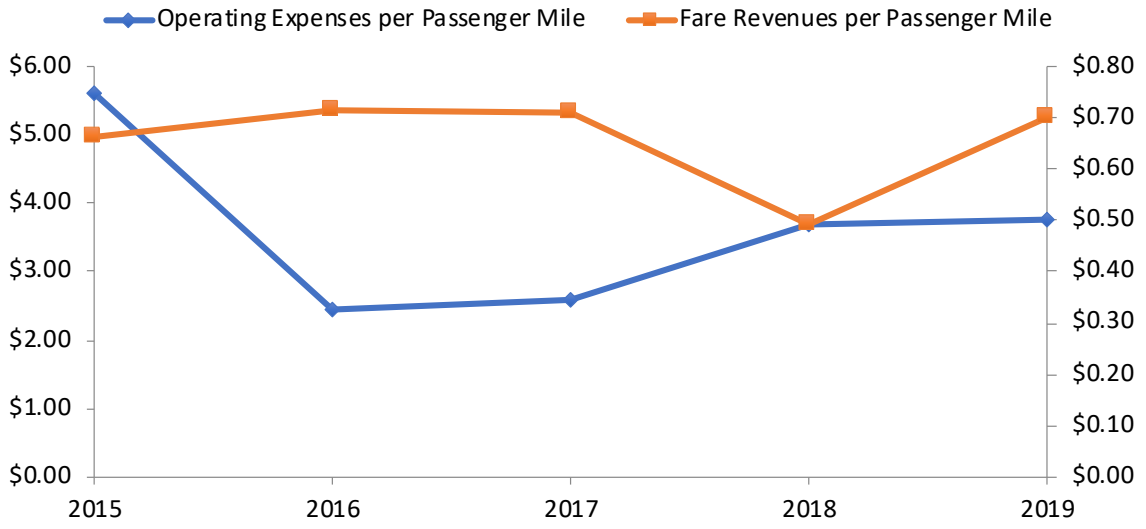


Figure 4-14 *Demand-Response Operation Characteristics per Passenger Mile*

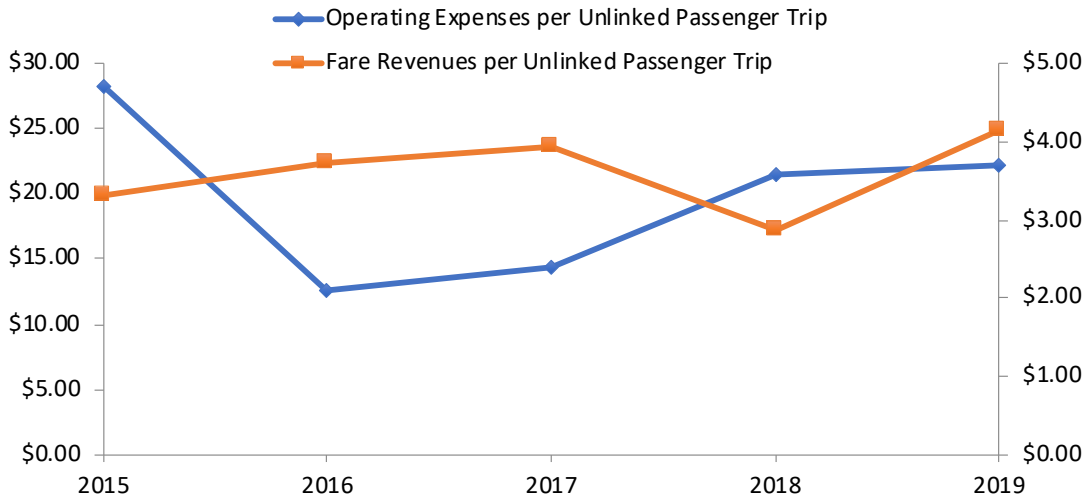


Figure 4-15 *Demand-Response Operation Characteristics per Unlinked Passenger Trip*

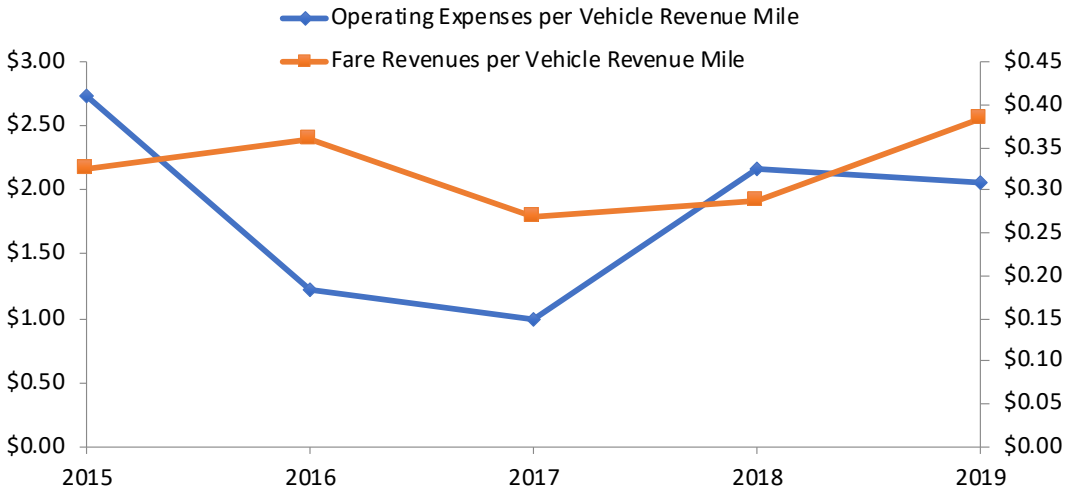


Figure 4-16 *Demand-Response Operation Characteristics per Vehicle Revenue Mile*

Although paratransit operating expenses remained relatively constant and fare revenues significantly increased from 2018 to 2019, this result cannot be singly attributed to PSTA MOD. It should be noted that ridership on MOD services at the time of the demonstration was small relative to overall ADA paratransit ridership within PSTA. As such, changes in costs as a result of the MOD project had limited impact on the broader costs faced by the agency leading up to and through the demonstration. Overall, the analysis finds Hypothesis 3 to be inconclusive.

Hypothesis 4: Wait times decline for users.

Performance Metric	Key Finding
Measured wait times, wait times reported in surveys (compare Before and After survey)	Around half of pilot participants experienced shorter wait times, and a minority perceived longer ones as due to the pilot.

The fourth hypothesis explored whether the new paratransit system reduced the wait times of its users. This hypothesis was evaluated using Before and After survey data about the perception of respondents of their wait times for paratransit. In addition, trip activity data were used to analyze the wait times experienced using PSTA MOD.

Figure 4-17 shows the average wait times reported while using PSTA DART services such as Care Ride. In the Before survey, wait time was defined as the time that passes between a scheduled pick-up time and when the vehicle actually departs from the pick-up location. Around 42% of 60 respondents reported wait times less than or equal to 5 minutes, and around 32% reported wait times greater than or equal to 15 minutes, leading to an average reported wait time of 10 minutes. About 13% of individuals did not have to wait, on average, which means that a vehicle arrived at or before their scheduled pick-up time. On the other hand, Figure 4-18 shows the average wait times reported while using PSTA MOD, where wait time is defined as the time that passes between a request for pick-up and when the vehicle actually departs from the pick-up location. Around 15% of 147 respondents reported wait times less than or equal to 5 minutes, and around 30% reported wait times greater than or equal to 15 minutes, leading to an average reported wait time of 11 minutes.

Looking at paired responses of 30 individuals, who reported their wait times before and after participating in the pilot, around 37% reported a decrease in their wait times; 53% reported an increase and 10% reported no change. The average wait time for these 30 individuals was 8 minutes for PSTA DART services and 11 minutes for PSTA MOD.

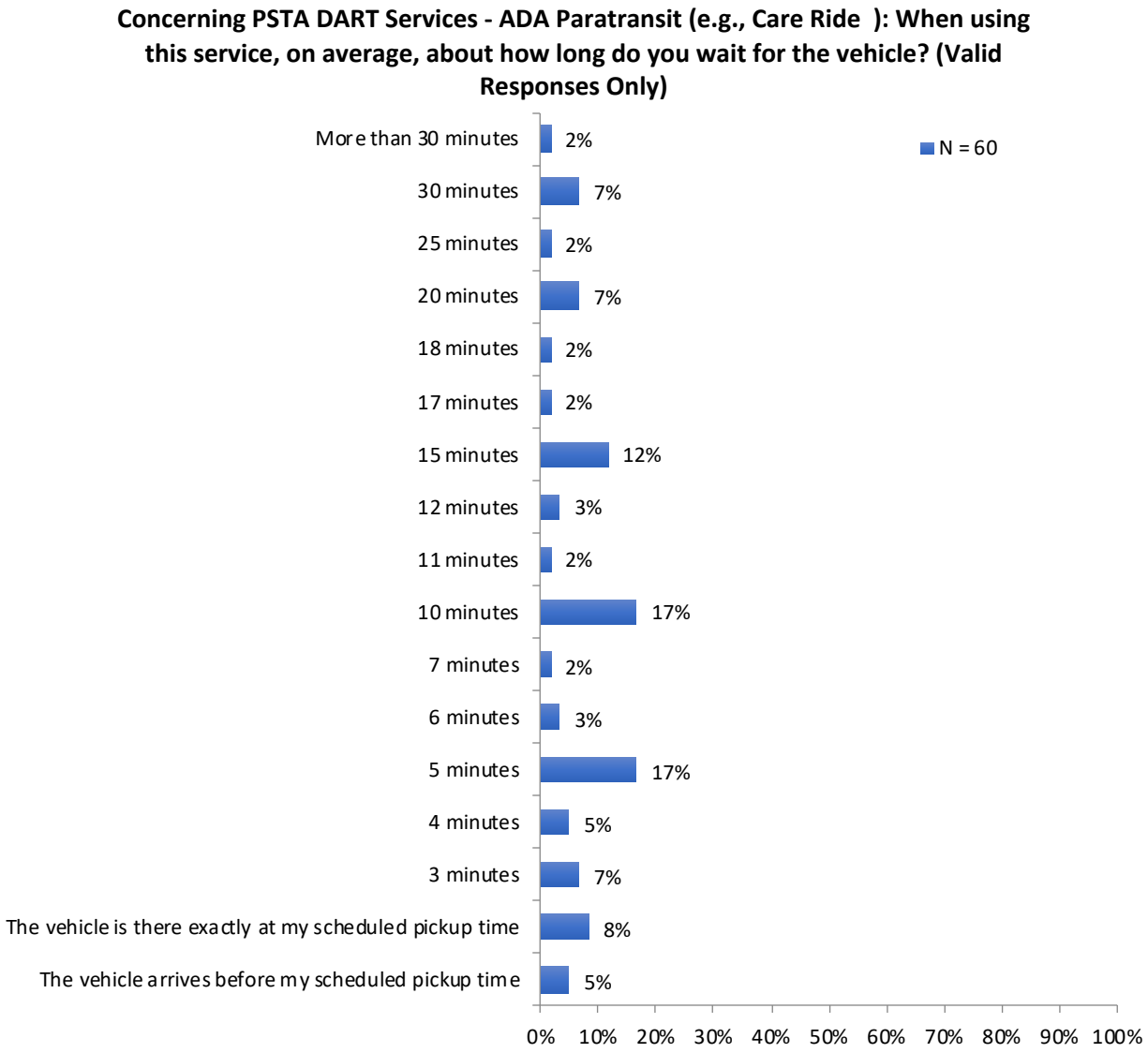
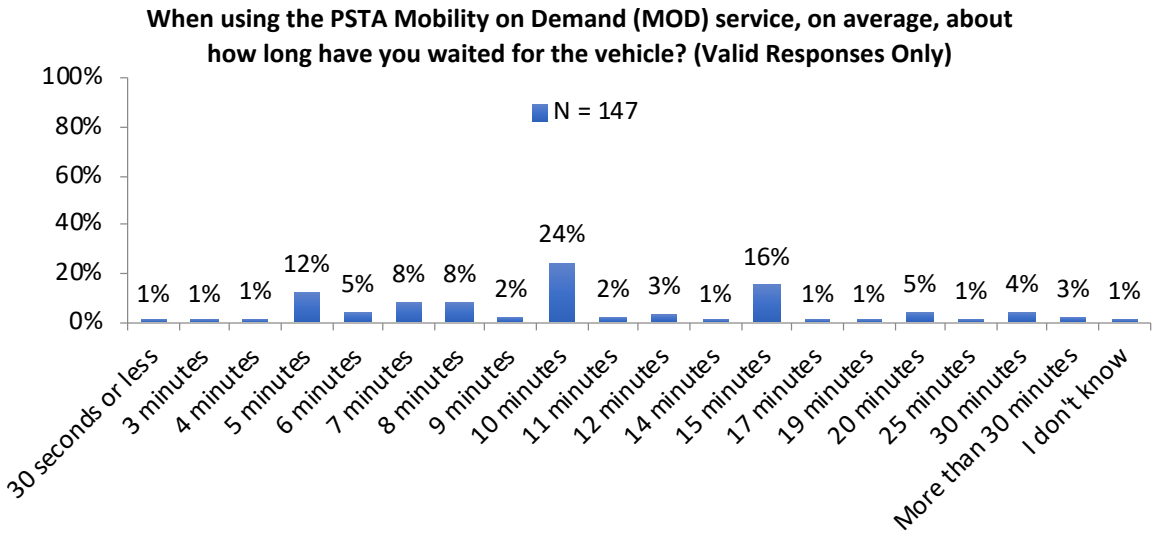


Figure 4-17 *Before Survey – Average Wait Times*



Note that data labels are rounded to the whole percent. Some data displayed with equal labels may differ by one or more tenths of a percent in actual value.

Figure 4-18 *After Survey – Average Wait Times*

For more accurate measures of wait times, a trip activity dataset was analyzed for PSTA MOD. The dataset covered approximately 15,000 trips from June 2019 to December 2019. The average wait time was 7 minutes, and 95% of the trips had a wait time less than 15 minutes, as shown in Figure 4-19.

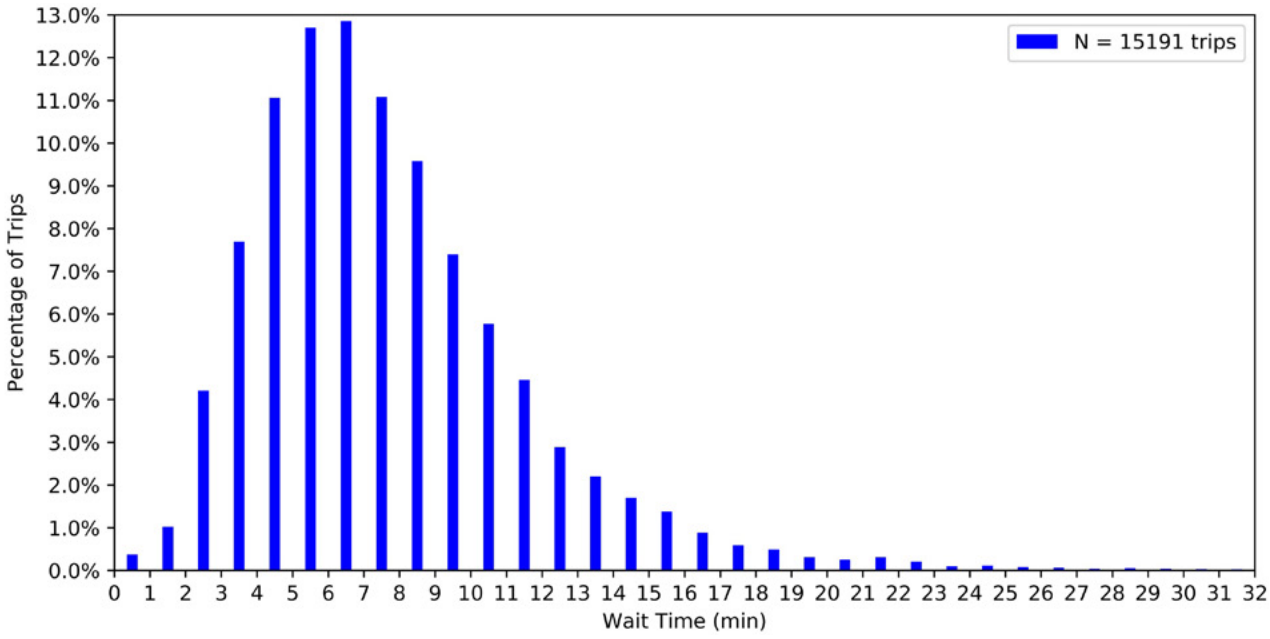


Figure 4-19 *PSTA MOD Activity Data – Trip Wait Times*

Overall, the analysis of reported wait times showed mixed results, which may be attributed to a difference in the operating services offered before and after the pilot—a scheduled service and an on-demand service, respectively. Wait times for an on-demand service such as PSTA MOD are subject to more variability related to the number of available drivers and the number of customers at a specific instant. Thus, a direct comparison between wait times reported in the Before and After surveys is not sufficient to determine the effect of the pilot on wait times.

From another perspective, wait times can be defined as the time that passes between a person's need to make a trip and the time that trip can be fulfilled. For PSTA MOD, a rider was able to request a trip at any time without having to schedule in advance. For PSTA DART reservation, instructions were as follows:

> You may call up to one (1) month before your scheduled trip to make a reservation, but no later than 5:00 p.m. the day before your trip. Telephone operators are available to take reservations between 8:00 a.m. and 5:00 p.m., Monday through Friday, and between 9:00 a.m. and 5:00 p.m. on weekends and holidays. In order to accommodate as many clients as possible, pick-up times will be negotiated up to one hour before or after the pick-up time requested by the client…. Recurring or Subscription Trips can be made for trips which have the same origin, destination, times and days of the week, and will permit you to travel without having to make a reservation each time you take these trips. Recurring trips must be pre-approved and confirmed on a monthly basis and are subject to the same rules as non-recurring trips.

This means that although recurring trips did not have to be pre-scheduled every time, they still needed to be pre-approved, adding a certain degree of planning/wait times to the process. Thus, PSTA MOD decreased the wait time of users from at least one day and offered a flexible on-demand service instead.

The Before survey asked respondents to rate their wait times while using PSTA DART services. Figure 4-20 shows that 72% of 106 respondents reported a rating of 7 (out of 10) or higher and 20% reported a rating less than or equal to 5, leading to an average rating of 8.

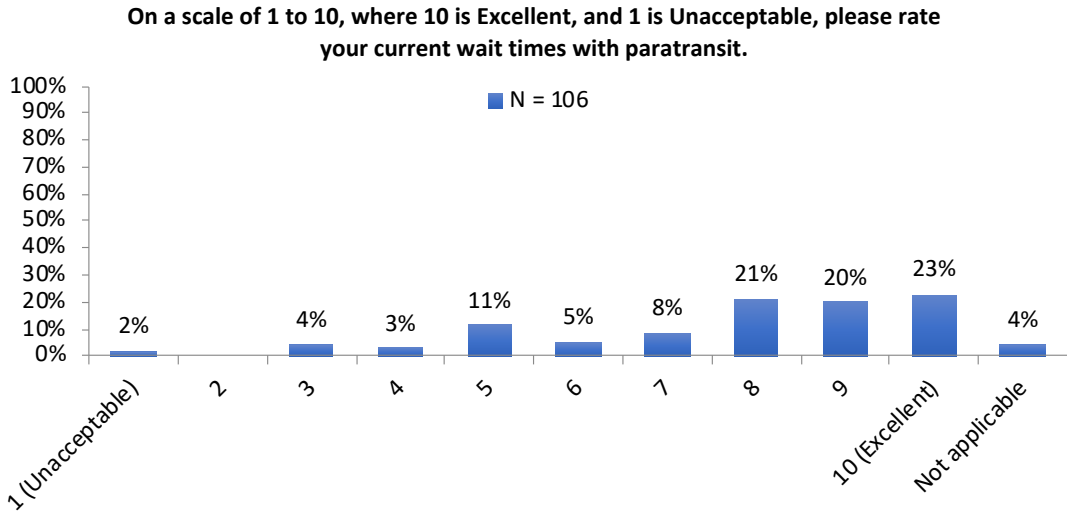


Figure 4-20 *Before Survey – Rating of Wait Times*

To evaluate the effect of the pilot on wait times, the After survey asked respondents to report how their wait times changed after using PSTA MOD. Figure 4-21 shows that 50% of 147 respondents perceived a decrease in their wait times as a result the pilot; 19% reported an increase and 16% reported no change.

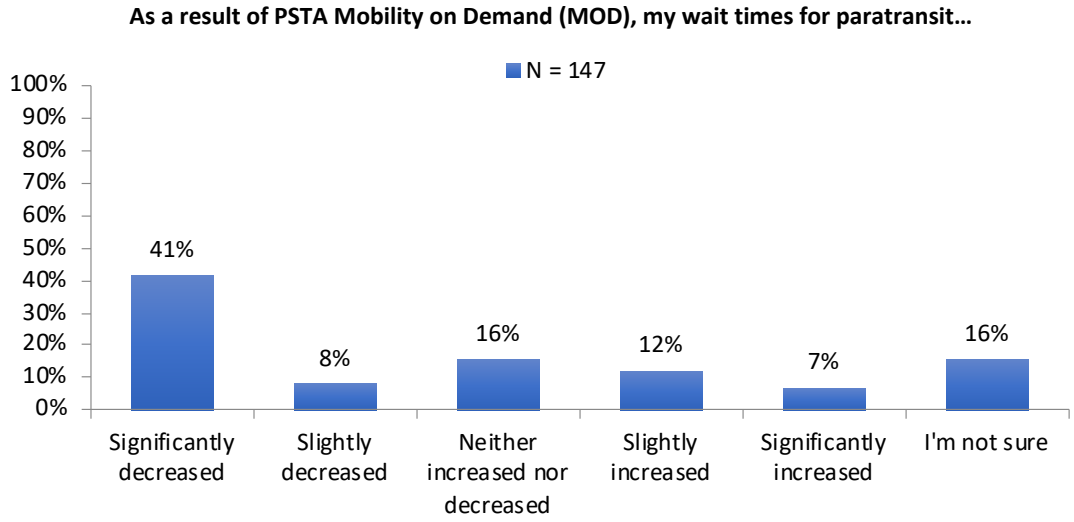


Figure 4-21 *After Survey – Effect of Pilot on Wait Times*

Figure 4-22 shows paired responses of 47 individuals for questions presented in Figures 4-20 and 4-21. Around 80% of 9 individuals who reported low ratings (<=5) for their wait times with paratransit before participating in the pilot experienced decreases in their wait times while using PSTA MOD, suggesting

that the pilot offered an improved paratransit service. Similarly, around 50% of 36 individuals who previously gave high ratings (>=7) experienced a better paratransit service and reduced wait times and around 20% perceived no change. However, around 20% of those individuals experienced longer wait times as a result of the pilot.

Overall, around half of pilot participants experienced shorter wait times while a minority perceived longer ones as a result of the pilot. Hypothesis 4 was found to be supported.

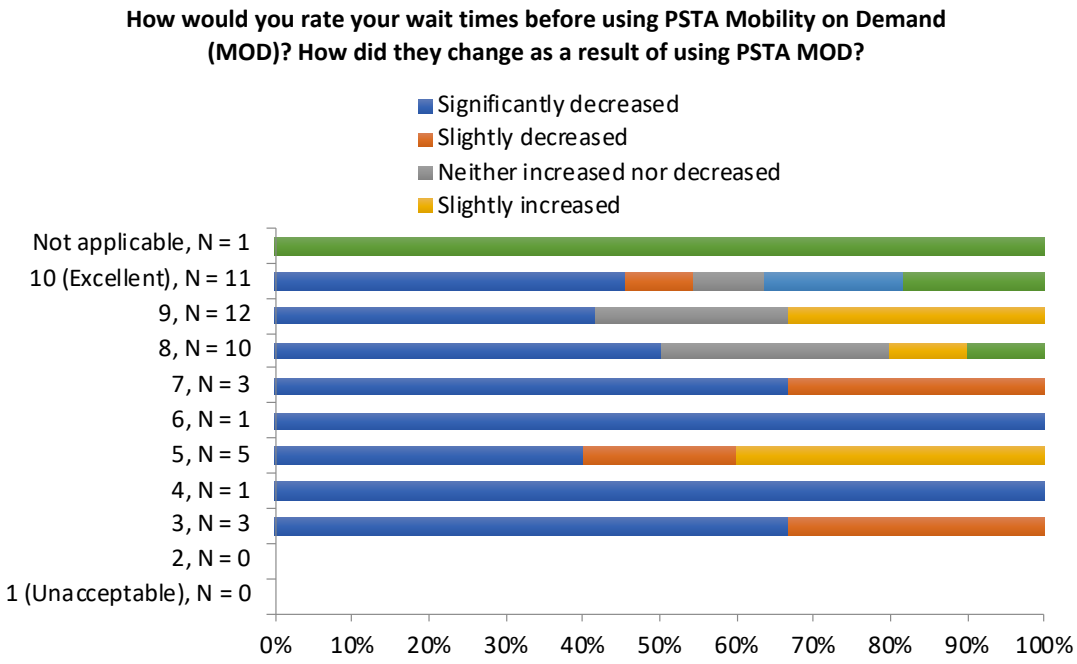


Figure 4-22 *Before/After Surveys – Perception of Wait Times – Paired Responses*

Hypothesis 5: The quality of life will be improved due to the new system.

Performance Metric	Key Finding
Ordinal scale response to quality-of-life questions (compare Before and After survey)	The PSTA MOD system notably enhanced the quality of life of 88% of 152 individuals.

The fifth hypothesis explored as part of the evaluation was whether the new paratransit system improved the quality of life of its users. This hypothesis was evaluated using Before and After survey data about the perception of respondents of their quality of life. The Before survey asked respondents to rate their quality of life. Figure 4-23 shows that 68% of 107 respondents reported a rating of 7 (out of 10) or higher and 23% reported a rating less than or equal to 5, leading to an average rating of 7.

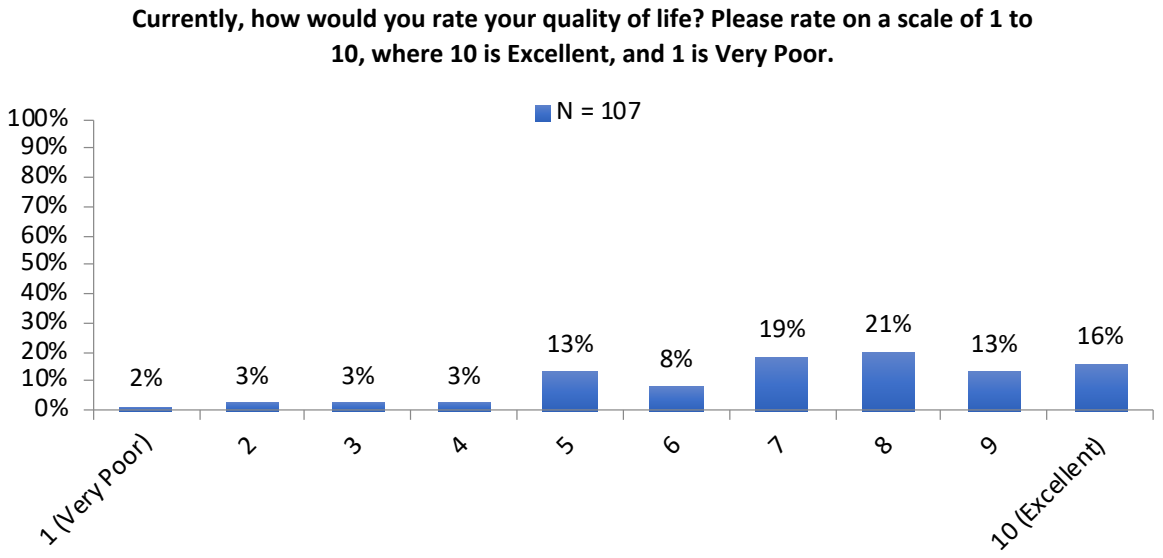


Figure 4-23 *Before Survey – Rating of Quality of Life*

To evaluate the effect of the pilot on quality of life, the After survey asked respondents to report how their quality of life changed after using PSTA MOD. Figure 4-24 shows that 88% of 152 respondents perceived an increase in their quality of life as a result the pilot.

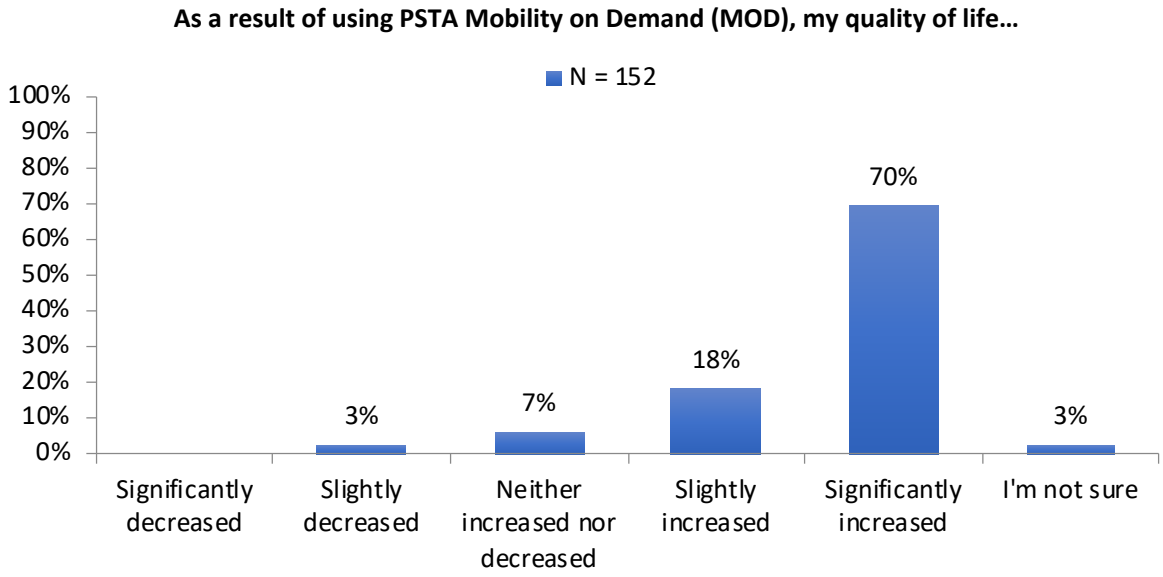


Figure 4-24 *After Survey – Effect of Pilot on Quality of Life*

Figure 4-25 shows paired responses of 48 individuals for questions presented in Figures 4-23 and 4-24. Logically, significant increases in quality of life were reported by individuals who rated their quality of life to be less than or equal

to 5 before using PSTA MOD; slight increases were reported more often by individuals who previously gave moderate ratings of 6 and 7. However, a majority of individuals who previously reported high ratings of 8, 9, and 10 perceived significant increases in their quality of life as a result of using PSTA MOD. This suggests that the pilot might have exceeded their initial expectations and enhanced their quality of life from multiple aspects explored in other hypotheses.

Overall, survey results show that the PSTA MOD system significantly enhanced the quality of life of 88% of 152 individuals. Hypothesis 5 was found to be supported.

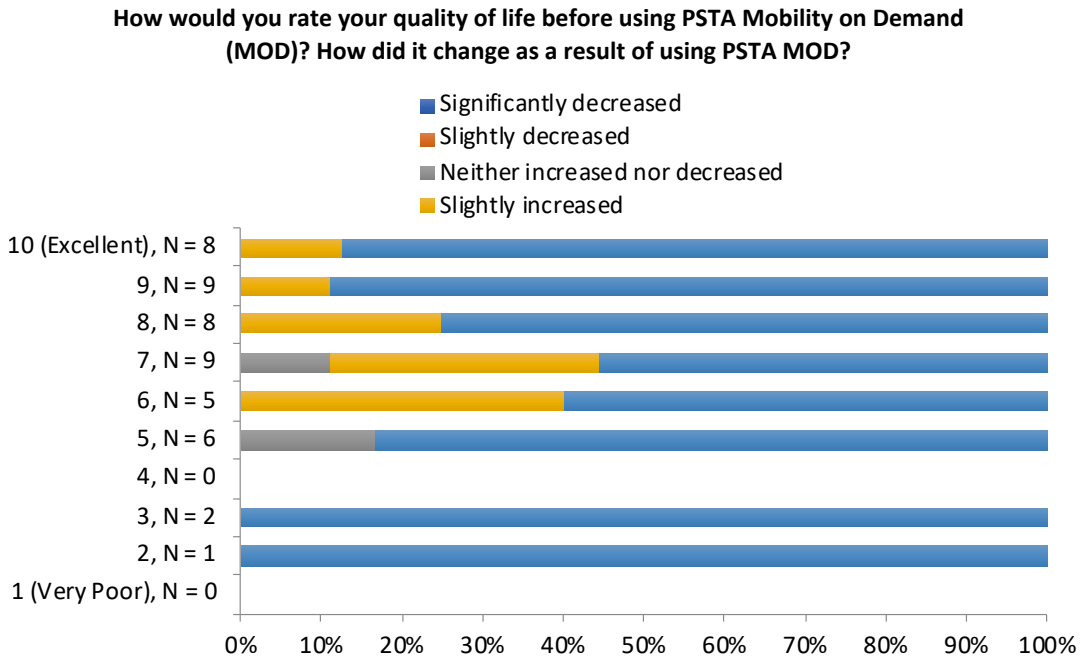


Figure 4-25 *Before/After Surveys – Perception of Quality of Life – Paired Responses*

Hypothesis 6: Travel times decline or do not change.

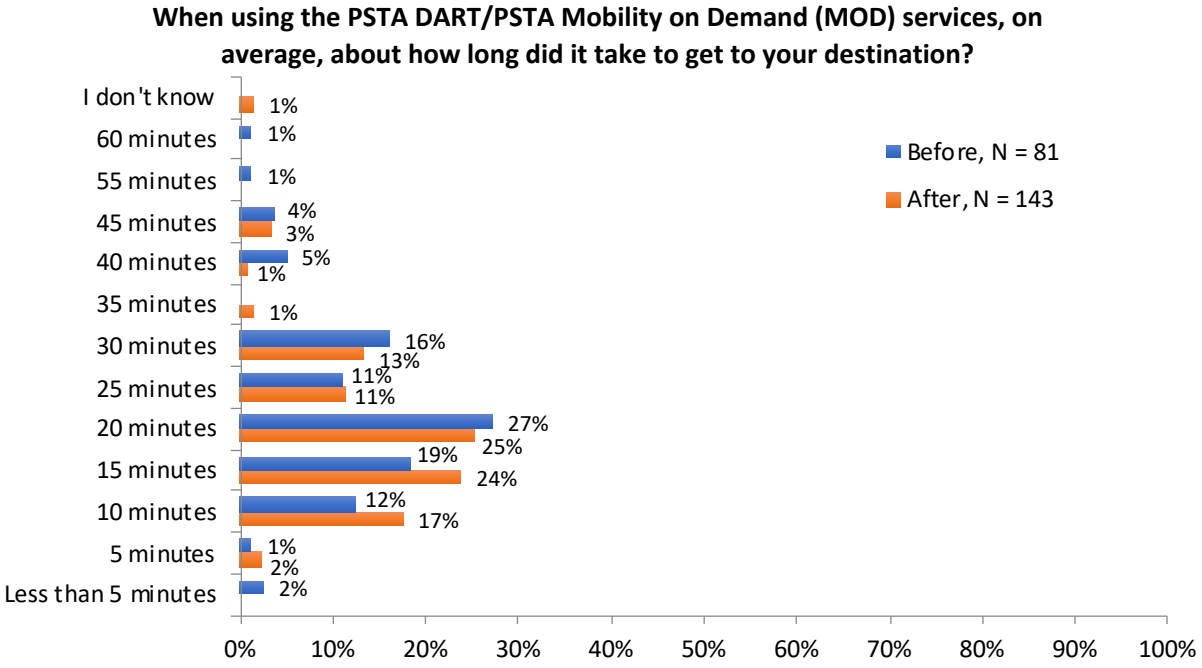
Performance Metric	Key Finding
Measured travel times	Around 60% of 152 pilot participants experienced a decline or no change in their travel times. Paired survey data showed a two-minute decrease in the average travel time as a result of using PSTA MOD.

The sixth hypothesis explored as part of the evaluation was whether the new paratransit system decreased the travel times of its users. This hypothesis was evaluated using Before and After survey data about the perception of

respondents of their travel times for paratransit. In addition, trip activity data were used to analyze travel times using PSTA MOD.

Figure 4-26 shows the average travel times reported before and after participating in the pilot while using PSTA DART services and PSTA MOD. Comparing both distributions, there is an evident shift to shorter travel times while using PSTA MOD. The average reported travel time by 81 individuals for PSTA DART services was 22 minutes and that reported by 143 individuals for PSTA MOD was lower, at 20 minutes.

Looking at paired responses of 35 individuals who reported their travel times before and after participating in the pilot, around 47% reported a decrease in their travel times, 29% reported an increase, and 24% reported no change. The average travel time for these 35 individuals was 23 minutes for PSTA DART services and 21 minutes for PSTA MOD.



Note that data labels are rounded to the whole percent. Some data displayed with equal labels may differ by one or more tenths of a percent in actual value.

Figure 4-26 *Before/After Surveys – Average Travel Times*

For more accurate measures of travel times, a trip activity dataset was analyzed for PSTA MOD. The dataset covered approximately 19,000 trips from June 2019 to December 2019 by around 745 users. The average travel time was 16 minutes, and 95% of the trips took less than 35 minutes, as shown in Figure 4-27.

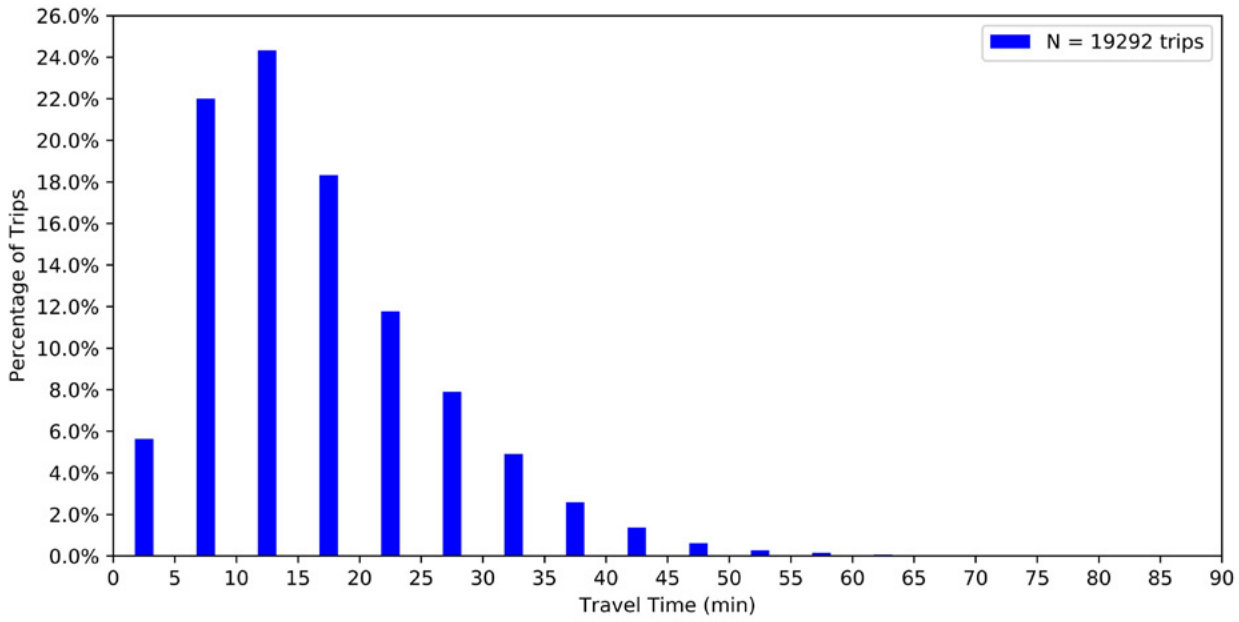


Figure 4-27 *PSTA MOD Activity Data – Trip Travel Times*

The Before survey asked respondents to rate their travel times while using para-transit. Figure 4-28 shows that 83% of 98 respondents reported a rating of 7 (out of 10) or higher and only 9% reported a rating less than or equal to 5, leading to an average rating of 8.

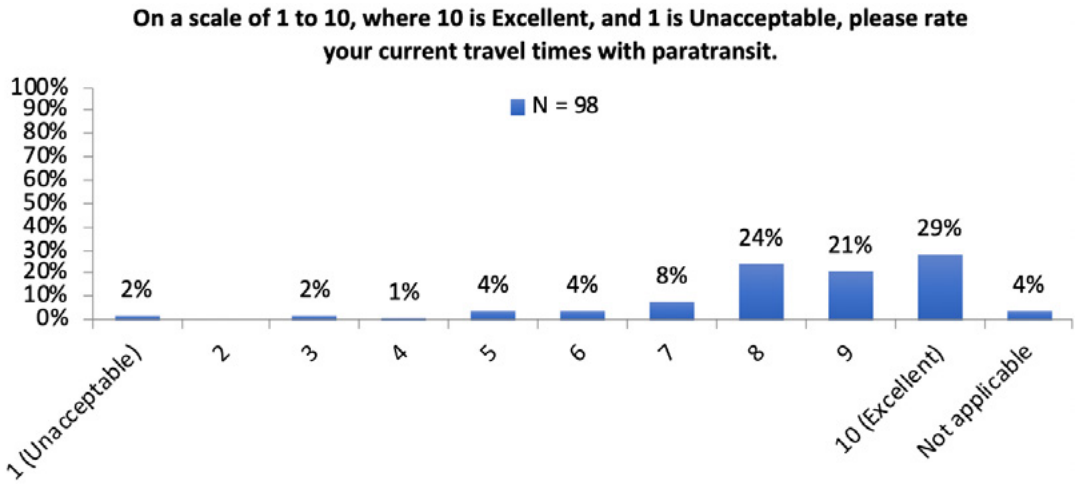
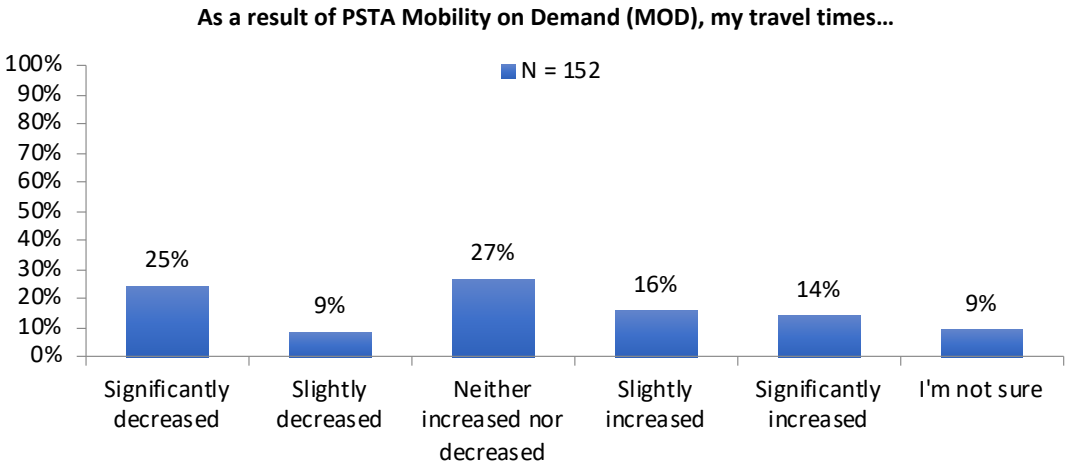


Figure 4-28 *Before Survey – Rating of Travel Times*

To evaluate the effect of the pilot on travel times, the After survey asked respondents to report how their travel times changed after using PSTA MOD. Figure 4-29 shows that 34% of 152 respondents perceived a decrease in their

travel times as a result the pilot; 30% reported an increase and 27% reported no change.



Note that data labels are rounded to the whole percent. Some data displayed with equal labels may differ by one or more tenths of a percent in actual value.

Figure 4-29 *After Survey – Effect of Pilot on Travel Times*

Figure 4-30 shows paired responses of 38 individuals for questions presented in Figures 4-28 and 4-29. The sample size of paired responses for individuals who reported low ratings (<=5) for their travel times with paratransit is not large enough to make reliable inferences. However, around 45% of 33 individuals who previously gave high ratings (>=7) experienced reduced travel times, and around 33% perceived no change as a result of using PSTA MOD. However, around 21% of those individuals experienced longer travel times as a result of the pilot.

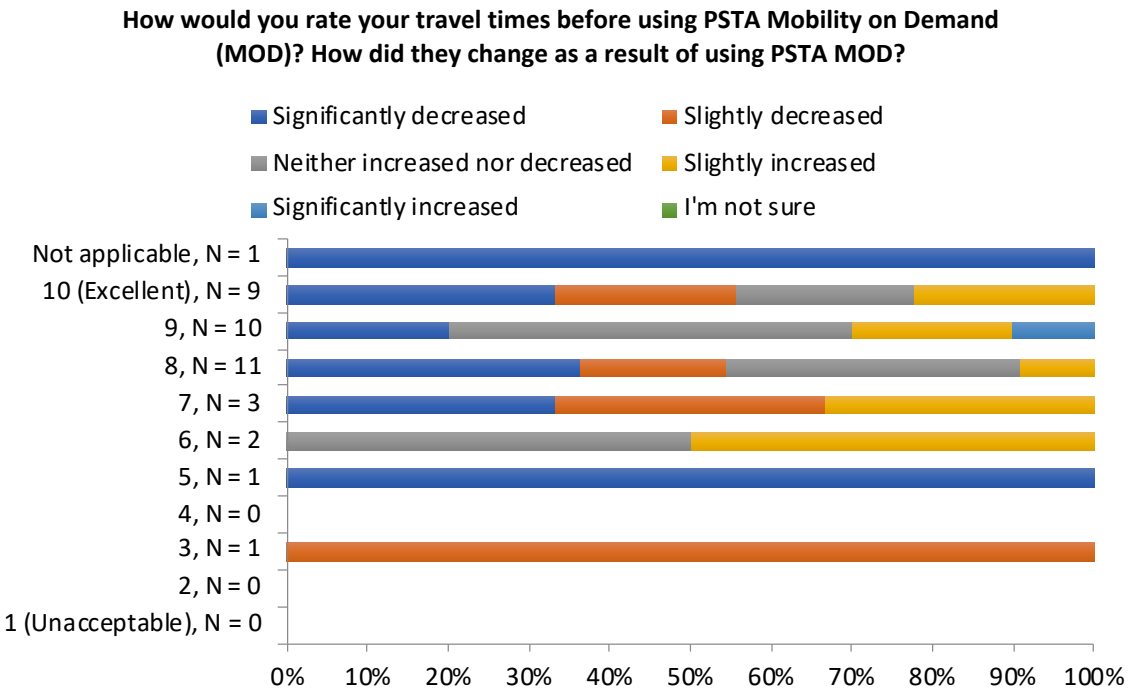


Figure 4-30 *Before/After Surveys – Perception of Travel Times – Paired Responses*

Overall, around 60% of 152 pilot participants experienced a decline or no change in their travel times, and paired survey data showed a two-minute decrease in the average travel time as a result of using PSTA MOD. Hypothesis 6 was found to be supported.

Hypothesis 7: E-wallet payments for paratransit improve the ease of paying for paratransit.

Performance Metric	Key Finding
Ordinal scale response to ease of payment questions (compare Before and After survey), payment collected via E-wallet and cash over time	Around 80% of 152 pilot participants experienced an easier payment process as a result of e-wallet payments for PSTA MOD. Trip activity data also showed an increase in the number of users and trips per month, which suggests that the system provided a user-friendly payment process.

The seventh hypothesis explored as part of the evaluation was whether the new paratransit system improved the ease of paying for paratransit. This hypothesis was evaluated using Before and After survey data about the perception of respondents of the payment process for paratransit. In addition, trip activity data were used to analyze user activity using PSTA MOD.

The Before survey asked respondents to rate the processes of scheduling trips and paying for paratransit using PSTA DART services such as Care Ride. Figure 4-31 shows that 78% of 77 respondents reported a rating of 7 (out of 10) or higher for the process of paying for Care Ride and 16% reported a rating less than or equal to 5, leading to an average rating of 8. Similarly, 73% of 88 respondents reported a rating of 7 (out of 10) or higher for the process of scheduling trips with Care Ride and 20% reported a rating less than or equal to 5, leading to an average rating of 8.

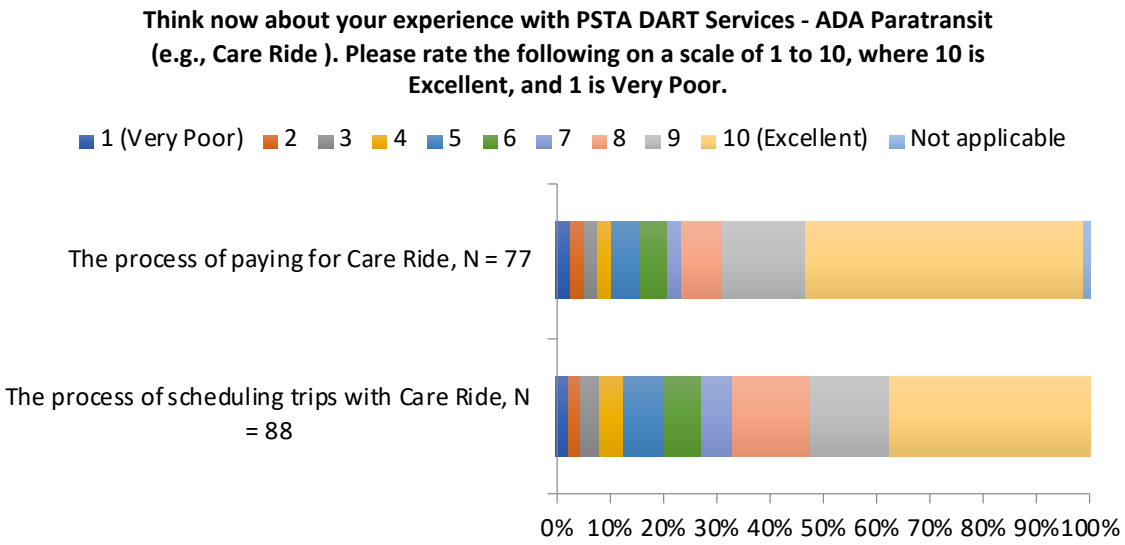


Figure 4-31 *Before Survey – Ratings of Payment and Scheduling Processes*

To evaluate the effect of the pilot on the ease of paying for paratransit, the After survey asked respondents to report how their process of paying for paratransit services changed after using PSTA MOD. Figure 4-32 shows that as a result of using PSTA MOD, 80% of 152 respondents experienced an easier payment process; only 2% experienced a more difficult one and 13% perceived no change.

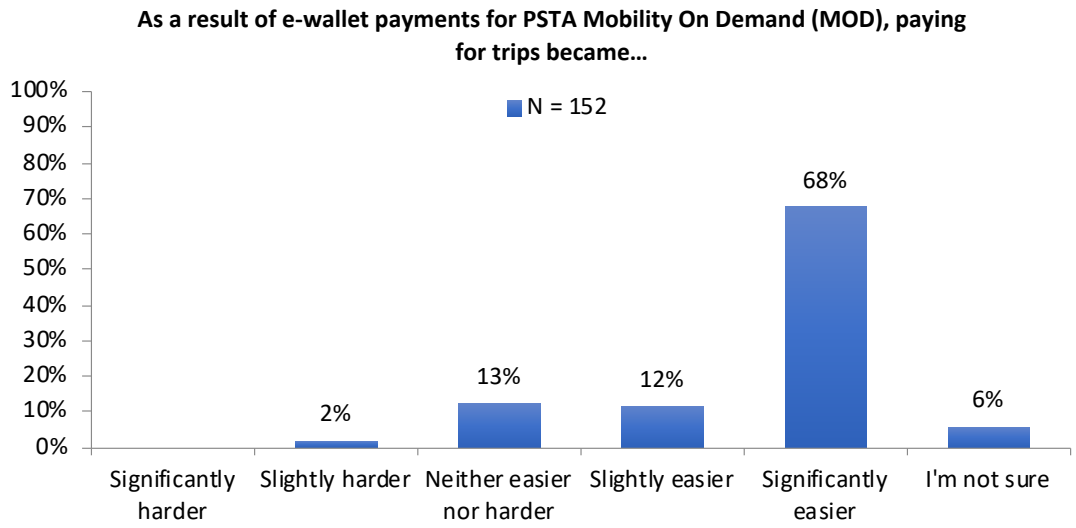


Figure 4-32 *After Survey – Effect of Pilot on Payment Process*

Figure 4-33 shows paired responses of 34 individuals for questions presented in Figures 4-31 and 4-32. All 6 individuals who previously gave low ratings (<=5) experienced an easier payment process as a result of using PSTA MOD. Similarly, around 85% of 26 individuals who previously gave high ratings (>=7) experienced an easier payment process, and 15% perceived no change as a result of using PSTA MOD.

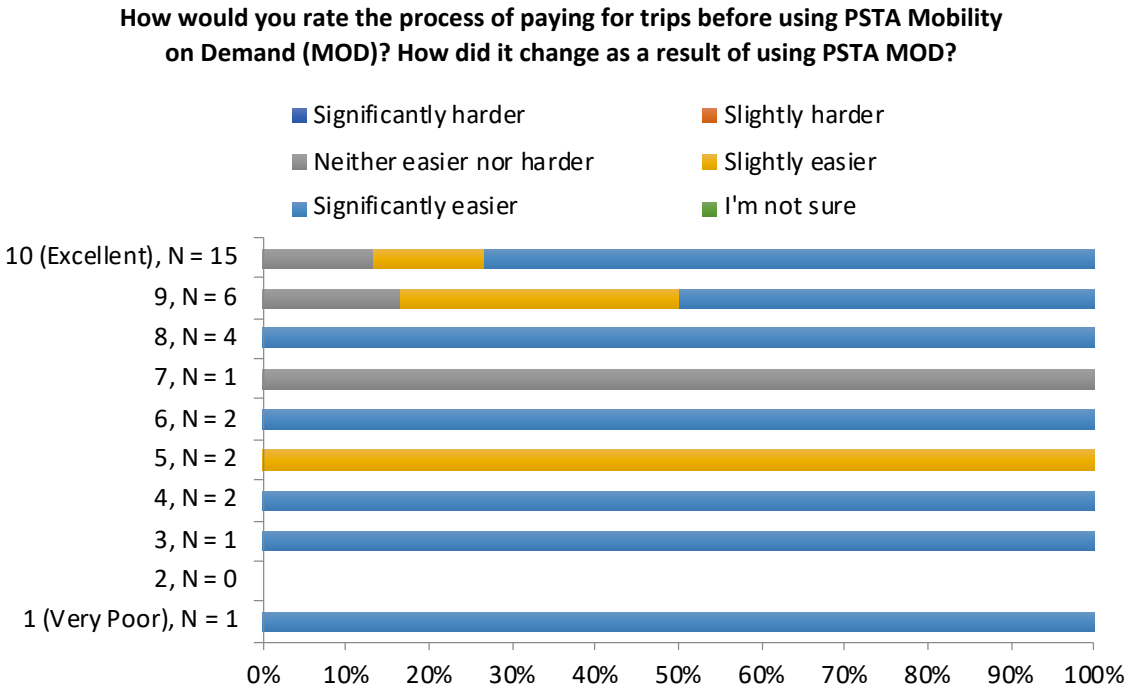


Figure 4-33 *Before/After Surveys – Perception of Payment Process – Paired Responses*

From a trip activity data perspective, Hypothesis 1 previously confirmed that both the number of users and the number of trips continuously increased over the pilot duration. The analysis also showed an increase in the average number of trips per individual per month, which shows that, with time, users of the system were becoming high-frequency users. This suggests that the PSTA MOD system facilitated this increase by providing a user-friendly scheduling and payment process.

Overall, around 80% of 152 pilot participants experienced an easier payment process as a result of e wallet payments for PSTA MOD. Trip activity data also showed an increase in the number of users and trips per month, which suggests that the system provided a user-friendly payment process. Hypothesis 7 was found to be supported.

Hypothesis 8: The spatial diversity of locations to which users travel increases.

Performance Metric	Key Finding
Spatial distribution of destinations traveled by users	Trip activity data showed that PSTA MOD constantly served diverse locations, and the average trip distance increased by around 10% over the pilot duration. Survey data confirmed that around 62% of 153 pilot participants experienced an increase in their traveled distances.

The eighth hypothesis explored as part of the evaluation was whether the new paratransit system increased the spatial diversity of locations to which users travel. This hypothesis was evaluated using After survey data about the perception of respondents of their traveled distances. In addition, trip activity data were used to analyze the spatial distribution of trips using PSTA MOD.

The trip activity dataset covered approximately 19,000 trips from June to December 2019 by around 745 users. Figure 4-34 shows the spatial distribution of origin locations for trips using PSTA MOD. All trips originated from Pinellas County except for a few that originated from Hillsborough County. Figure 4-35 shows the spatial distribution of destination locations where a similar observation can be made with slightly more trips ending in Pasco County and Hillsborough County.

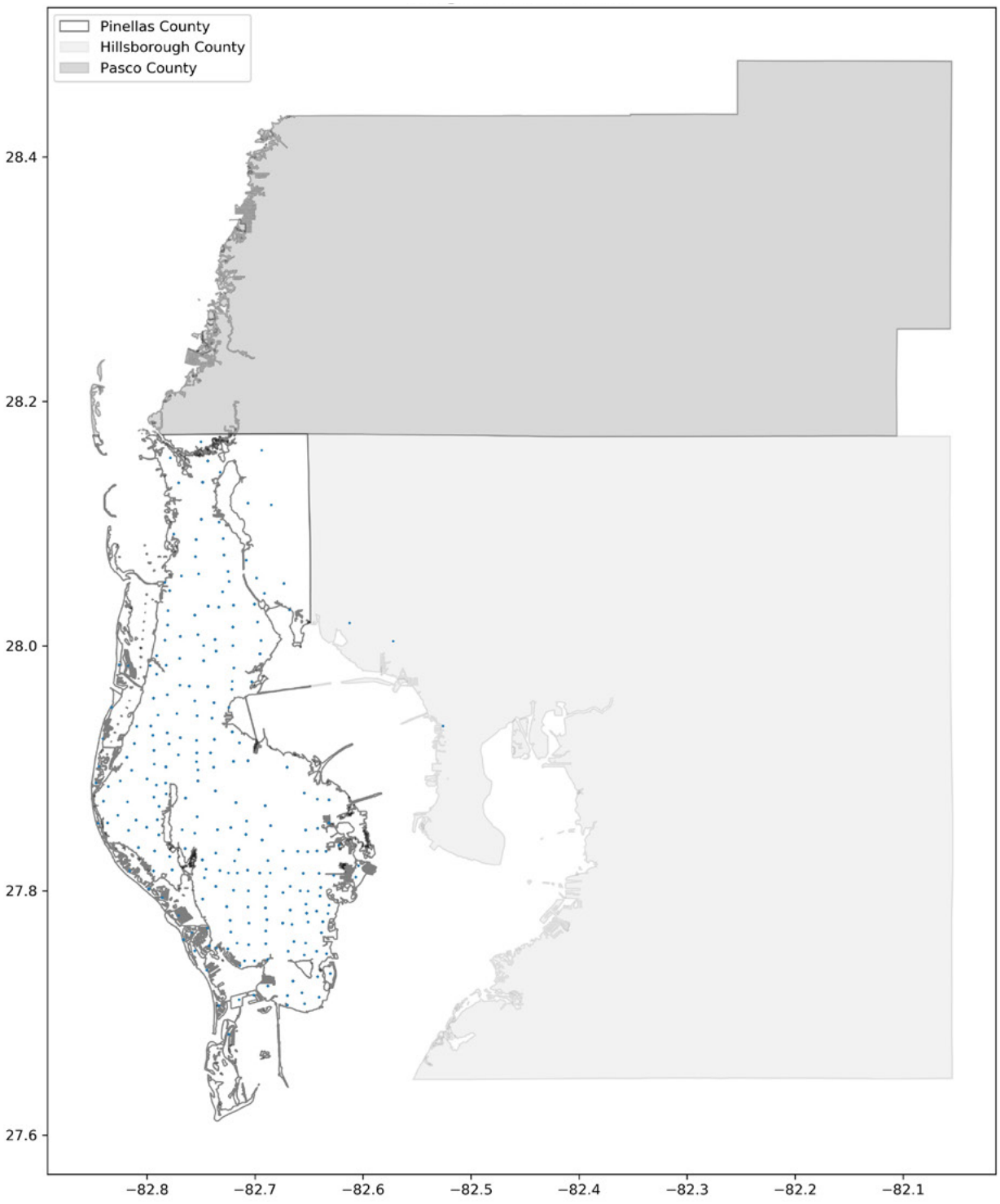


Figure 4-34 *PSTA MOD Activity Data – Trip Origin Distribution*

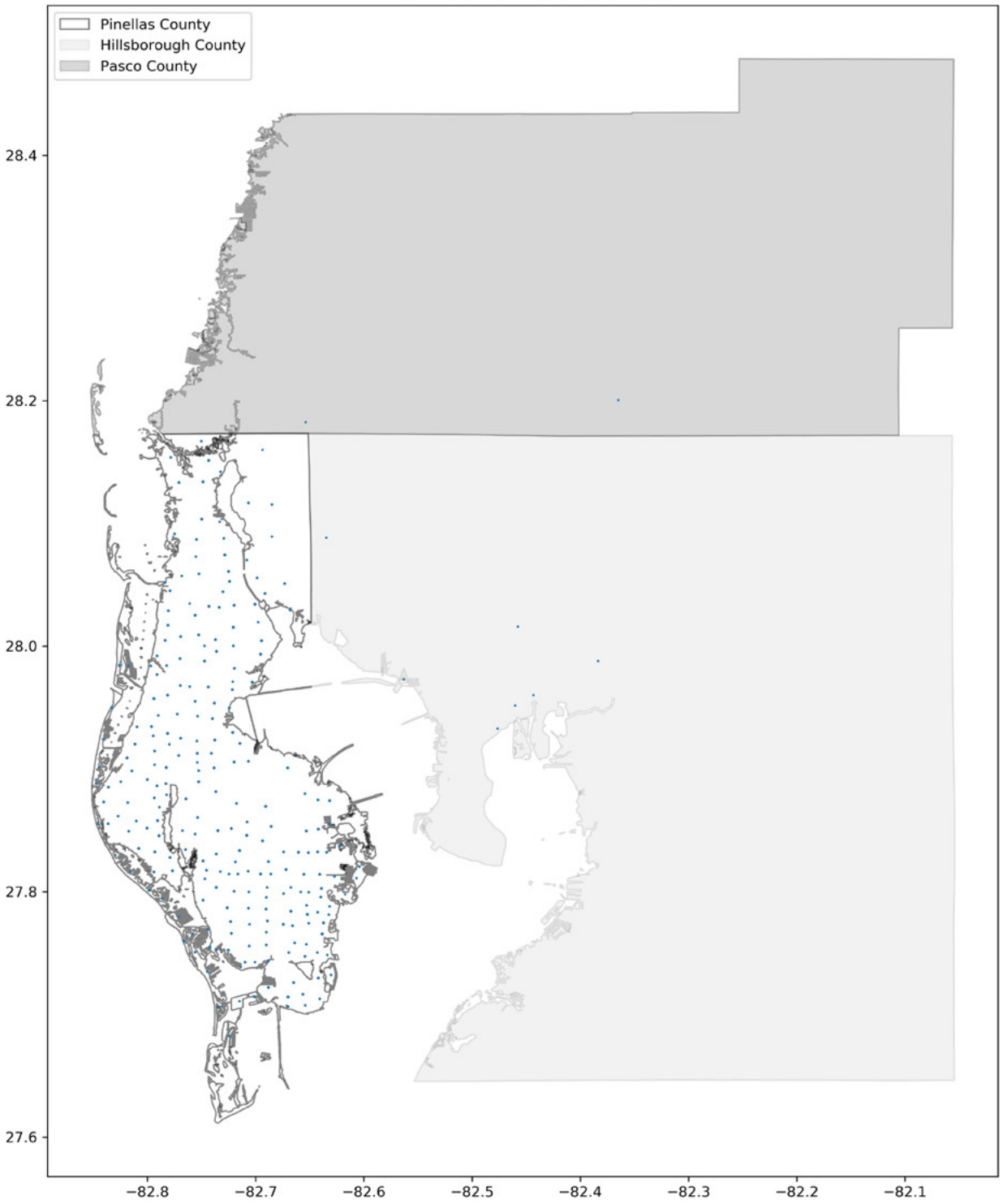


Figure 4-35 *PSTA MOD Activity Data – Trip Destination Distribution*

To analyze the spatial diversity of trip destinations, the coordinates of destination locations were used to compute different spatial statistics shown in Table 4-5.

Table 4-5 *PSTA MOD Activity Data – Trip Destinations Spatial Statistics*

Month (2019)	Number of Trips	Average Trip Duration (min)	Average Trip Euclidean Distance (mi)	Average Distance from Local Centroid (mi)	Distance between Consecutive Local Centroids (mi)	Average Distance from Global Centroid (mi)
June	1,447	16	4.3	7.1	N/A	7.1
July	2,150	15	4.2	7.0	0.3	7.0
August	2,592	16	4.3	7.0	0.2	7.0
September	2,789	16	4.5	7.2	0.1	7.2
October	3,354	16	4.5	7.2	0.1	7.2
November	3,443	16	4.6	7.2	0.4	7.2
December	3,517	17	4.7	7.2	0.1	7.2

The centroid of all 19,292 trips, defined as the global centroid, was used to calculate the average distance between that point and all trip destinations, which was 7.1 miles. Then, the average distance between the global centroid and destination locations was calculated on a monthly basis, which was almost constant, at around 7 miles over the course of the evaluation. This shows that there was little skewness in distribution of distances traveled from month to month, and as this monthly average distance was approximately equal to the global average distance, the destinations were already spread across Pinellas County from the first month and remained rather equally spread over the duration of the pilot.

Similarly, another metric was calculated but at a local level. The centroid of trips aggregated on a monthly level, defined as the local centroid, was used to calculate the monthly average distance between that point and all trip destinations in the same month. Also, the distance between every month's local centroid and that of the preceding month was calculated and shows that the local centroid was almost constant over the pilot period. Combining these statistics with the previously calculated statistics using the global centroid confirms the result that the spatial variability of destination locations did not change significantly over the pilot duration. However, results also show that PSTA MOD served a widely varied set of destinations from the beginning of its launch and continued to do so from June to December 2019.

To evaluate the effect of the pilot on the spatial variability of trip destinations, the After survey asked respondents to report how their traveled distances changed after using PSTA MOD. Figure 4-36 shows that 62% of 153 respondents perceived an increase in their traveled distances as a result the pilot; only 2%

reported a decrease and 34% reported no change. This can be also seen in Table 4-5, which shows that the average trip Euclidean distance increased by around 10% from 4.3 miles to 4.7 miles over the pilot duration.

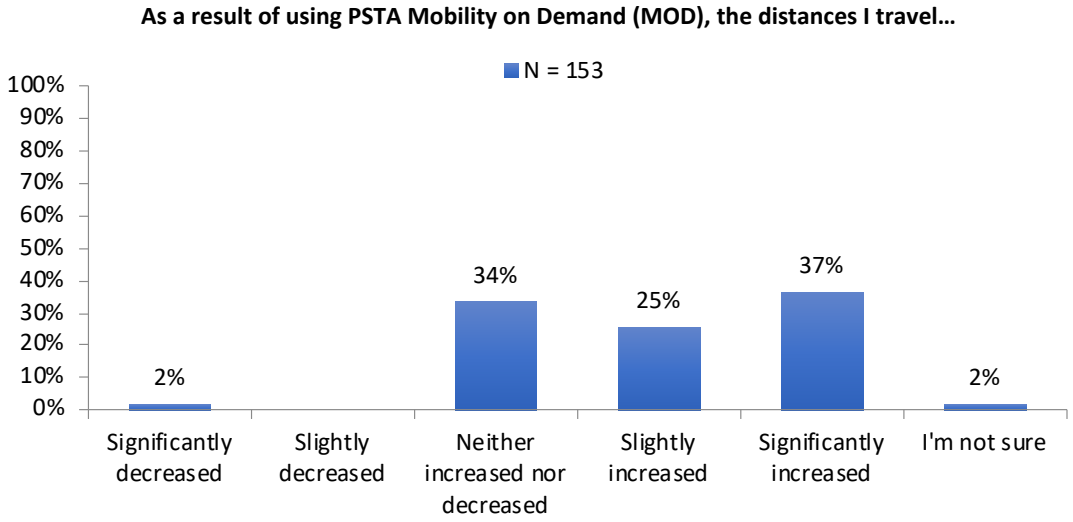


Figure 4-36 *After Survey – Effect of Pilot on Traveled Distances*

Overall, trip activity data showed that PSTA MOD consistently served diverse locations, and the average trip distance increased by around 10% over the pilot duration. Survey data confirmed the latter result and showed that around 62% of 153 pilot participants experienced an increase in their traveled distances. Hypothesis 8 was found to be supported.

Hypothesis 9: The accessibility and mobility of persons using wheelchairs improves.

Performance Metric	Key Finding
Ordinal scale response to accessibility and mobility questions among persons using wheelchairs (compare Before and After survey)	The PSTA MOD system significantly improved the mobility and accessibility of 63% of 16 wheelchair users.

The ninth hypothesis explored whether the new paratransit system improved the accessibility and mobility of its wheelchair users. This hypothesis was evaluated using Before survey data about the perception of respondents of their accessibility and mobility. The project offered a number of pathways to improve mobility for persons using wheelchairs; most notably, it enabled wheelchair passengers to be able to schedule demand-responsive travel through the Goin app for multiple providers. Such travel had to be scheduled by phone prior to the project. The results presented here evaluate whether and how this and other innovation impacted persons using wheelchairs.

The Before survey asked respondents to rate their general mobility and ability to access locations within Pinellas County using PSTA services. Figure 4-37 shows that 80% of 108 respondents reported a rating of 7 (out of 10) or higher for their ability to access locations within Pinellas County, and 16% reported a rating less than or equal to 5, leading to an average rating of 8. Similarly, the ability to access locations using PSTA services received an average rating of 8.5, with 76% of 93 respondents reporting a rating of 7 or higher and only 9% reporting a rating less than or equal to 5. Mobility within Pinellas County also received an average rating of 8, with 77% of 86 respondents rating it as 7 or higher and 17% rating it as 5 or lower.

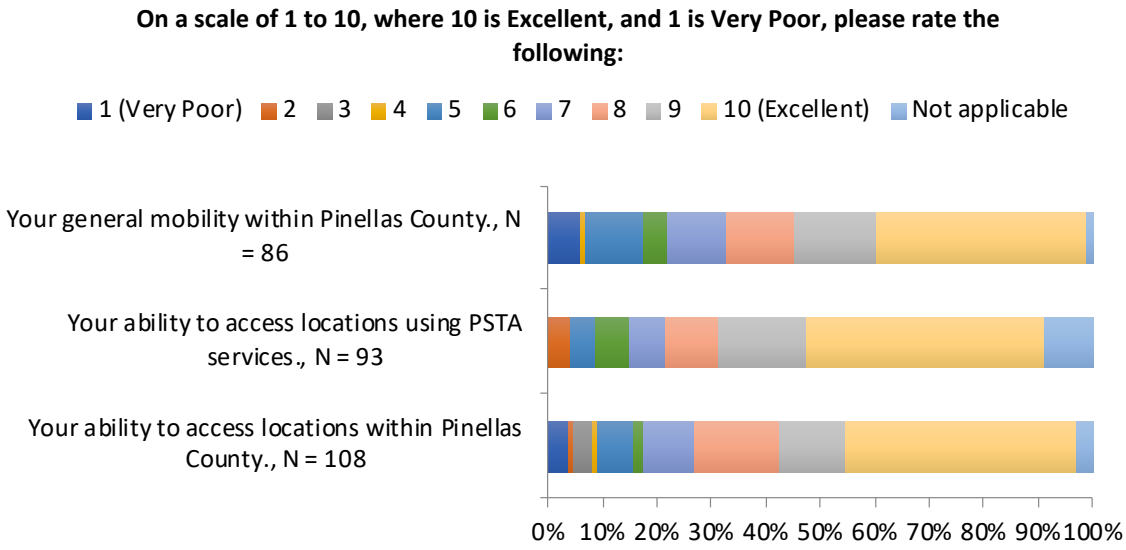


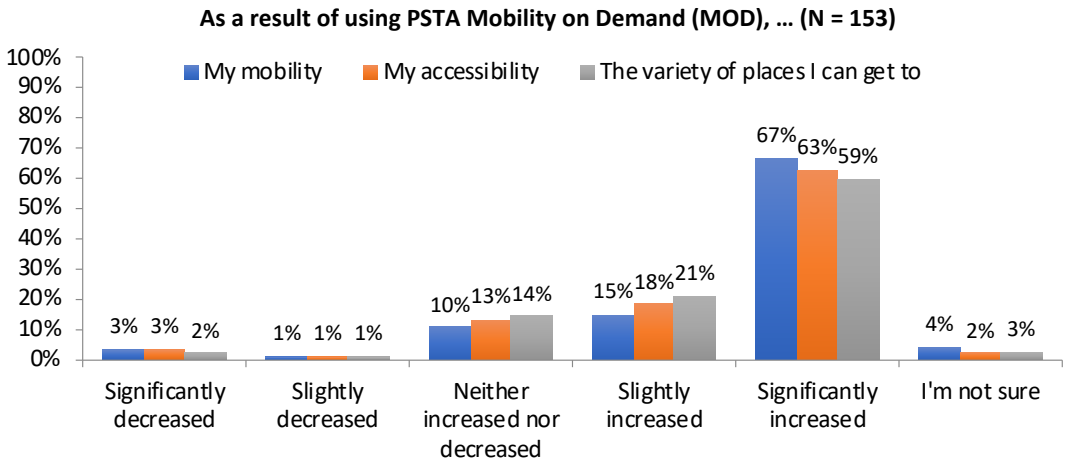
Figure 4-37 *Before Survey – Ratings of Mobility, Accessibility, and Accessible Locations – All Individuals*

To compare the responses of wheelchair users to non-users, Table 4-6 shows the average rating, the proportion of ratings greater than or equal to 7, and the proportion of ratings less than or equal to 5 for general mobility and ability to access locations within Pinellas County using PSTA services. A two-sample proportion test was conducted to compare each metric between wheelchair users and non-users, but all results were insignificant. However, results show that the average rating of accessibility within Pinellas County was slightly less for wheelchair users (8) compared to non-users (8.5).

Table 4-6 *Before Survey – Ratings of Mobility, Accessibility, and Accessible Locations – Wheelchair Users vs. Non-Users*

	Wheelchair Users				Wheelchair Non-Users			
	N	Rating			N	Rating		
		Average	>=7	<=5		Average	>=7	<=5
Your ability to access locations within Pinellas County	18	8	78%	22%	81	8.5	84%	14%
Your ability to access locations using PSTA services	13	8.5	85%	8%	67	8.5	82%	10%
Your general mobility within Pinellas County	12	8	83%	17%	68	8	76%	19%

To evaluate the effect of the pilot on quality of life, the After survey asked respondents to report how their general mobility and ability to access locations within Pinellas County using PSTA services changed after using PSTA MOD. Figure 4-38 shows that as a result of using PSTA MOD, 82%, 81%, and 80% of 153 respondents perceived an increase in their mobility, accessibility, and access to a variety of places, respectively.



Note that data labels are rounded to the whole percent. Some data displayed with equal labels may differ by one or more tenths of a percent in actual value.

Figure 4-38 *After Survey – Effect of Pilot on Mobility, Accessibility, and Accessible Locations – All Individuals*

To compare the responses of wheelchair users to those of non-users, Table 4-7 shows the proportions of individuals perceiving an increase and a decrease in their general mobility and ability to access locations within Pinellas County using PSTA services. A two-sample proportion test was conducted at a 95% confidence level to compare each metric between wheelchair users and non-users. Results showed that the proportion of users perceiving an increase in their mobility was significantly lower among wheelchair users (63%) than non-users (84%). Also, the proportion of users perceiving a decrease in their ability to access a variety of places was significantly higher among wheelchair users (13%) than non-users (2%). However, a majority of wheelchair users perceived increases in their mobility, accessibility, and ability to get to a variety of places as a result of using PSTA MOD.

Table 4-7 *After Survey – Perception of Mobility, Accessibility, and Accessible Locations – Wheelchair Users vs. Non-Users*

	Wheelchair Users			Wheelchair Non-Users		
	N	Increase	Decrease	N	Increase	Decrease
My mobility	16	63%	13%	133	84%	3%
My accessibility	16	63%	13%	133	83%	3%
The variety of places I can get to	16	75%	13%	133	82%	2%

Overall, survey results show that the PSTA MOD system significantly improved the mobility and accessibility of 63% of 16 wheelchair users. Hypothesis 9 was found to be supported.

Hypothesis 10: The trip purpose of system users is diversified to include a greater number of trip purposes than before the system implementation.

Performance Metric	Key Finding
Count of trip purposes across the population	The PSTA MOD system provided users with access to a greater number of diversified trip purposes that met their needs. Specifically, increases in travel were most evident for access to/from medical/health services, restaurants/bars, social activities, shopping in general, and errands.

The tenth hypothesis explored whether the new paratransit system provided users with access to a greater number of diversified trip purposes. This hypothesis was evaluated using Before survey data about the travel needs of respondents and their use of PSTA DART services and the new PSTA MOD system.

The Before and After surveys asked respondents about their trip purposes while using PSTA DART services and PSTA MOD system. Figure 4-39 shows that both systems were used for a variety of trip purposes, with the most popular including going to/from health services, restaurants/bars, social activities, shopping, and errands. After survey results show an increase in the share of users going to/from medical/health services and a decrease in that of users going to/from restaurants and social activities.

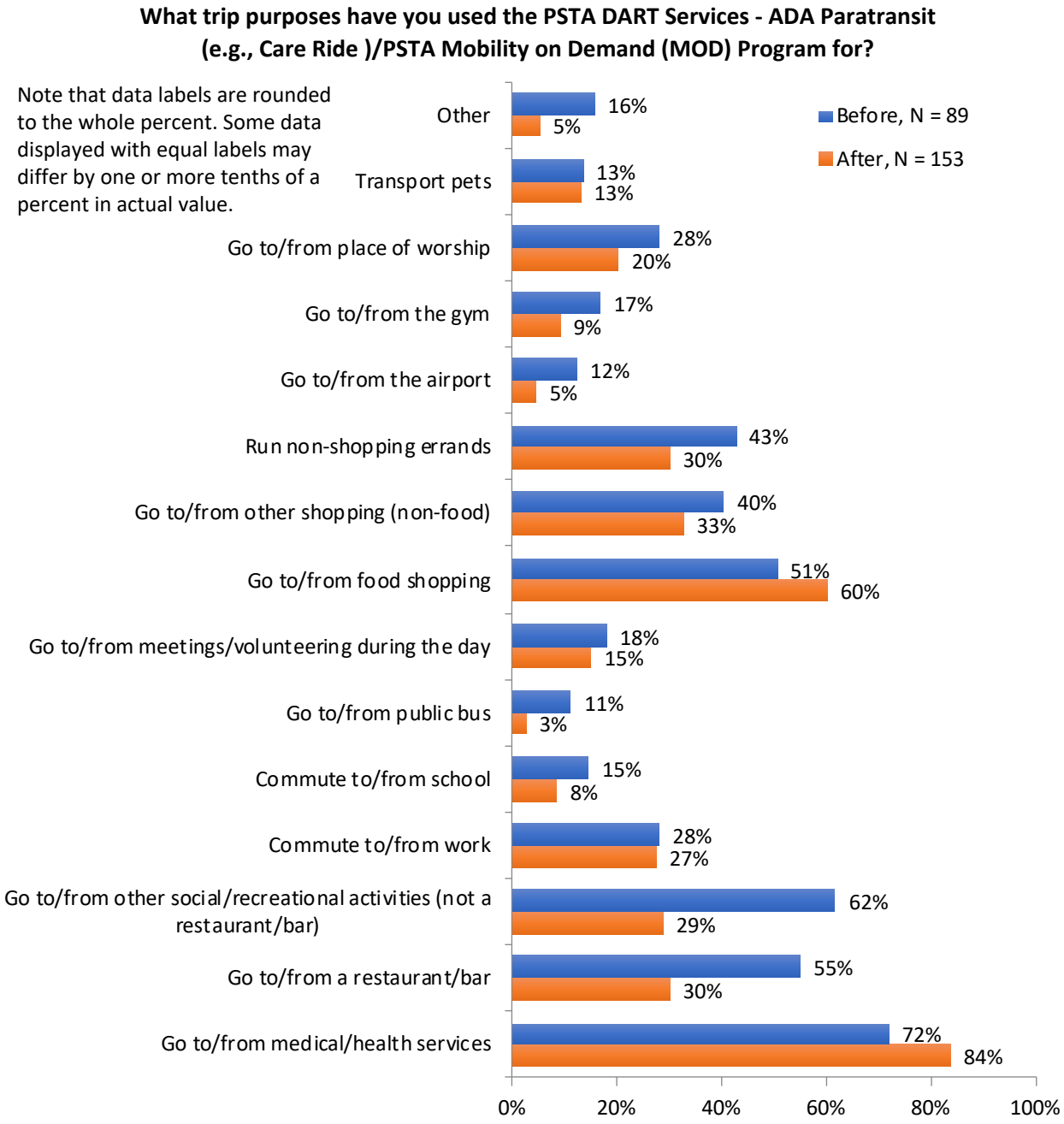


Figure 4-39 *Before/After Surveys – Trip Purposes*

The Before survey also asked respondents about their significant travel needs as shown in Figure 4-40. Results show that the most significant travel needs included going to medical appointments, shopping for food and other things, socializing with friends, going to places of worship, and commuting to work or school.

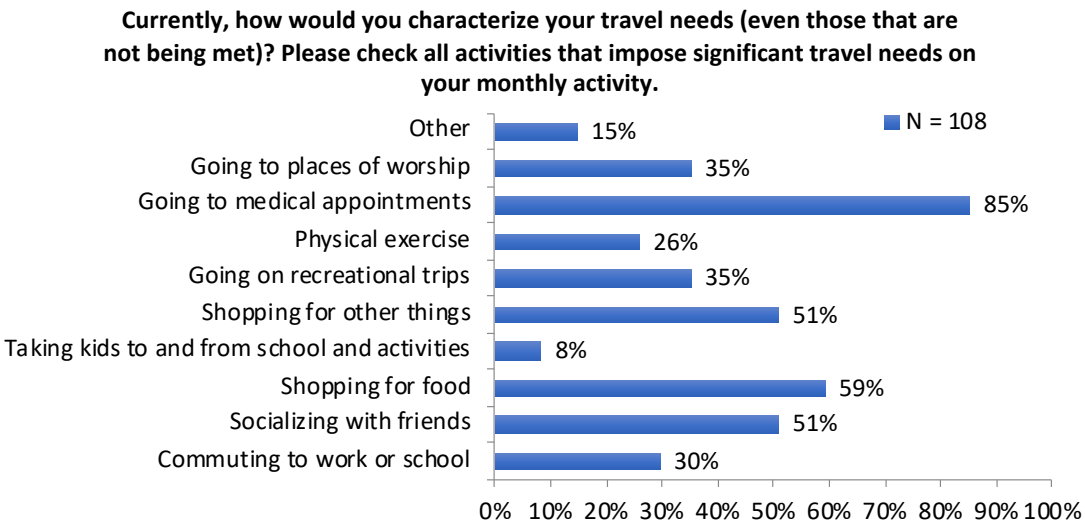


Figure 4-40 *Before Survey – Travel Needs*

Also, the Before and After surveys asked respondents about how often they used PSTA DART services and the PSTA MOD system for a variety of trip purposes. After survey results, in Figure 4-41, show that 94% of 34 respondents used PSTA MOD at least once per week to commute to/from work. This share of frequent users was also high for going to/from places of worship (60% of 25 respondents), commuting to/from school (50% of 10 respondents), going to/from food shopping (42% of 78 respondents), running non-shopping errands (38% of 40 respondents), going to/from the gym (36% of 11 respondents), going to/from medical/health services (34% of 112 respondents), and going to/from social/recreational activities (33% of 40 respondents). These most frequently conducted trip purposes align with previous results shown in Figure 4-40, which proves that the most significant travel needs were being met by the PSTA MOD system.

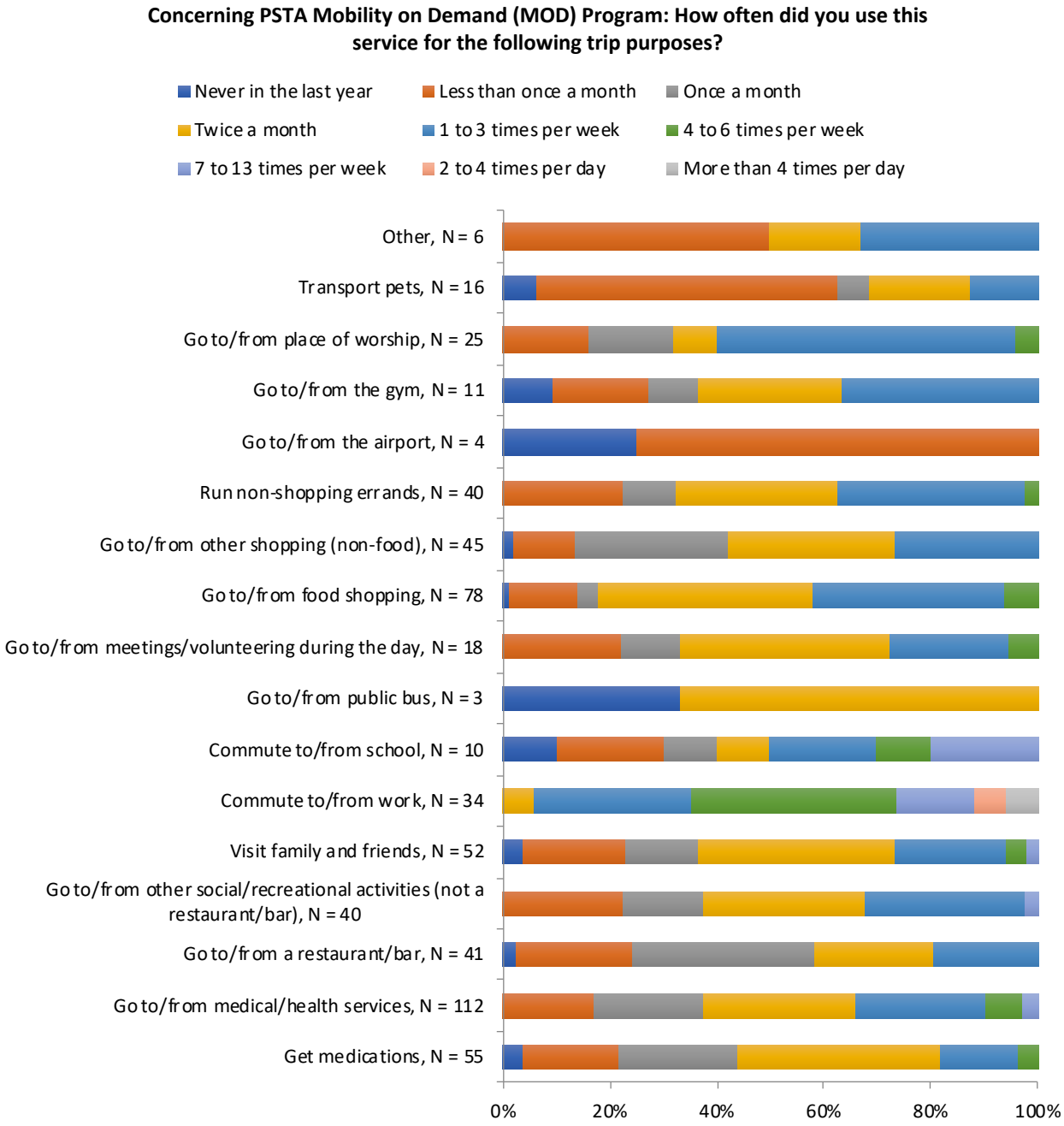


Figure 4-41 *After Survey – Trip Purposes Frequency of Use*

Using before and after paired responses of travel frequencies for each trip purpose, it is possible to construct a matrix that shows the shift in travel frequency as a result of the PSTA MOD system. Table 4-8 shows an example of the obtained result for 31 paired responses, for going to/from medical/ health services. All responses to the right of the shaded diagonal correspond to individuals increasing their travel to/from medical health services as a result of the pilot, which would add up to 35% of 31 individuals.

Table 4-8 *Before/After Travel Frequency Matrix – Go To/From Medical/Health Services – Paired Responses*

Go to/from medical/ health services (N = 31)		After Survey								
		Never in last year	Less than once per month	Once per month	Twice per month	1–3 times per week	4–6 times per week	7–13 times per week	2–4 times per day	More than 4 times per day
Before Survey	Never in last year	0	1	0	1	1	0	0	0	0
	Less than once a month	0	1	2	0	1	0	0	0	0
	Once per month	0	1	0	2	0	0	0	0	0
	Twice per month	0	1	4	3	3	0	0	0	0
	1–3 times per week	0	1	1	3	2	0	0	0	0
	4–6 times per week	0	0	0	1	1	1	0	0	0
	7–13 times per week	0	0	0	0	0	0	0	0	0
	2–4 times per day	0	0	0	0	0	0	0	0	0
	More than 4 times per day	0	0	0	0	0	0	0	0	0

Similarly, before/after matrices were constructed for each trip purpose and the resulting shares of individuals increasing their travel were calculated. Figure 4-42 shows the summarized results for each of the trip purposes, where the most significant increases in travel using the PSTA MOD system include access to/from medical/health services, restaurants/bars, social activities, shopping in general, and errands.

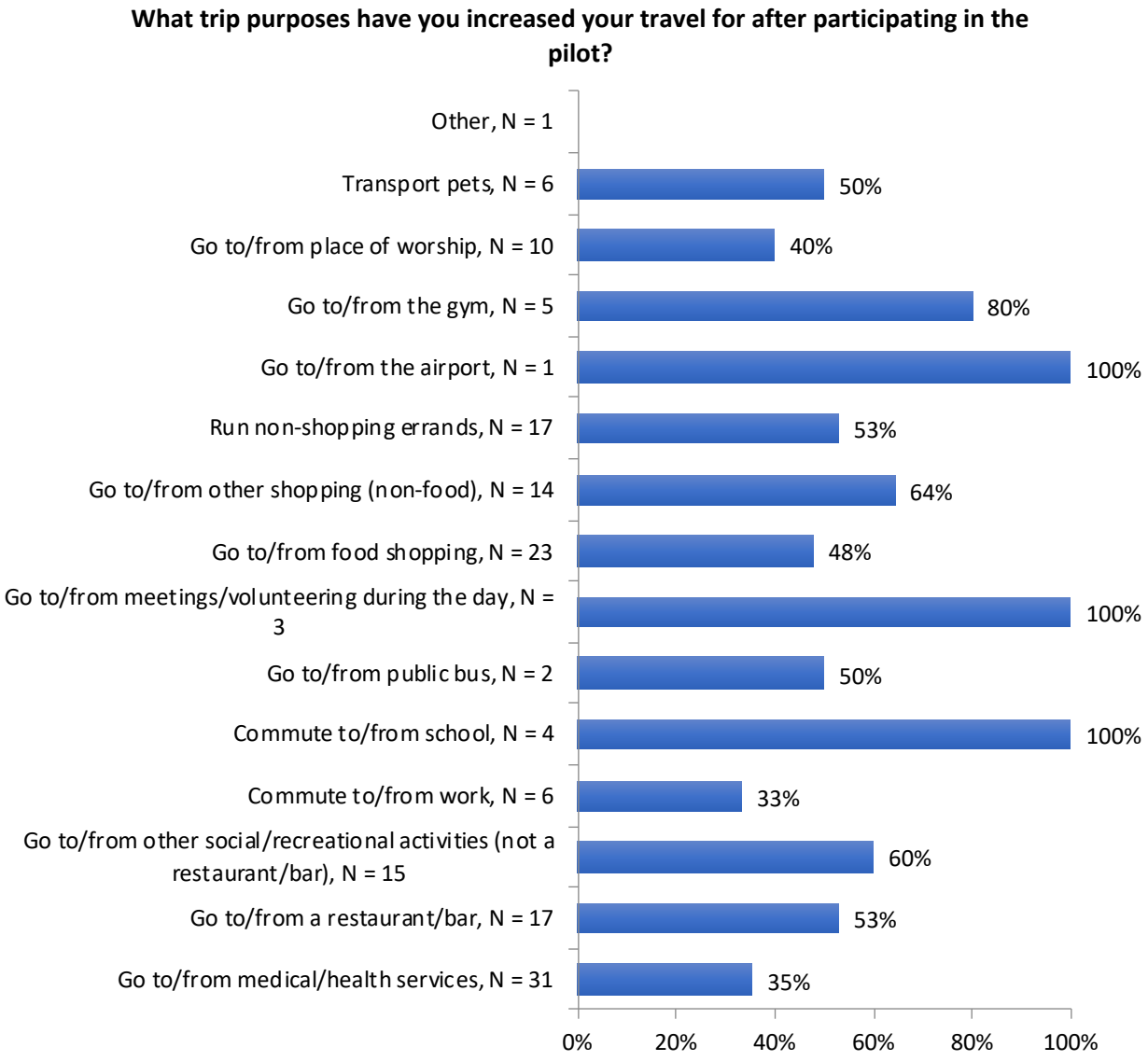


Figure 4-42 *Before/After Surveys – Increase in Travel for Different Trip Purposes – Paired Responses*

The After survey asked respondents to report how their participation in a variety of activities changed after using PSTA MOD. Figure 4-43 shows that 70% of 153 respondents perceived an increase in their participation.

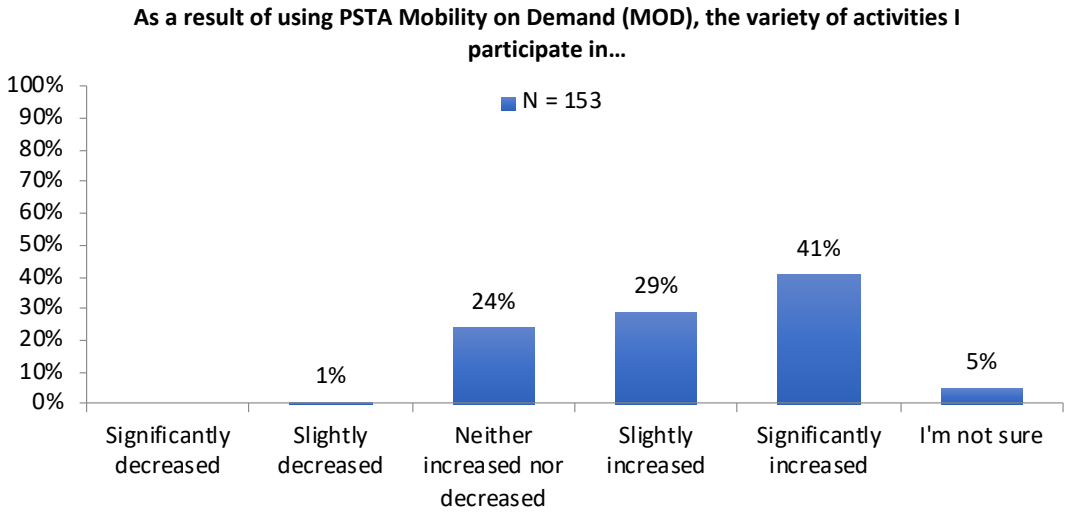


Figure 4-43 *After Survey – Effect of Pilot on Variety of Activities*

Overall, survey results show that the PSTA MOD system provided users with access to a greater number of diversified trip purposes that met their needs. Specifically, increases in travel were most evident for access to/from medical/ health services, restaurants/bars, social activities, shopping in general, and errands. Hypothesis 10 was found to be supported.

Hypothesis 11: The spread of travel times increases as a result of the system.

Performance Metric	Key Finding
Distribution of travel times	Around 77% of 153 pilot participants experienced an increase in their flexibility of departure times, and PSTA MOD activity data showed that trip request times were uniformly spread throughout the day.

The eleventh hypothesis explored whether the new paratransit system increased the spread of travel times (i.e., trip request times) of its users. This hypothesis was evaluated using Before and After survey data about users' scheduled pick-up times and their perception of their flexibility of departure. In addition, trip activity data were used to analyze the spread of travel times using PSTA MOD.

Figure 4-44 shows the scheduled pick-up times of 27 individuals for their recent trips using PSTA DART services. Around 41% of respondents scheduled a pick-up for 8:30 AM or earlier, contributing to a total of 78% who scheduled a pick-up before 12:00 noon.

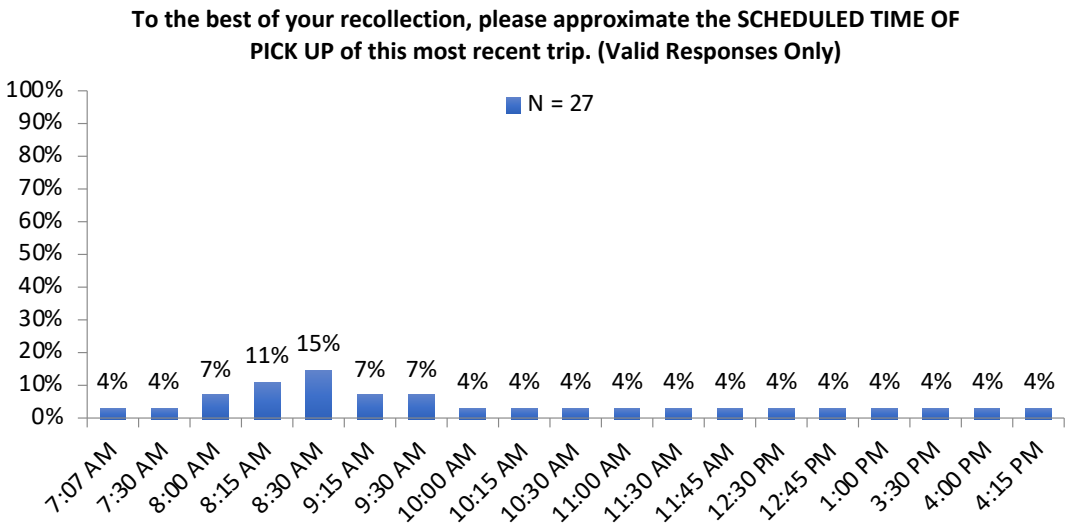


Figure 4-44 *Before Survey – Scheduled Pick-up Times – Recent Trip*

To evaluate the effect of the pilot on the spread of travel times, the After survey asked respondents to report how their flexibility of departure times changed after using PSTA MOD. Figure 4-45 shows that 77% of 153 respondents perceived an increase in their flexibility of departure times as a result the pilot; 13% reported no change and only 7% reported a decrease.

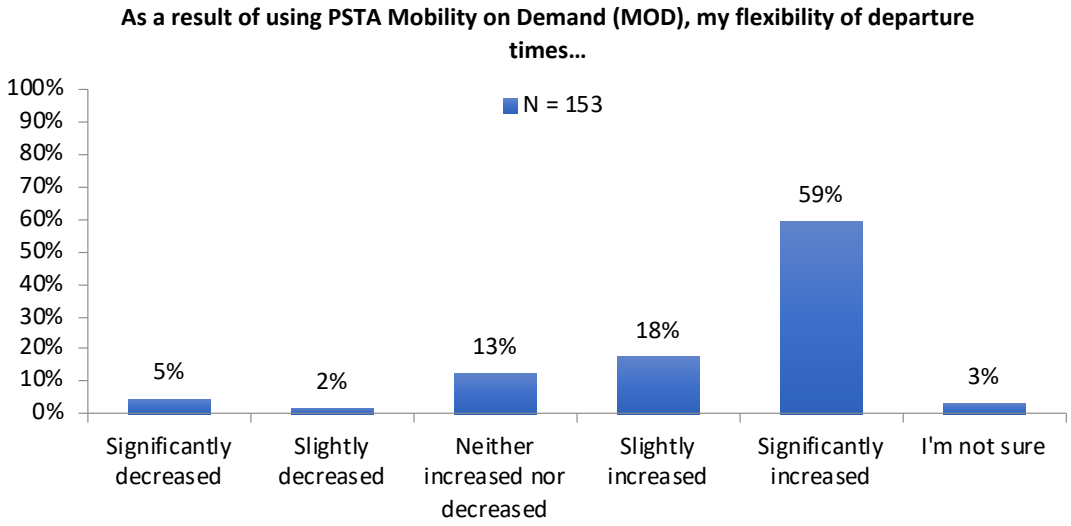


Figure 4-45 *After Survey – Effect of Pilot on Flexibility of Departure Times*

For accurate measures of trip request times as a result of the pilot, a trip activity dataset was analyzed for PSTA MOD. Figure 4-46 shows a nearly uniform distribution of trip request activity from 6:00 AM to 8:00 PM, with the highest activity occurring in the hours around 12:00 noon. This shows a significant

increase in the spread of travel times as compared to the scheduled pick-up times reported in Figure 4-44.

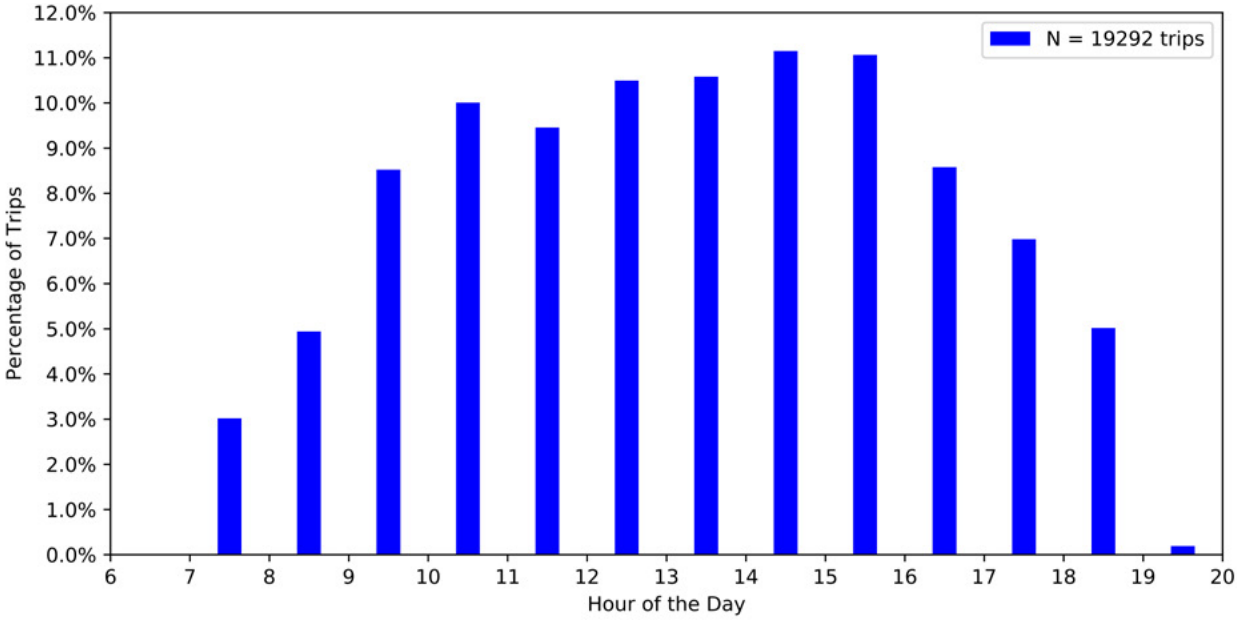


Figure 4-46 *PSTA MOD Activity Data – Trip Request Times*

Overall, around 77% of 153 pilot participants experienced an increase in their flexibility of departure times and PSTA MOD activity data showed that trip request times were uniformly spread throughout the day. Hypothesis 11 was found to be supported.

Hypothesis 12: Lessons from project implementation can inform future project and system designs and implementation.

Performance Metric	Key Finding
Qualitative documentation from stakeholder interviews	The project produced a number of lessons learned as related to insurance needs, data standardization, and negotiations that can be applied to similar projects in the future.

The evaluation team interviewed members of the PSTA MOD project team to better understand challenges, barriers, successes, and broader lessons learned from the implementation of the project. Interviews were conducted with representatives of PSTA, Care Ride, and Goin. Section 5 provides a synthesis of those interviews and the findings related to Hypothesis 12.

Wait and Travel Time Comparisons of WAV Trips and Non-WAV Trips

The evaluation explored a comparison of wait times and travel times of the new paratransit system as provided to passengers both with and without disabilities. For the PSTA MOD system, wait time is defined as the time that passes between a request for pick-up and when the vehicle actually departs from the pick-up location. This system was evaluated using After survey data about each group's perceptions of travel times and wait times. In addition, trip activity data were used to compare the number of trip requests, wait times, and travel times using PSTA MOD for the two groups. One important point to note about this comparison is that at least some passengers in non-WAVs had disabilities as well. For example, 20% of Before survey respondents used a wheelchair, and 59% of the same survey respondents reported some type of disability that required some specialized accommodation for transportation. Hence, its most certain that some of the non-WAV trips included persons with disabilities as well. This contrasts with other analyses within the MOD Sandbox Demonstration evaluations, where non-WAV trips could be safely assumed to predominantly comprise persons without disabilities. In the case of this analysis, some ambulatory passengers who required assistance with walkers or canes were transported by non-WAV vehicles.

Different systems provided different services within the evaluated data. Lyft and United Taxi did not provide WAVs and were able to provide service only to users who could be accommodated in a conventional vehicle. Care Ride and Wheelchair Transport were providers of WAV vehicles for users who required the accommodation of transporting a non-folding wheelchair.

Figures 4-47 and 4-48 show the number of trips using non-WAVs (non-WAV trips) and the number of trips using WAVs (WAV trips) requested per month over the duration of the pilot. Although the total number of non-WAV trips is much greater than that of WAV trips, the trend is similar for both trip types and consistent with a previous result shown in Hypothesis 1(b). Results show that the number of trip requests increased from month to month, and the most significant increases occurred at the beginning of the pilot. The difference in the total number of trips is due to the fact that this trip dataset covered 263 users requesting non-WAVs in comparison to only 20 users requesting WAVs throughout the pilot.

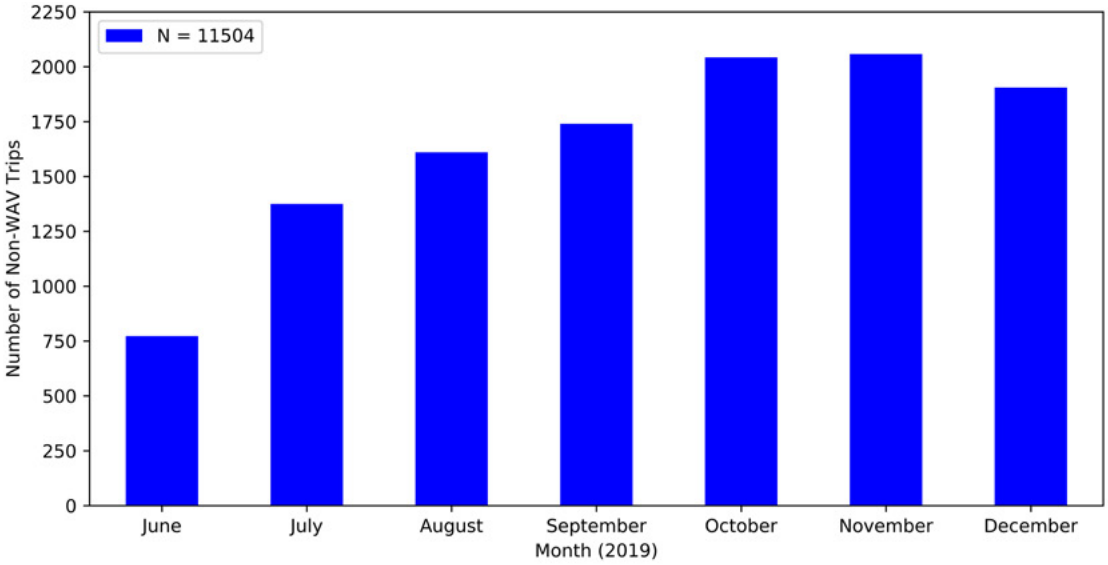


Figure 4-47 *PSTA MOD Activity Data – Non-WAV Trips Time Series*

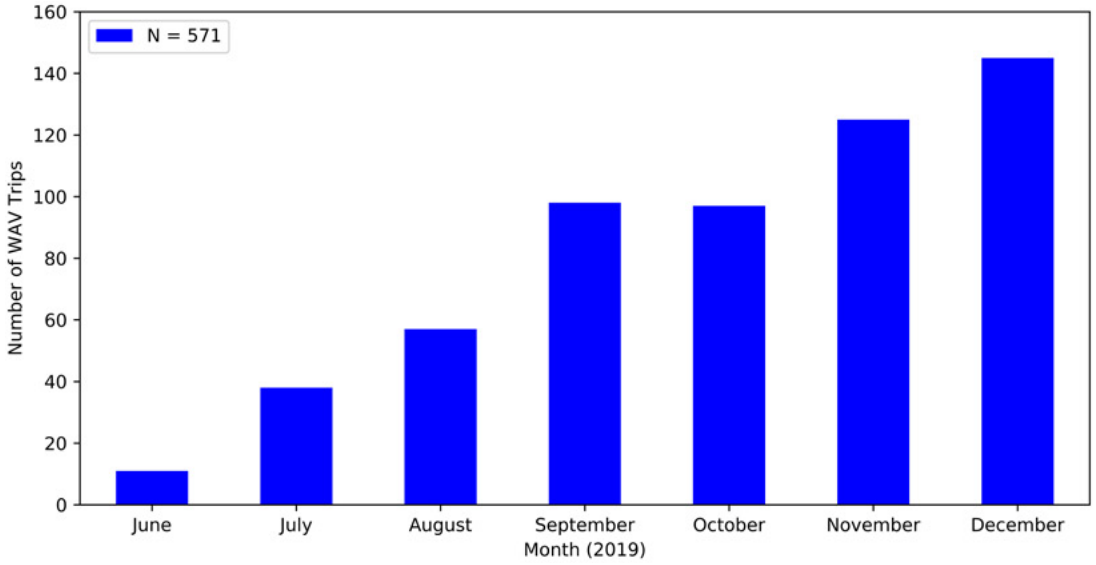


Figure 4-48 *PSTA MOD Activity Data – WAV Trips Time Series*

Figure 4-49 shows the trip wait time distributions for both non-WAV and WAV trips for which the general distribution shapes look similar.

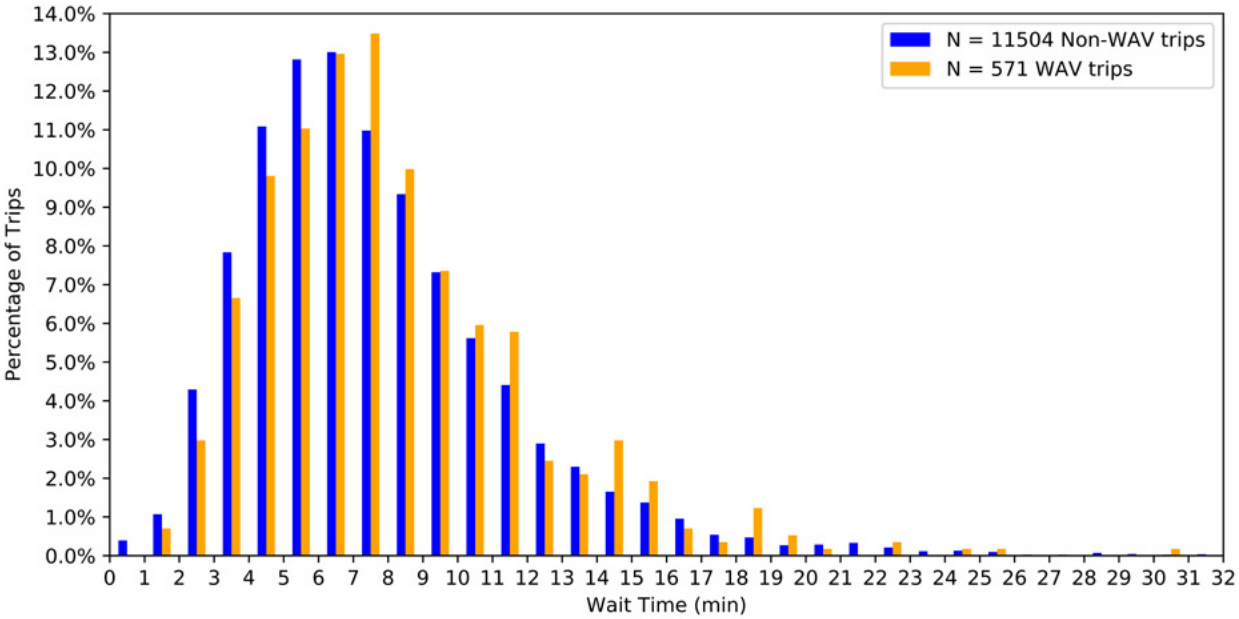


Figure 4-49 *PSTA MOD Activity Data – Trip Wait Times – Non-WAVs and WAVs*

Figure 4-50 shows the trip travel time distributions for both non-WAV and WAV trips for which the general distribution shapes look slightly different.

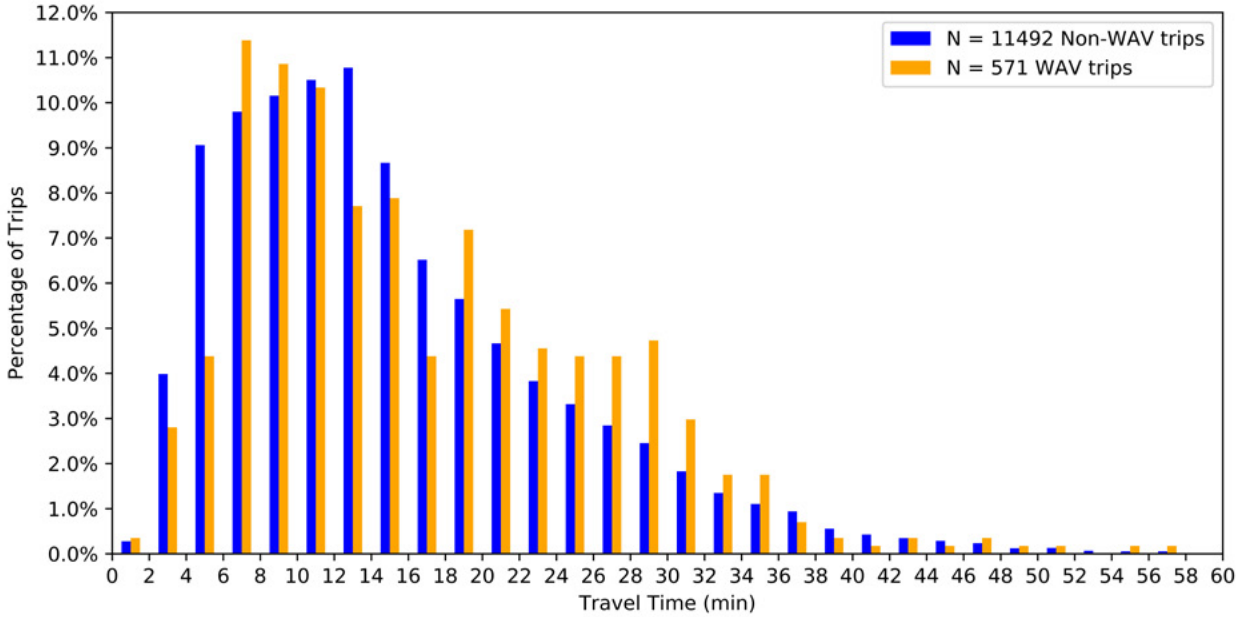


Figure 4-50 *PSTA MOD Activity Data – Trip Travel Times – Non-WAVs and WAVs*

To analyze the above distributions in depth, Table 4-9 shows calculated statistics for both non-WAV and WAV trips. Results show that the mean and median trip wait times were approximately equal for both trip types. The comparison of mean and median trip travel times shows that wheelchair users experienced longer travel times by around two minutes, on average.

Table 4-9 *PSTA MOD Activity Data – Non-WAV and WAV Trips Statistics*

	Wait Time (min)		Travel Time (min)	
	Non-WAV Trips	WAV Trips	Non-WAV Trips	WAV Trips
Mean	7.2	7.6	14.6	16.2
Median	6	7	13	14
75%	9	9.5	19	22
90%	12	13	27	29

To evaluate the experiences of people with and without disabilities while using PSTA MOD, Figures 4-51 and 4-52 show their perceptions of travel times and wait times as a result of participating in the pilot.

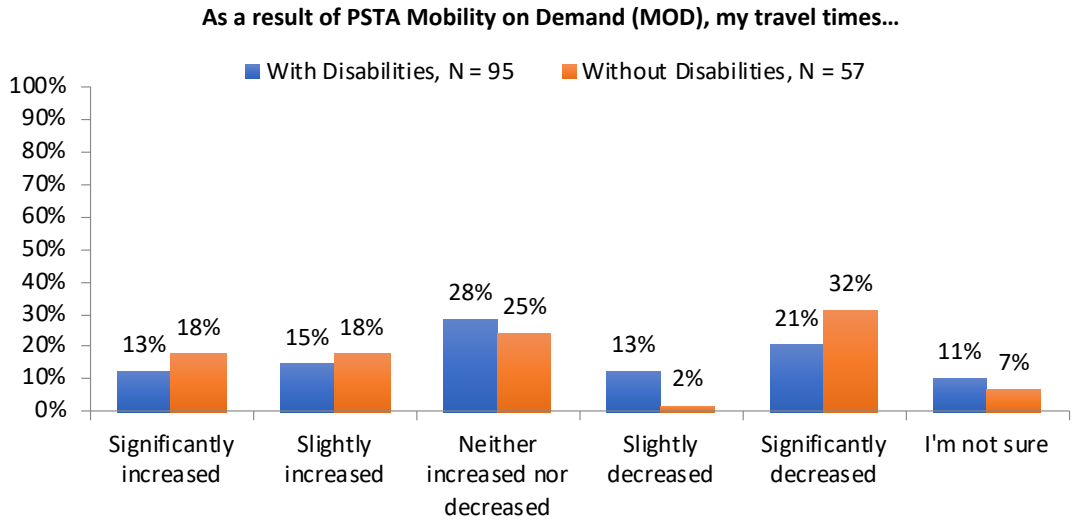
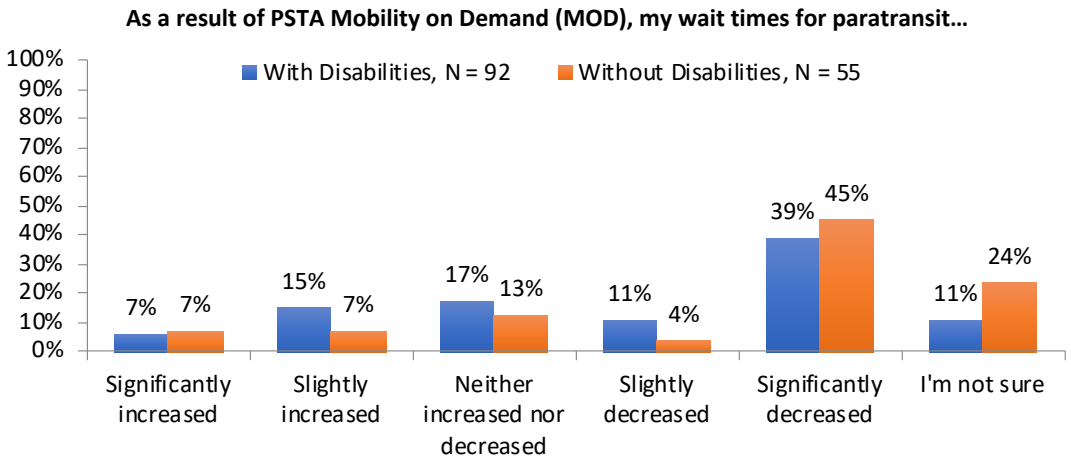


Figure 4-51 *After Survey – Effect of Pilot on Travel Times – People with/without Disabilities*



Note that data labels are rounded to the whole percent. Some data displayed with equal labels may differ by one or more tenths of a percent in actual value.

Figure 4-52 *After Survey – Effect of Pilot on Wait Times – People with/without Disabilities*

To compare the responses of people with disabilities to those of people without disabilities, Table 4-10 shows the proportions of individuals perceiving an increase and decrease in their travel times and wait times using PSTA services. Results show that approximately equal proportions of people with and without disabilities experienced decreases in their travel and wait times as a result of using PSTA MOD. However, a slightly greater share of people with disabilities experienced an increase in their travel and wait times compared to people without disabilities. To investigate further, a two-sample proportion test was conducted at 90% and 95% confidence levels to compare each metric between the two groups, but results were statistically insignificant.

Table 4-10 *After Survey – Perception of Travel Times, Wait Times – People with/without Disabilities*

	People with Disabilities			People without Disabilities		
	N	Increase	Decrease	N	Increase	Decrease
Travel Times	95	27%	34%	57	35%	33%
Wait Times	92	22%	50%	55	15%	49%

Section 5

Lesson Learned from Project Partners

PSTA operates a paratransit model wherein the entire service is contracted out through its DART program. PSTA's DART services are contracted out to Care Ride, United Taxi, and Lyft. Working with these contractors allows PSTA to offer same-day, on-demand rides to its riders with disabilities that parallels the PSTA service area.

The partnerships PSTA has with Care Ride and United Taxi predate the MOD Sandbox Demonstration. One partner in particular, United Taxi, has worked with PSTA for approximately 20 years, providing services for several small demand-responsive programs, all with different funding sources. Although PSTA has a number of existing paratransit and taxi partnerships in place, the MOD Sandbox enabled the agency to explore new partnerships with Lyft and software vendor Goin. Prior to the MOD Sandbox, PSTA had a very fragmented on-demand mobility offering for customers that required travelers to call a taxi directly or download a separate TNC app.

Also prior to the MOD Sandbox, riders using ADA paratransit had to call in their trips; there was no ability to request rides through an app. Goin, which developed the back-end dispatch system for PSTA, was instrumental in linking all of the modes together. The MOD Sandbox created a reservation and dispatch process where riders had the ability to request a ride on their phone or call PSTA directly to book a ride with a telephone dispatcher. When a ride is booked using the latter method, PSTA's telephone dispatcher enters the traveler's origin and destination into the Goin platform, verifies the ride is within the service area, and provides the traveler with a series of mobility options including estimated time of arrival. The dispatcher then assigns a ride to a traveler based on their personalized preferences and needs (e.g., a traveler prefers a particular mode or requires a WAV, etc.). The dispatcher provides the rider with the name of the service, vehicle description, and driver name. Riders also have the option of calling the driver for updates, watching their pick-up on their smartphone, and/or receiving voice or text notifications. In doing so, both the telephone dispatcher and the software platform were critical to expanding mobility choices to digitally impoverished travelers and simplifying the process of making choices for the customer.

Although a number of the project partners have existing relationships with PSTA, they believe FTA's MOD Sandbox is a key enabler providing seed funding to explore forward-thinking approaches to on-demand mobility.

During the project, riders paid a fare of $4.50 for a one-way trip or $9 for a roundtrip ticket. This price was later reduced to $3.50 per trip; ADA paratransit costs remained at $4.50. For all trips, the customer pays the same fare and PSTA

pays any additional costs. Goin has an electronic wallet that allows riders to contribute funds and use contactless payment. When the telephone dispatcher makes a reservation, they can see if a rider has funds available in their wallet. If sufficient funds are available, the booking deducts the rider's fare from their wallet. If insufficient funds are available, the rider can add additional funds over the phone or directly through the smartphone app with prepaid debit card or credit card. Unbanked and underbanked riders without access to a debit or credit card also have the option of mailing a check to PSTA and having it applied to their account or visiting the agency's headquarters and having cash applied to their wallet. PSTA reports that a few riders will send checks but very few come in person to pay by cash.

Interviewees noted a number of metrics for measuring program success. Key metrics identified included the number of riders, number of trips, overall cost (e.g., cost per trip and program cost), reduced dispatch and wait times, and rider satisfaction. However, interviewees noted that cost metrics may need to be redefined, as PSTA switched to a fareless paratransit model in response to the pandemic.

Multiple project partners reported that the MOD Sandbox was instrumental in testing this new service model. Although the project partners indicated that PSTA is an innovative agency willing to explore new partnership strategies, this particular demonstration would not have been possible without FTA funding and institutional support. In particular, PSTA noted that the drug and alcohol testing policy for TNC drivers is challenging and may have prevented this partnership from forming in the absence of a waiver or a change in FTA policy.

In summary, the partners interviewed believe that in many communities across Florida and the U.S., there is underutilized on-demand transportation infrastructure available to public transit agencies. They believe PSTA's MOD Sandbox demonstration exemplifies how public transit agencies can leverage public-private partnerships for on-demand mobility.

The partners interviewed had a number of recommendations and lessons learned for FTA and for those developing and managing public-private mobility partnerships:

- **WAV insurance challenges** – The partners interviewed explained that WAV insurance is quite high and difficult to get. They expressed a desire for FTA to explore establishing a national WAV insurance program (similar to FEMA's national flood insurance program) to help increase insurance availability and reduce costs.
- **Greater data standardization** – Interviewees noted that the lack of national data standards creates a number of very basic technical challenges because data fields do not align across service providers.

This, in turn, can inhibit the sharing of traveler profiles and payment information. Interviewees noted that the lack of national mobility data standard delays and, in some cases, can inhibit the formation of public-private mobility partnerships. For example, a difference in the number or type of alphanumeric characters allowed in a data field can delay or prevent a partnership from forming. Interviewees expressed a desire that FTA lead the industry in establishing data standards to ensure compatibility, level the playing field among providers, and enable faster partnership formation and service deployment. Typically, FTA participates in but does not lead standards development efforts; it has preferred to defer leadership of this type of task to standard development organizations, such as APTA or SAE International.

- **Communication between partners** – Interviewees emphasized the need to balance expectations with desired outcomes when working with TNCs and other third-party providers. Often, private-sector providers are not limited in what they can technically do but rather what they are willing to do. For example, what may work in one city may not work in every use case due to differences in rider density that could impact driver availability and response times.
- **Negotiations early and at the highest level possible** – Interviewees emphasized the importance of getting partners working together early. They also emphasized the importance of working between C-suites when negotiating public-private private partnerships to avoid organizational delays, such as mergers, acquisitions, organizational restructuring, and personnel changes. The interviewees noted that a partnership is more likely to succeed if it has a commitment from the top of an organization.
- **Get it in writing** – Interviewees noted that service provider and vendor integration need to be more firmly documented at the outset so all partners understand capabilities and limitations and are held accountable with respect to project timelines and deliverables.
- **Transit agency as a customer** – Interviewees noted that it is important that vendors view public transit agencies and riders as their customers. Public transit agencies should work with and select private sector partners that have this philosophy.

Section 6 Conclusions

The results of the evaluation found that the PSTA paratransit project had achieved a number of its objectives as defined by the hypotheses. The analysis of Before and After survey data showed that the PSTA MOD system increased the mobility of 82% of 153 pilot participants, with only 4% reporting a decrease in their mobility and 10% reporting no change. This finding was also evident in the trip activity data, which showed that more users were conducting more trips per month over the duration of the pilot. The average number of trips per individual increased from 7 trips per individual in June 2019 to 11 trips per individual in December 2019, and the median number of trips per individual doubled over the duration of the pilot. This change was reflected at an aggregate level also, where the number of monthly trip requests increased by around 143% over the pilot duration. Also, the analysis of After survey responses showed that the PSTA MOD system increased the number of trips for 79% of 153 pilot participants; only 3% reported a decrease in their number of trips and 17% reported no change.

To evaluate the effect of the pilot on the satisfaction of users, After survey responses were analyzed and showed that the PSTA MOD system significantly improved the mobility of 82% of 153 users. As different demographic attributes might influence the perception of individuals, results were disaggregated by gender to show that a greater majority of males (89% of 38 male users) perceived increases in mobility compared to females (79% of 112 female users).

Similarly, survey data were used to evaluate the effect of the pilot on the mobility and accessibility of wheelchair users. Before participating in the pilot, 18 wheelchair users gave an average rating of 8 out of 10 for their ability to access locations within Pinellas County. Similarly, 13 wheelchair users gave an average rating of 8.5 for their ability to access locations using PSTA services and 12 wheelchair users gave an average rating of 8 for their mobility within Pinellas County. After survey results showed that the PSTA MOD system significantly improved the mobility and accessibility of 63% of 16 wheelchair users. Also, 75% of these users perceived an increase in their ability to get to a variety of places as a result of participating in the pilot. Comparing the perceptions of wheelchair users and non-users after using PSTA MOD, a greater majority of non-users perceived increases in accessibility and mobility.

As the PSTA MOD system aimed at improving the mobility and accessibility of users, Before and After surveys asked individuals to rate their perceptions of quality of life before using PSTA MOD and to report changes in their quality of life after participating in the pilot. After survey results showed that the PSTA MOD system significantly enhanced the perception of quality of life for 88% of 152 pilot participants. In contrast, before the pilot, the average rating of quality of life was 7 out of 10, with 68% of 107 individuals reporting a rating of 7 or higher and 23% reporting a rating less than or equal to 5.

One hypothesis explored whether the calculated or projected spending on paratransit declined by the end of the project. This was evaluated using DART's service operation data from annual NTD reports submitted by PSTA. Analysis showed that the demand-response service expanded its services from 2015 to 2019 to incorporate more vehicles, which lead to an increase in operating expenses, fare revenues, and passenger trips. It was evident that fare revenues significantly increased, by around 50%, and operating expenses remained relatively constant between 2018 and 2019. Similar results were observed when analyzing expenses and revenues per passenger mile, per unlinked passenger trip, and per vehicle revenue mile.

To analyze the operational aspect of the PSTA MOD system, the surveys asked individuals to report their wait times for paratransit before using PSTA MOD and to report changes in their wait times after participating in the pilot. The average wait time reported while using PSTA DART services was 10 minutes based on 60 responses; that reported while using PSTA MOD was 11 minutes based on 147 responses. However, looking at paired responses of 30 individuals, around 37% reported a decrease in their wait times, 53% reported an increase, and 10% reported no change. Analysis of reported wait times showed mixed results, which may be attributed to the difference in type of service offered before and after the pilot. PSTA DART service was a scheduled service, which means that wait time is defined as the time that passes between a scheduled pick-up time and the time a vehicle actually departs. In contrast, PSTA MOD was an on-demand service, which means that wait time is defined as the time that passes between a request for pick-up and the time a vehicle actually departs. Thus, a direct comparison between wait times reported in the Before and After surveys was not sufficient to determine a change in wait times. From another perspective, wait times can be defined as the time that passes between a person's need to make a trip and the time that trip can be fulfilled. For PSTA MOD, a rider was able to request a trip at any time without having to schedule in advance, whereas a rider using PSTA DART services had to schedule a trip at least one day in advance. This means that PSTA MOD decreased the wait time of users from at least one day and offered a flexible on-demand service instead. Survey results supported this hypothesis and showed that the PSTA MOD system decreased the wait times for 50% of 147 pilot participants; 19% reported an increase in their wait times and 16% reported no change.

Similarly, the surveys asked individuals to report their travel times for paratransit before using PSTA MOD and to report changes in their travel times after participating in the pilot. The analysis of Before and After survey responses showed that 81 individuals reported an average travel time of 22 minutes using PSTA DART services, and 143 individuals reported it to be 20 minutes using PSTA MOD. After survey results showed that the PSTA MOD system decreased the travel times for 34% of 152 pilot participants; 30% reported an increase in their travel times and 27% reported no change.

The PSTA MOD system accepted e-wallet payments for trips to improve the ease of paying for paratransit. This was evaluated using Before and After survey data; individuals were asked to rate their payment processes for paratransit services before using PSTA MOD and to report changes in their payment processes after participating in the pilot. Analysis of responses from the Before survey showed that the average rating for payment processes for paratransit services such as Care Ride was 8 based on 77 responses. Also, 88 respondents gave the same average rating for the process of scheduling trips with Care Ride. On the other hand, analysis of responses from the After survey showed that PSTA MOD provided an easier payment process for 80% of 152 pilot participants; only 2% reported a more difficult payment process and 13% reported no change.

Trip activity data also included origin and destination locations for each trip. This was used to analyze the change in the spatial distribution of trips using PSTA MOD over the duration of the pilot. Analysis showed that all destination locations were spread at an average distance of 7.1 miles from their centroid. Spatial statistics showed that there was no skewness or variable concentration in trip locations from month to month. In fact, trips were spread over all Pinellas County soon after the pilot's launch and maintained that spatial distribution over the following months. On the other hand, analysis of After survey responses showed that the PSTA MOD system increased the distances traveled for 62% of 153 pilot participants; only 2% reported a decrease in their distances traveled, and 34% reported no change. Activity data confirmed this result and showed that the average Euclidean distance between trip origins and destinations increased by around 10% over the duration of the pilot.

Before and After surveys also asked individuals to report their trip purposes while previously using PSTA DART services and after using the new PSTA MOD system. Results showed that both systems were equally used for a variety of trip purposes such as access to health services, restaurants/bars, other social/recreational activities, shopping, and errands. Other significant travel needs reported by users before participating in the pilot included going to places of worship and commuting to work or school. Using before and after paired responses of travel frequencies for the different trip purposes, it was possible to construct matrices that show the shift in travel frequencies as a result of participating in the pilot. Results showed significant increases in travel using the PSTA MOD system for access to/from medical/health services, restaurants/bars, social activities, shopping in general, and errands. Also, After survey results confirmed that the pilot significantly increased participation in a variety of activities for 70% of 153 users.

In addition to accommodating diversified trip purposes, the on-demand service allowed more flexible departure times for its users. This was evaluated using Before and After survey data; individuals were asked to report their scheduled pick-up times for paratransit before using PSTA MOD and to report changes in

their flexibility of departure after participating in the pilot. Also, trip activity data were used to analyze travel departure times using PSTA MOD. Analysis of Before survey responses showed that around 78% of 27 individuals scheduled a pick-up before 12:00 noon and around 41% requested trips at or before 8:30 AM. On the other hand, activity data showed that request times using PSTA MOD were almost uniformly distributed throughout the day, with the highest activity occurring around 12:00 noon. After survey results confirmed that the PSTA MOD system increased the flexibility of departure times for 77% of 153 pilot participants; only 7% reported a decrease in their flexibility and 13% reported no change.

In addition to survey data, trip activity data collected disability information as well. This allowed for the comparison of different metrics measuring service provision to passengers with and without disabilities. The analysis showed that the total number of ambulatory trips fulfilled was much greater than that of wheelchair trips. However, the trends were similar for both trip types, showing that the number of trips fulfilled increased from month to month, with the most significant increases occurring at the beginning of the pilot. Regarding trip wait times, results showed that the mean and median trip wait times were approximately equal for non-WAV and WAV trips. In contrast, the comparison of mean and median trip travel times showed that wheelchair users experienced longer travel times by around two minutes, on average. This additional travel time might have been due to the time it takes to load and unload a wheelchair onto/off the vehicle, which was not accurately recorded in the activity dataset. On the other hand, After survey results showed that similar proportions of people with and without disabilities experienced decreases in their travel and wait times as a result of using PSTA MOD. A slightly greater proportion of people with disabilities experienced an increase in their travel and wait times compared to people without disabilities, but differences were statistically insignificant.

Key lessons learned from the project related to the 1) acquisition of WAV insurance, 2) data standardization, and 3) negotiations and communication with agencies and private-sector entities. In particular, the project noted that the high costs and difficulties of acquiring WAV insurance is a major challenge faced by agencies. Project interviewees felt that FTA could play a role as a national actor in establishing a uniform insurance program that could potentially reduce costs and lower barriers to acquisition. Other challenges related to data standardization produced limitations with collaboration, in the sense that certain data fields stored by some operators were not used by others. This produced challenges with interoperability. Project interviewees noted that negotiations with agencies and operators need to occur early and with high-level decision-making entities to ensure the greatest clarity and efficiency with communication and agreements.

Overall, the project was found to be successful in providing improvements to paratransit service that increased the mobility and accessibility of system users within Pinellas County and enhanced reported overall quality of life. The program's on-demand service also increased the flexibility of departure of its customers and accommodated a wide variety of trip purposes. The lessons learned from the pilot project should allow for future projects to build on this experience and advance common objectives with similar initiatives within other commute systems.

Appendix A Additional Survey Results

Before Survey

The following plots show raw summaries of the Before survey results. The figures are in the general order of questions asked. Only questions not presented in the report are presented in this Appendix.

Figure A-1 *Before Survey – Household Size*

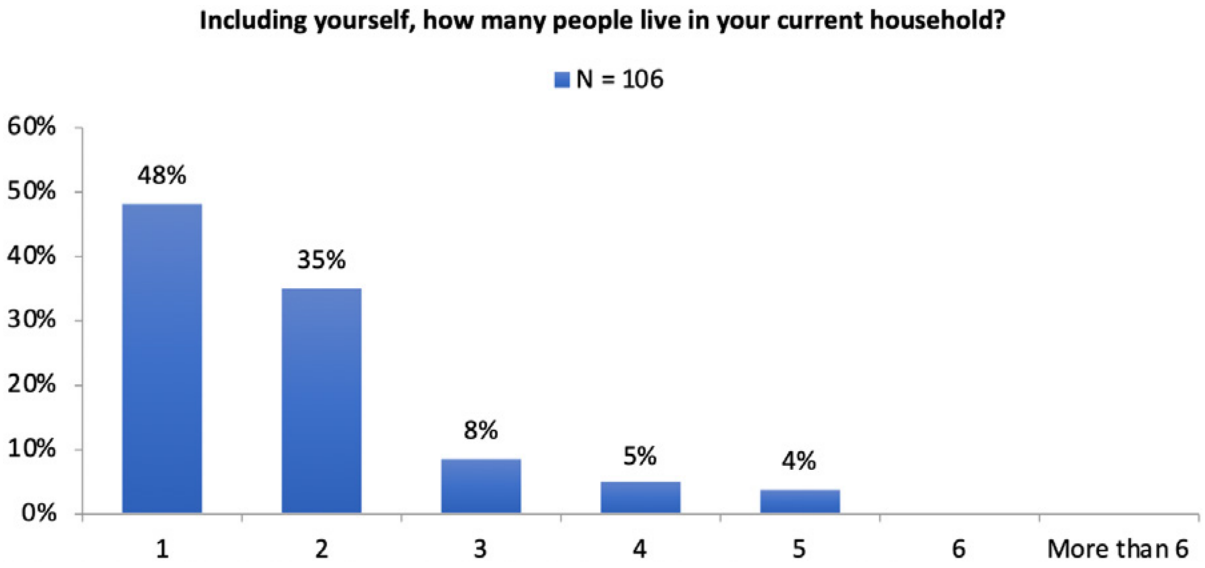


Figure A-2 *Before Survey – Household Relation*

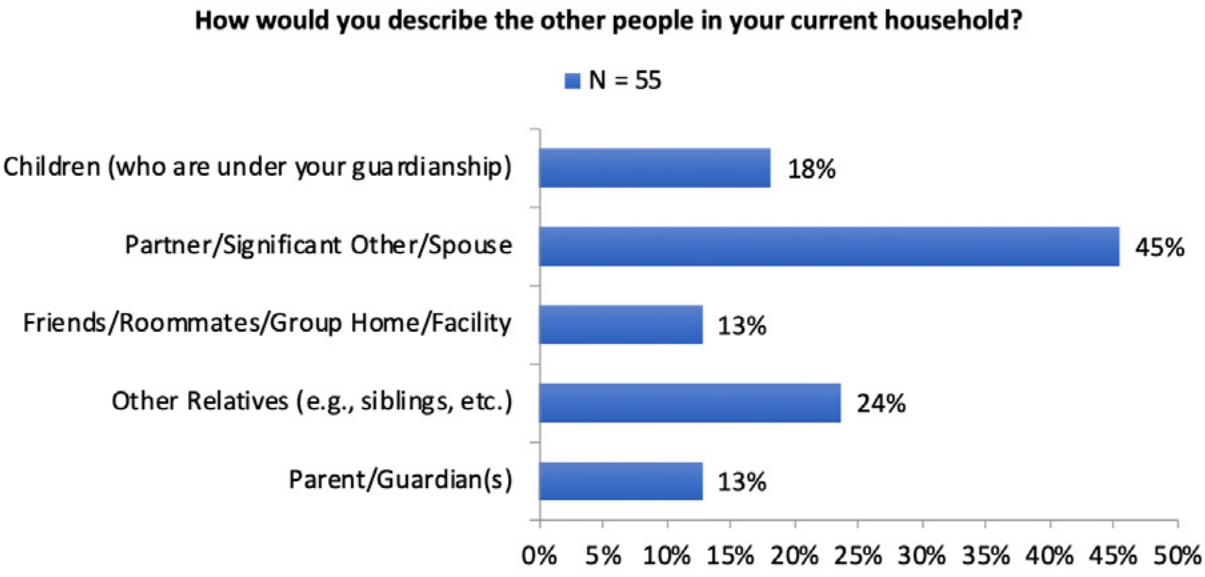


Figure A-3 *Before Survey – Mode Share Distribution*

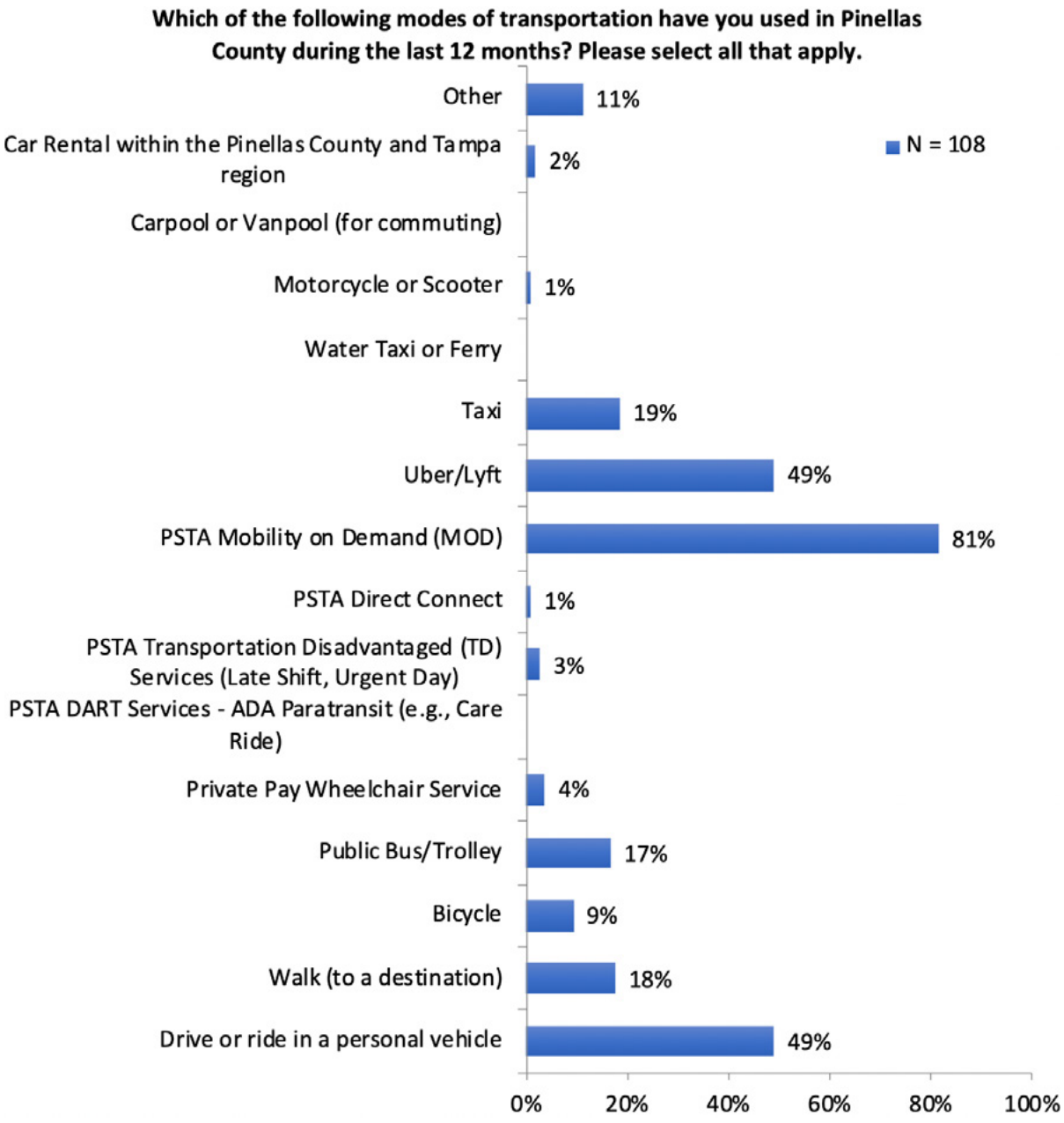


Figure A-4 *Before Survey – Mode Frequency of Use Distribution*

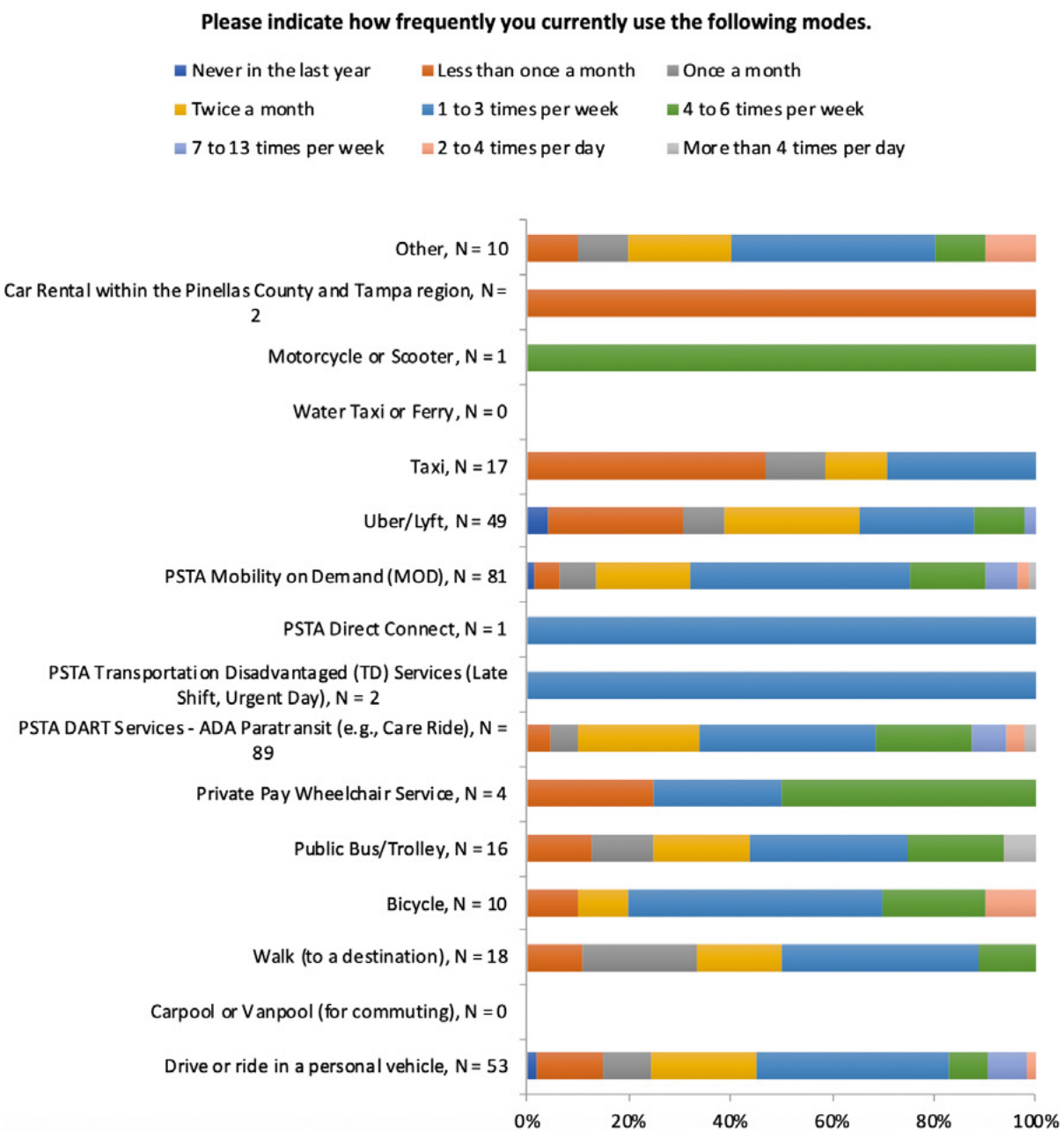


Figure A-5 *Before Survey – Frequency of Trip Purposes Using PSTA DART Services*

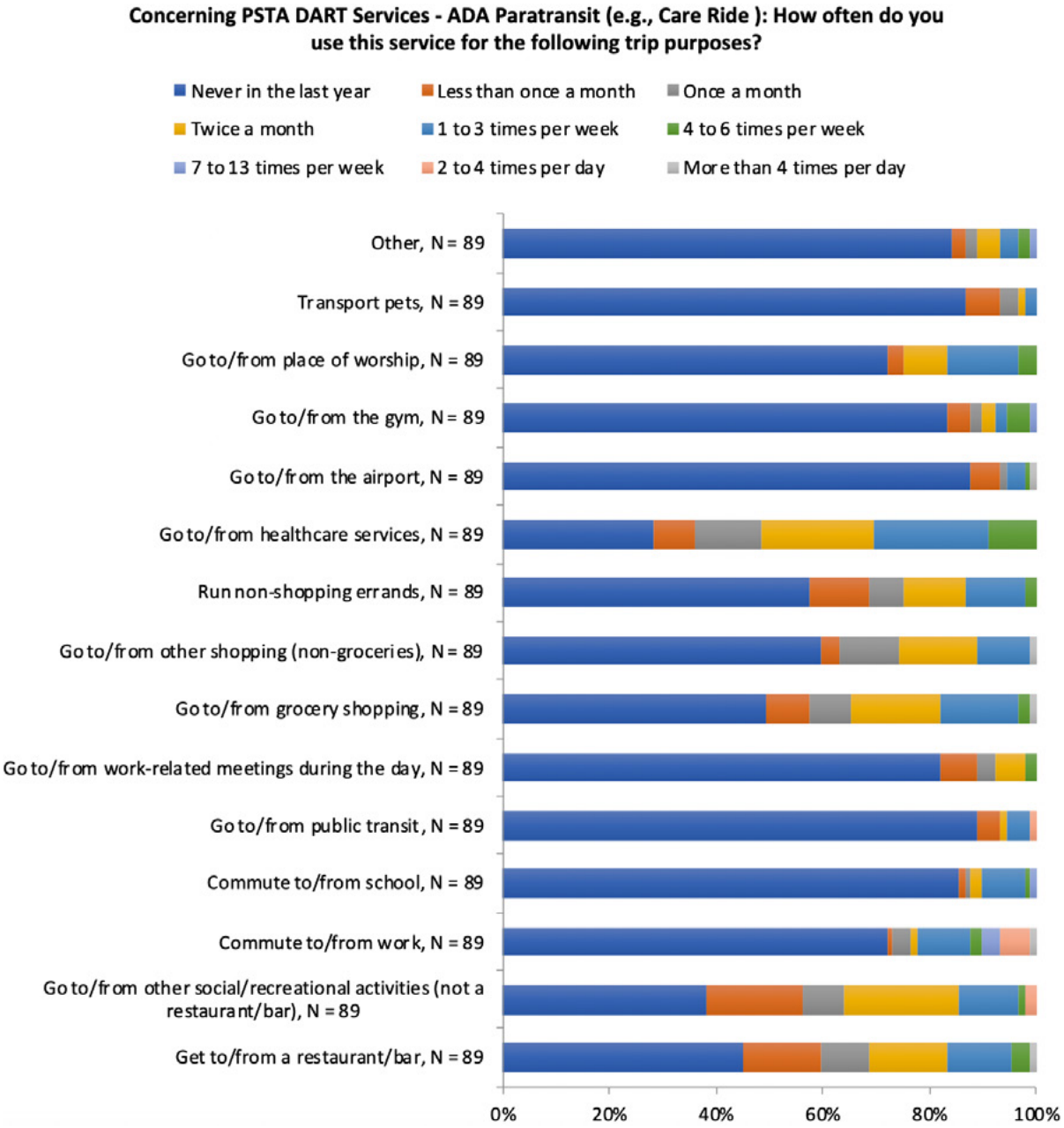


Figure A-6 *Before Survey – Recent Trip Purpose*

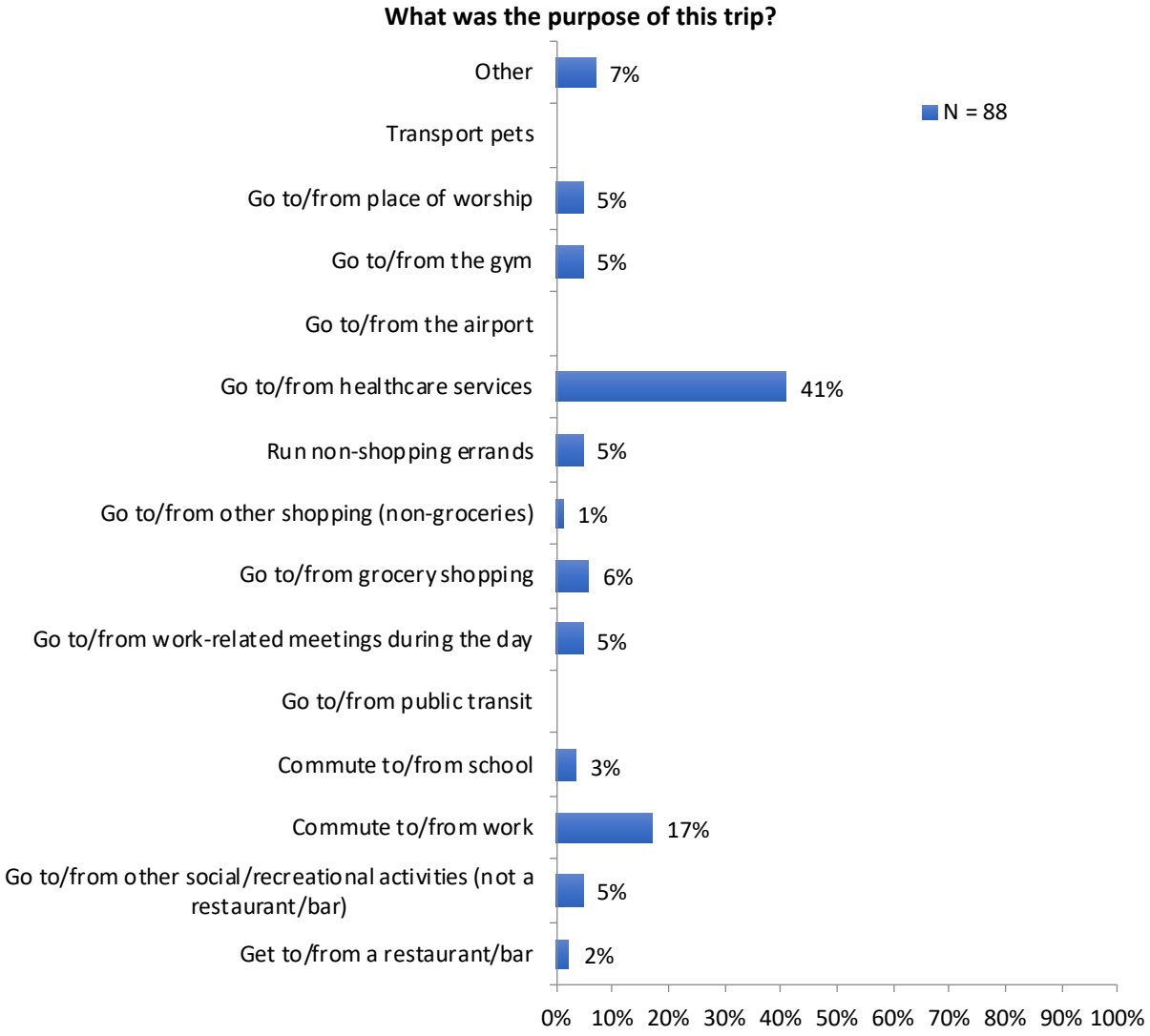


Figure A-7 *Before Survey – Recent Trip Day*

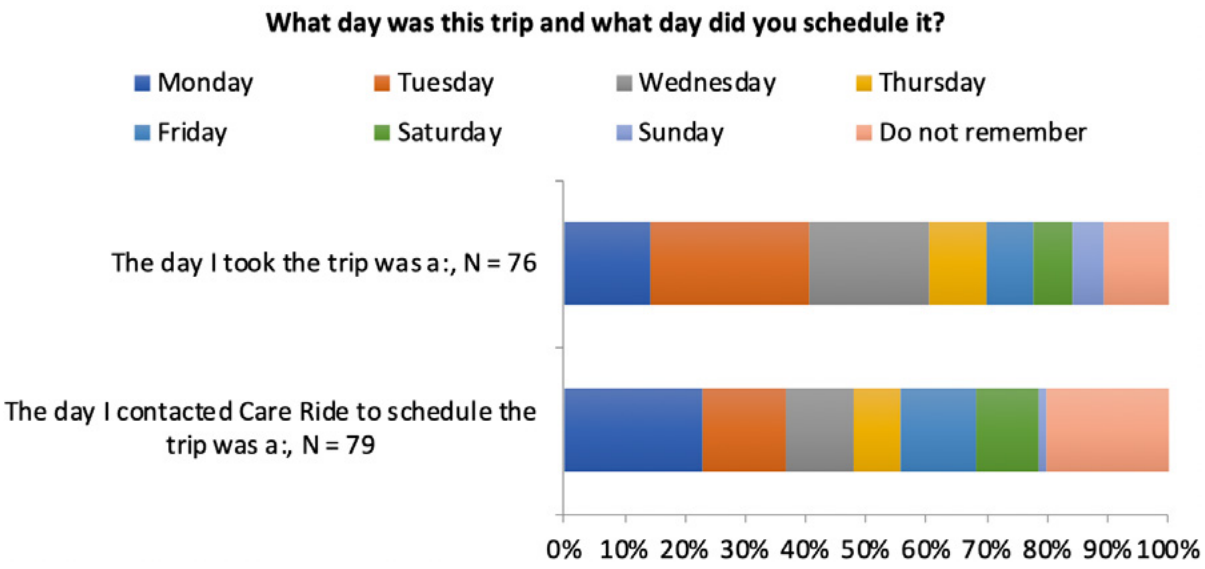


Figure A-8 *Before Survey – Recent Trip Actual Departure Time*

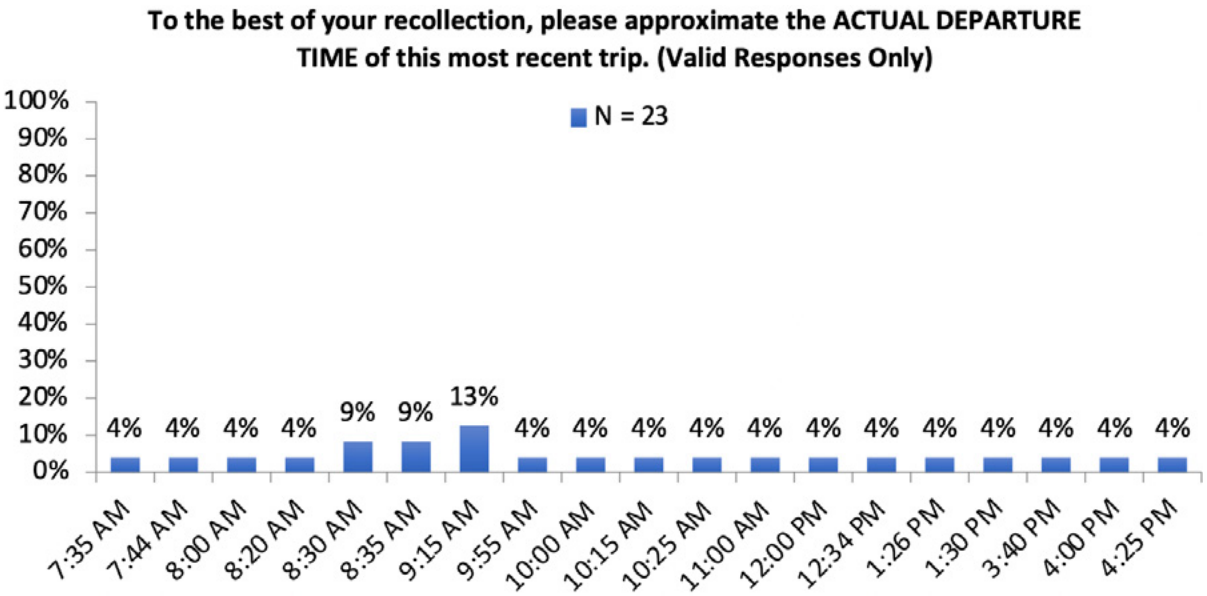


Figure A-9 *Before Survey – Recent Trip Travel Time*

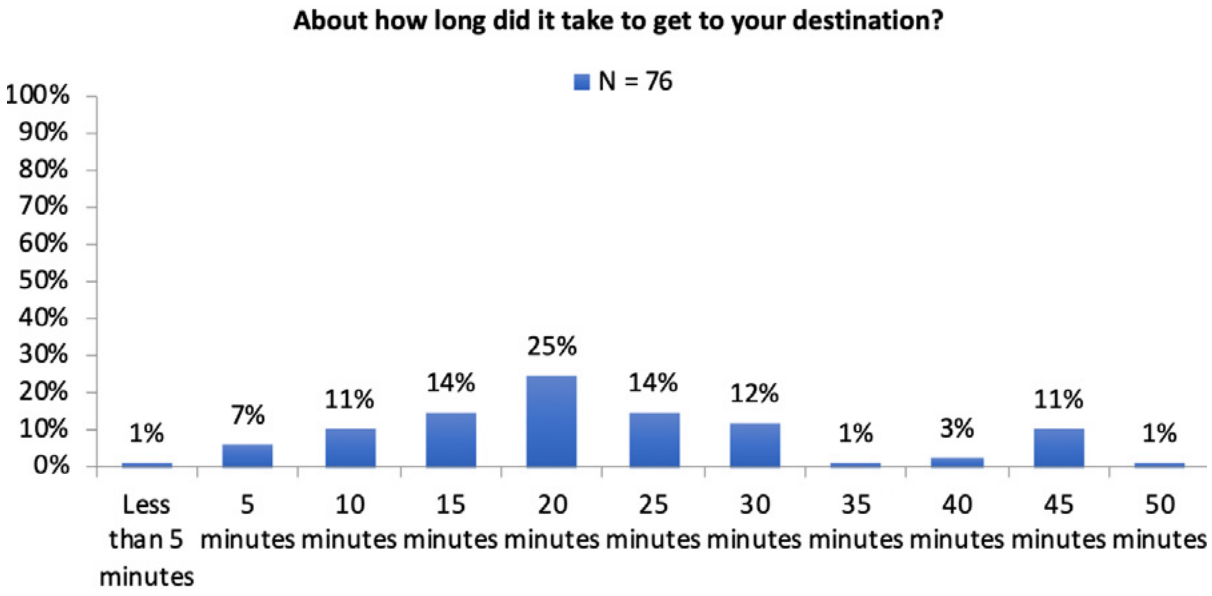


Figure A-10 *Before Survey – Recent Return Trip*

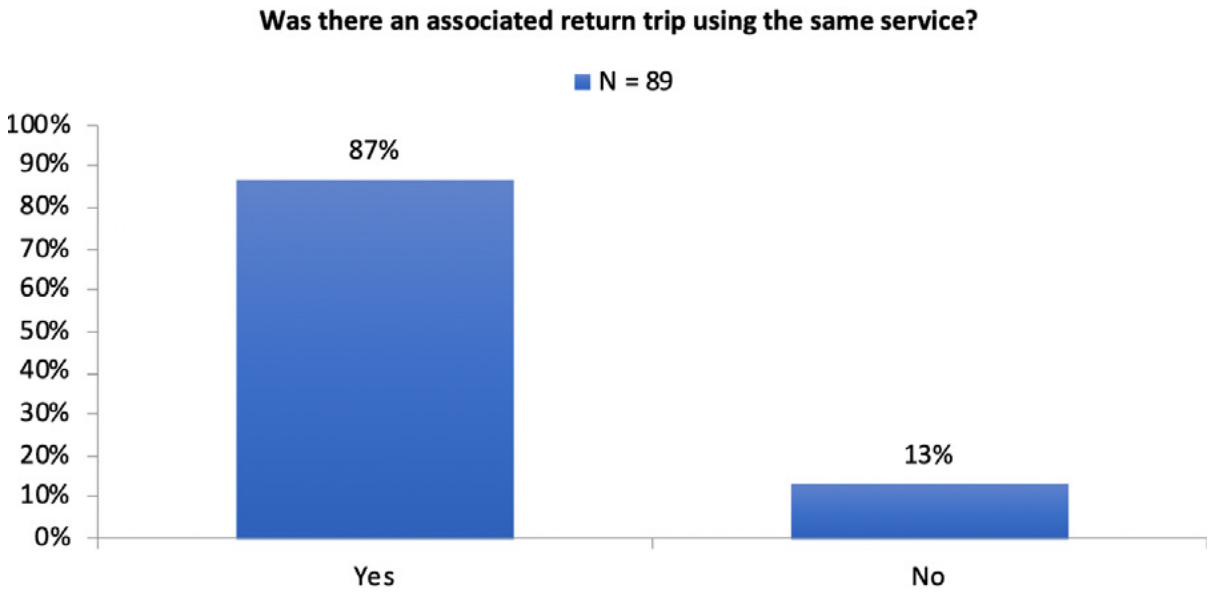


Figure A-11 *Before Survey – Recent Return Trip Feedback*

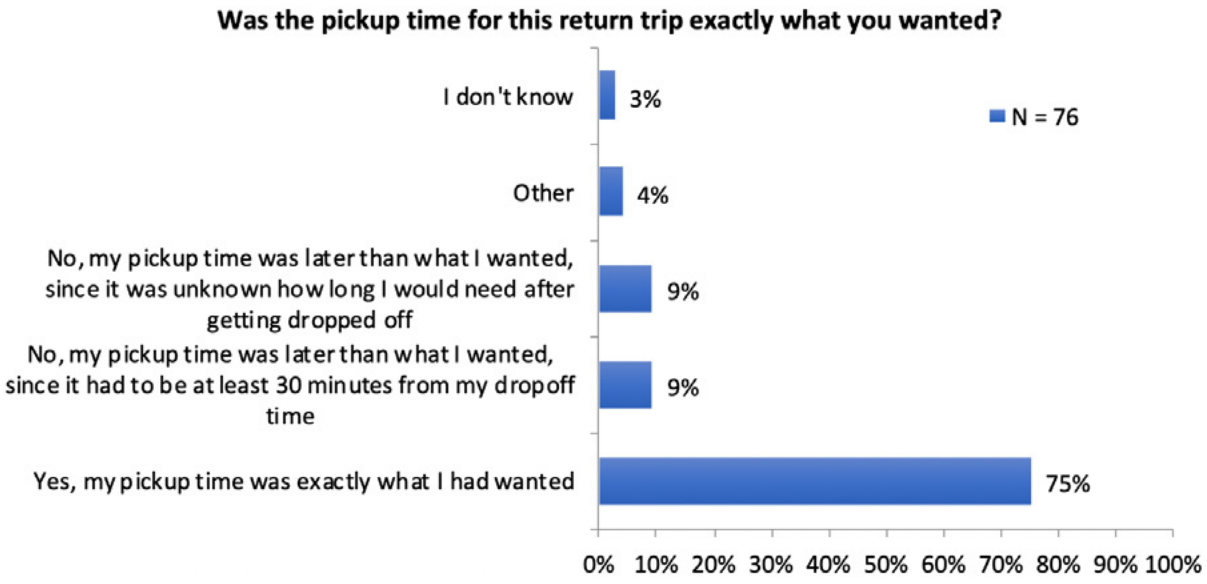


Figure A-12 *Before Survey – Recent Return Trip Difference Between Pick-up Times*

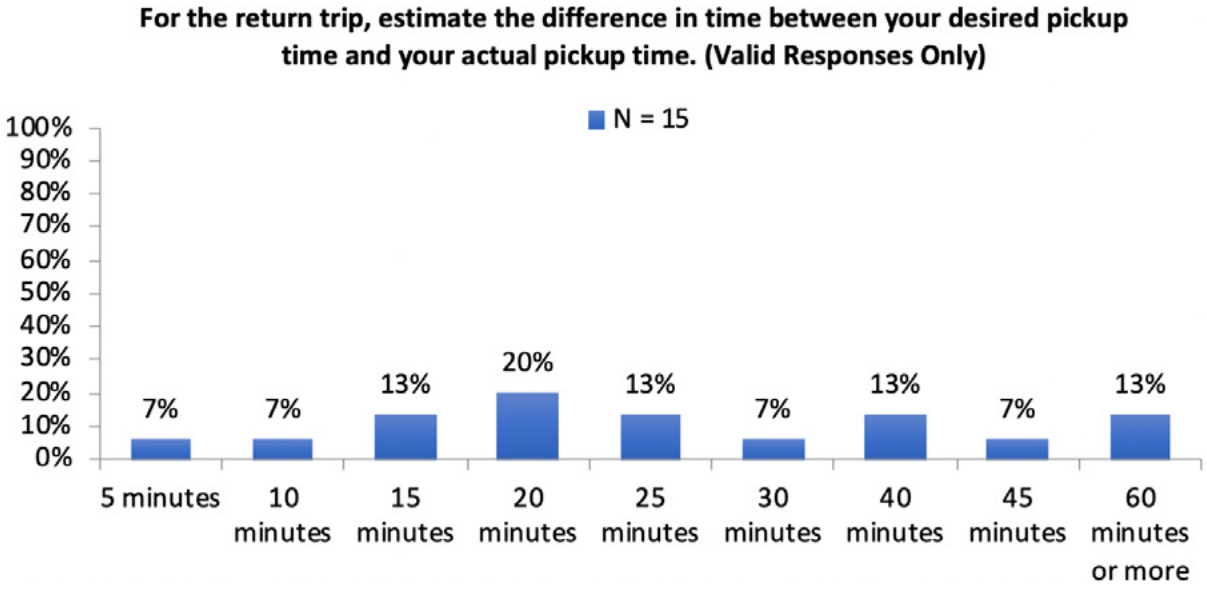


Figure A-13 *Before Survey – Recent Trip Payment Method*

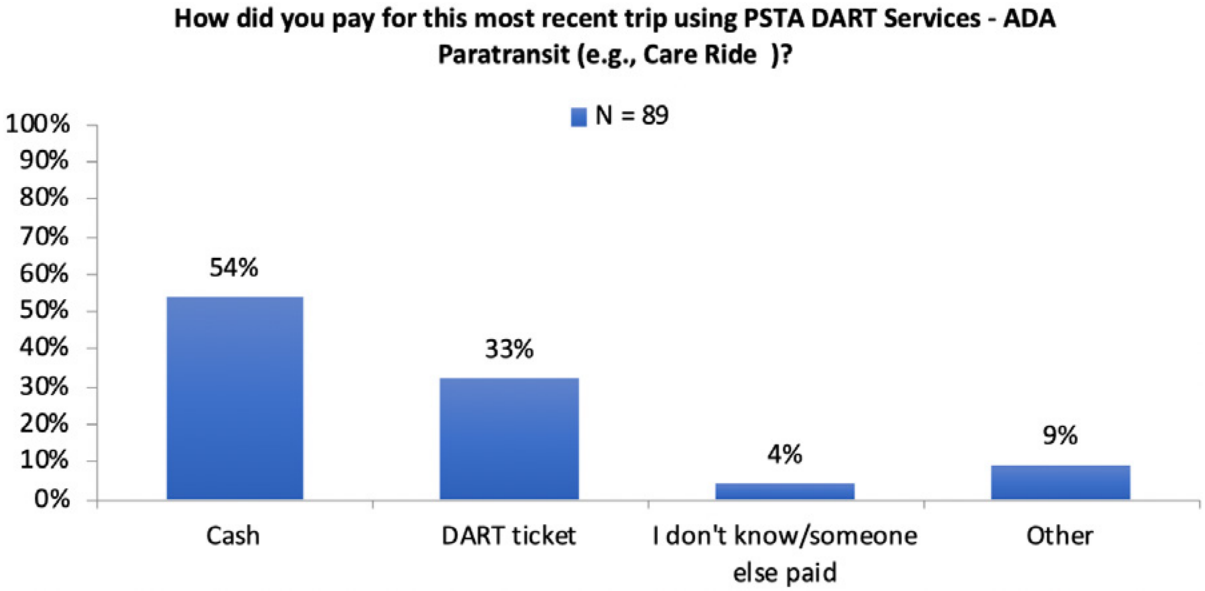


Figure A-14 *Before Survey – Recent Trip Alternative Mode*

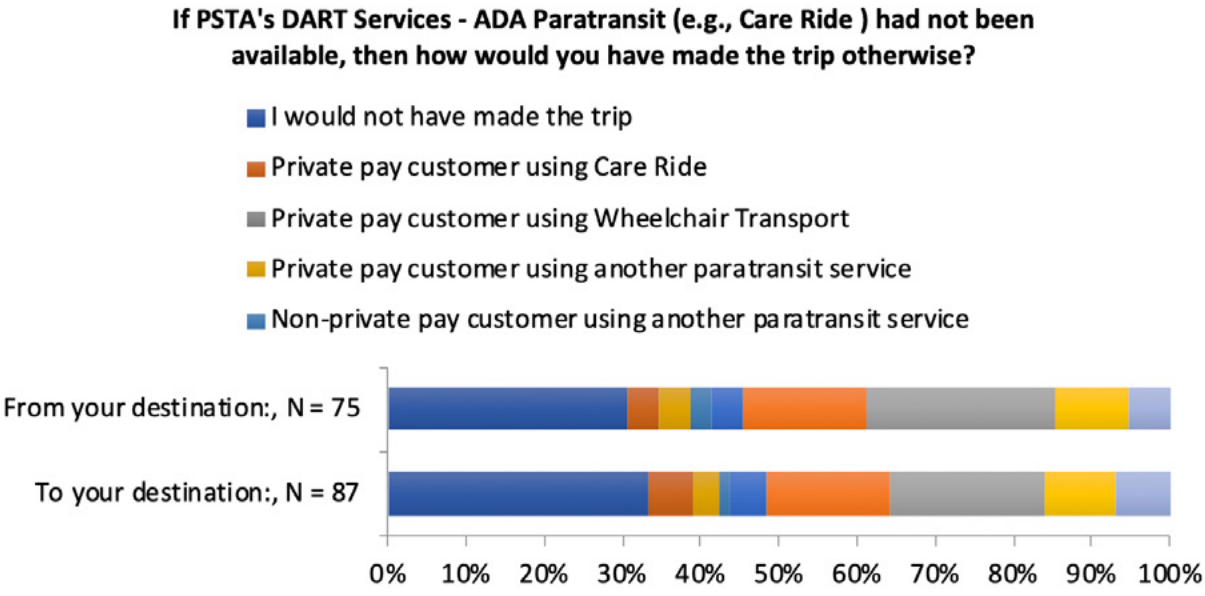


Figure A-15 *Before Survey – Personal Disabilities*

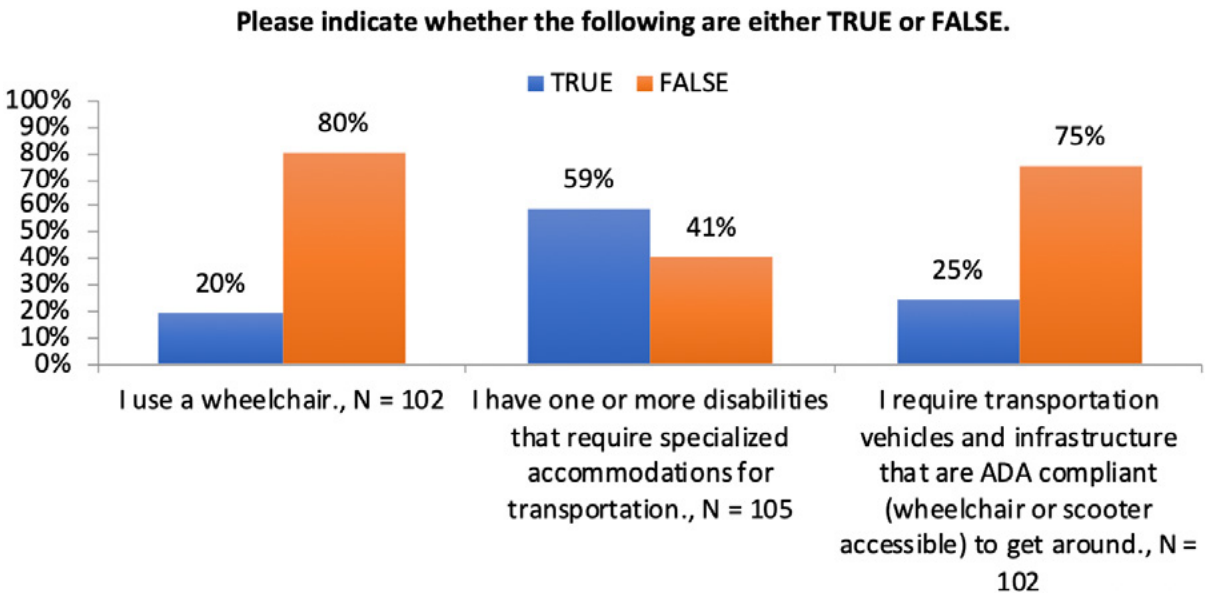


Figure A-16 *Before Survey – Education Level*

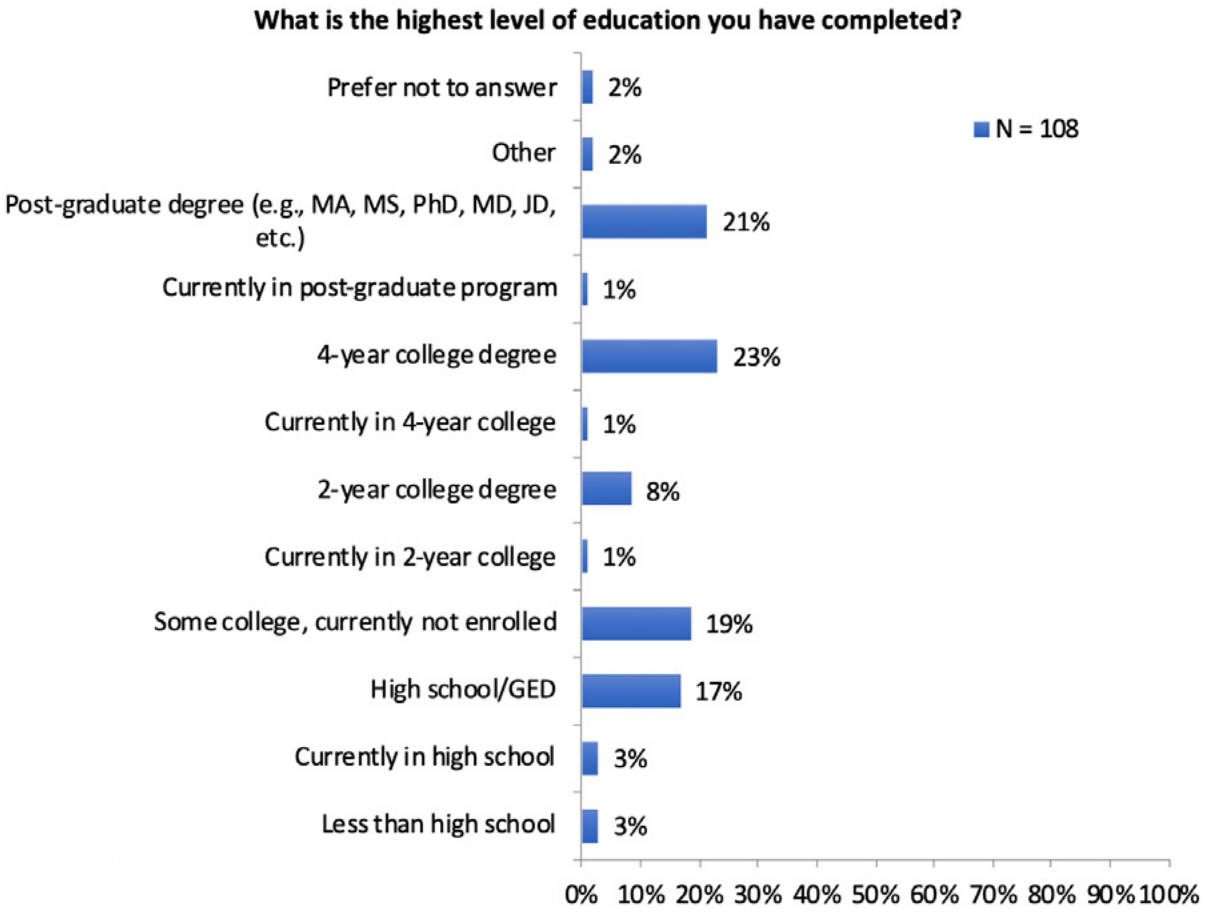


Figure A-17 *Before Survey – Race or Ethnic Identification*

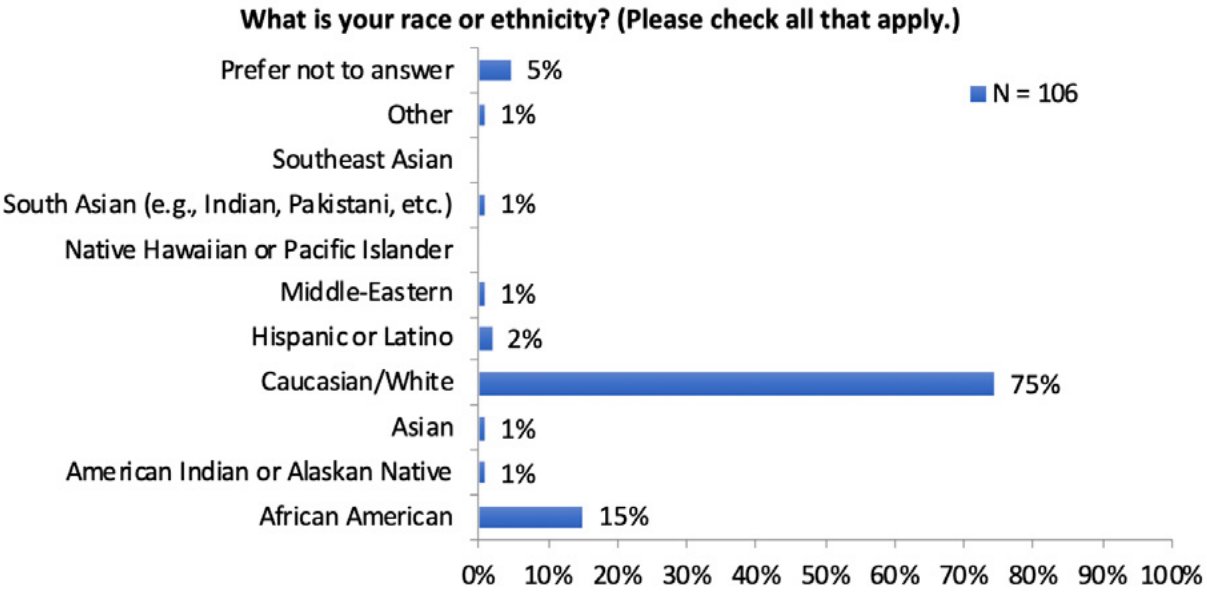


Figure A-18 *Before Survey – Household Income*

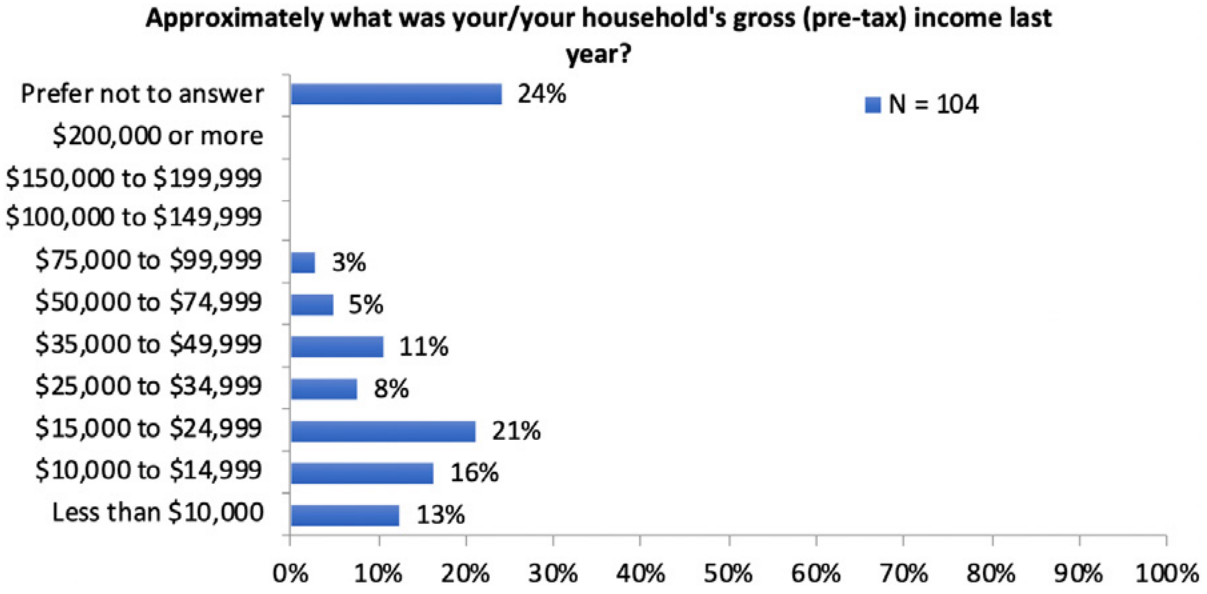
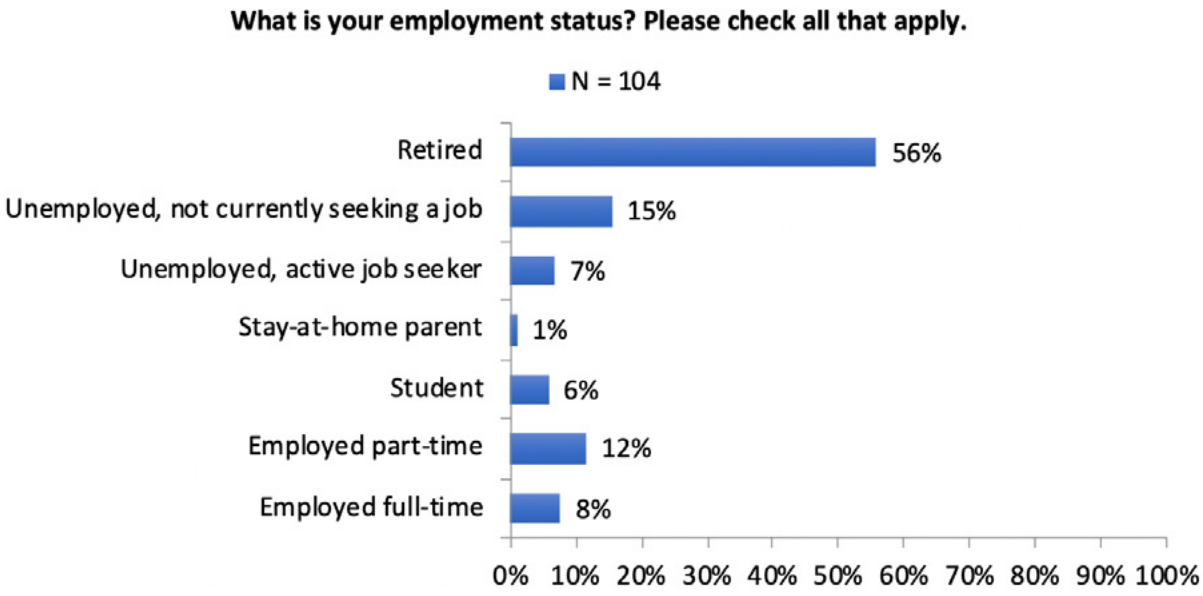


Figure A-19 *Before Survey – Employment Status*



After Survey

The following plots show raw summaries of the After survey results. The figures are in the general order of questions asked. Only questions not presented in the report are presented in this Appendix.

Figure A-20 *After Survey – Household Size*

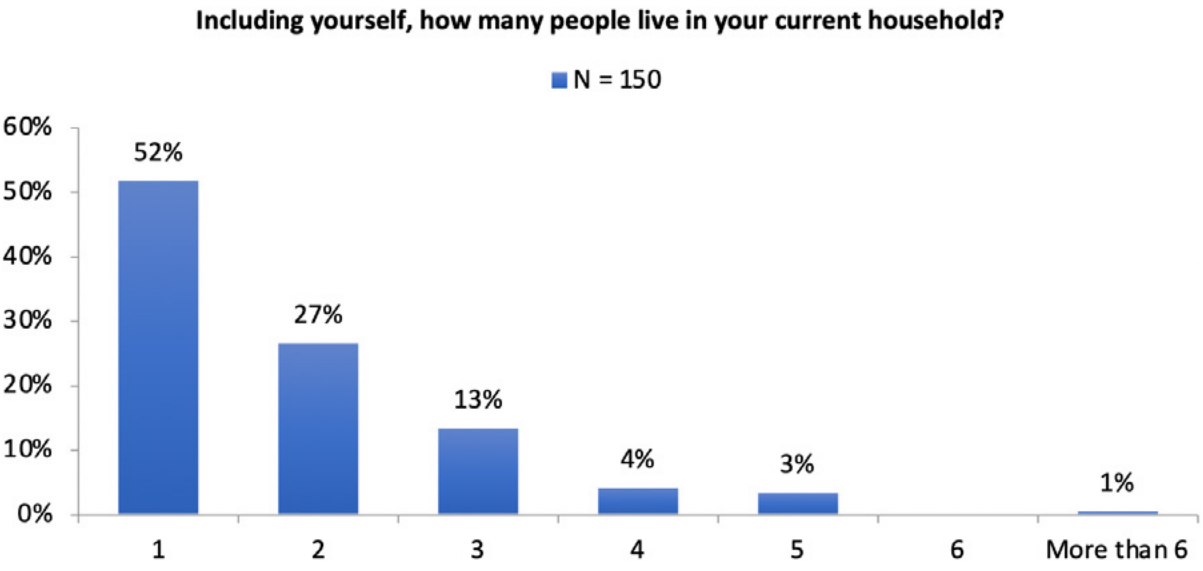


Figure A-21 *After Survey – Household Dynamic*

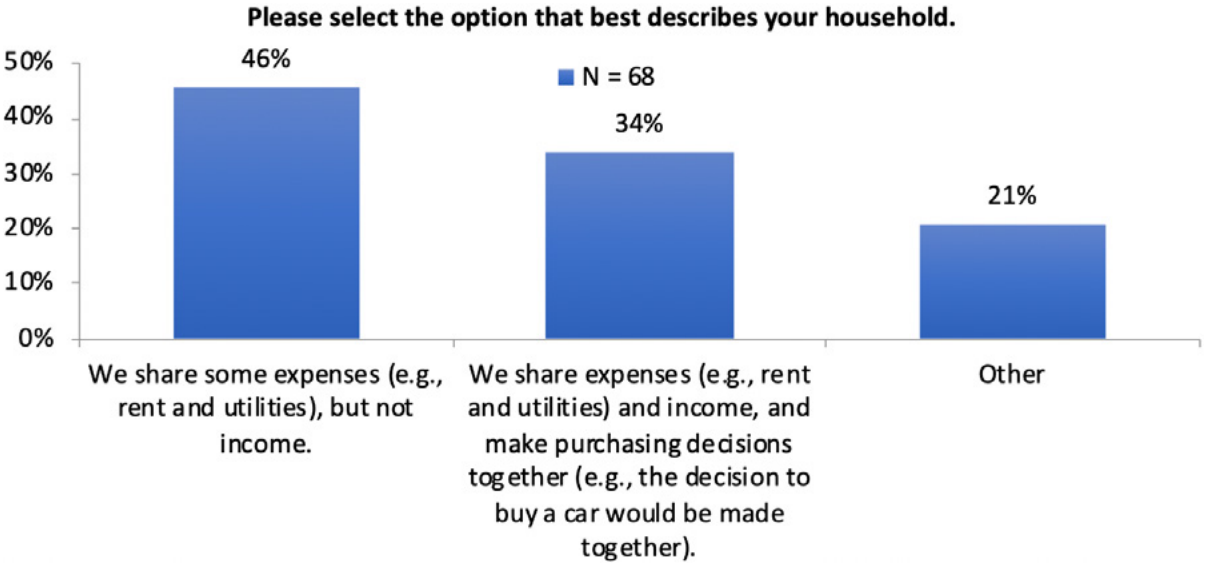


Figure A-22 *After Survey – Household Relation*

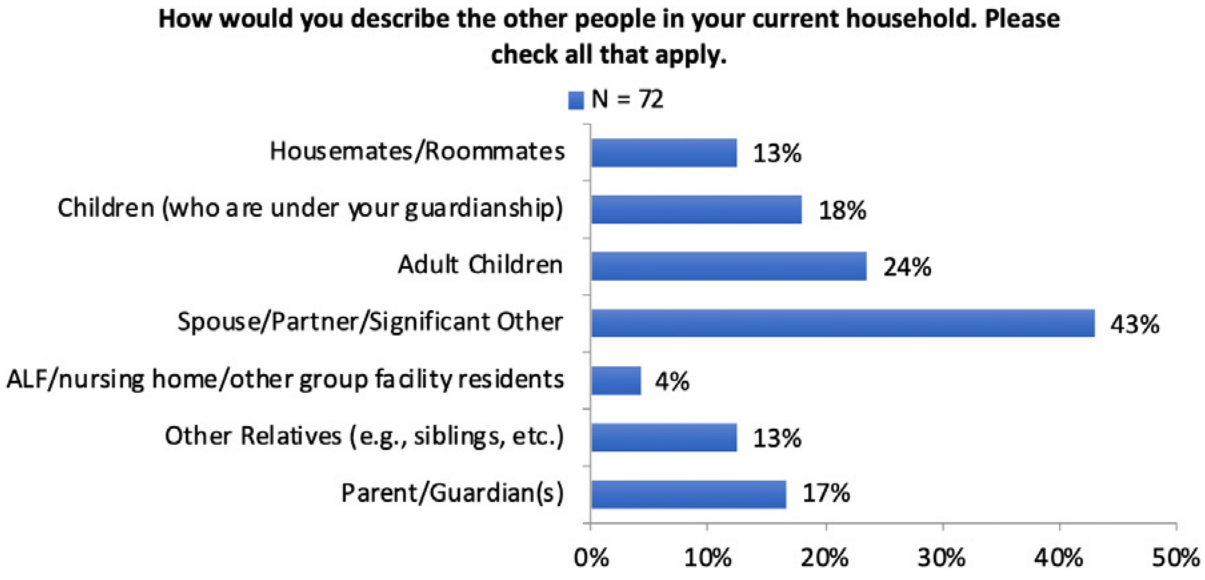
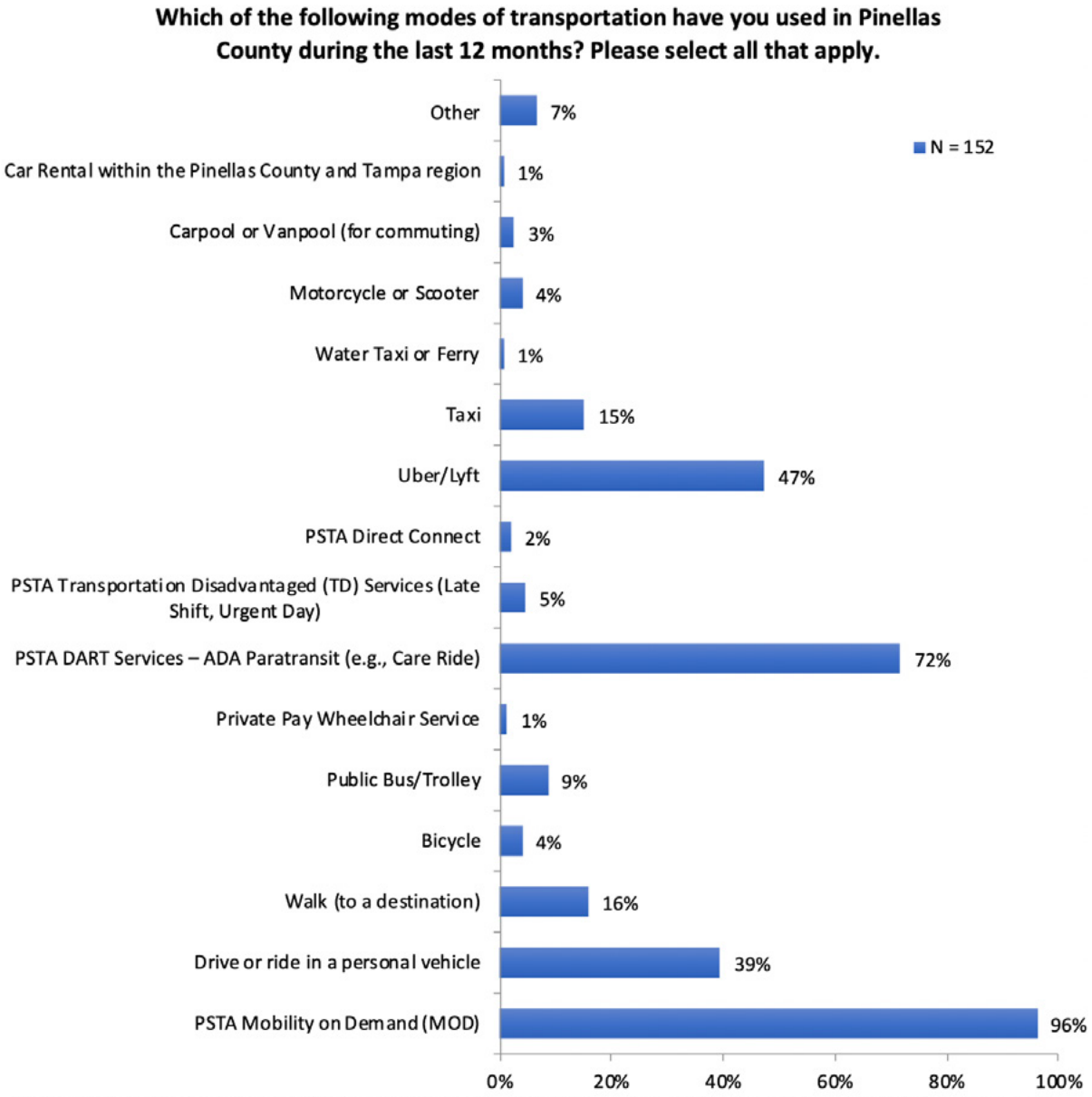


Figure A-23 *After Survey – Mode Share Distribution*



Note that data labels are rounded to the whole percent. Some data displayed with equal labels may differ by one or more tenths of a percent in actual value.

Figure A-24 *After Survey – Mode Frequency of Use Distribution*

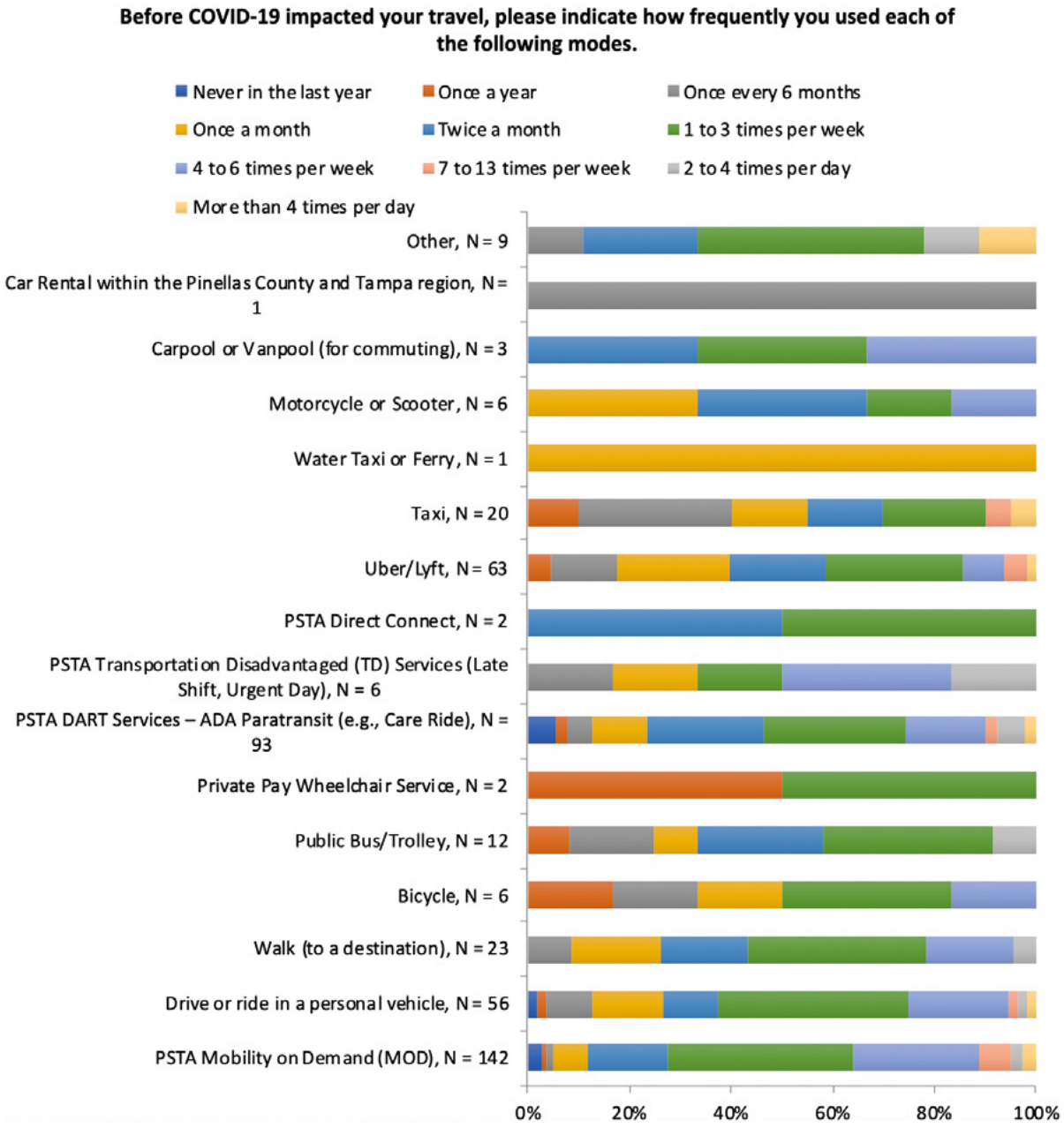


Figure A-25 *After Survey – PSTA MOD Use*

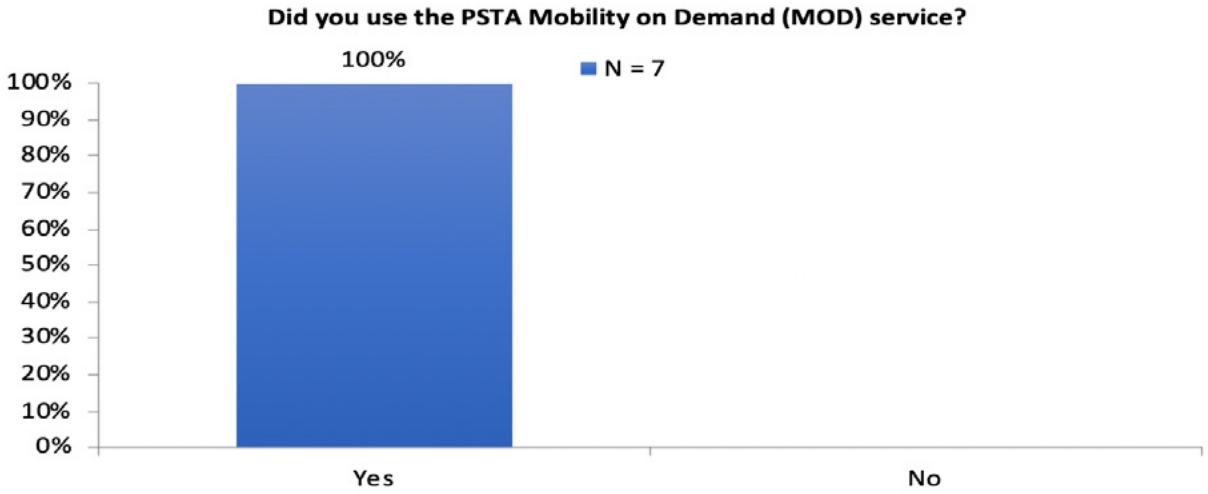
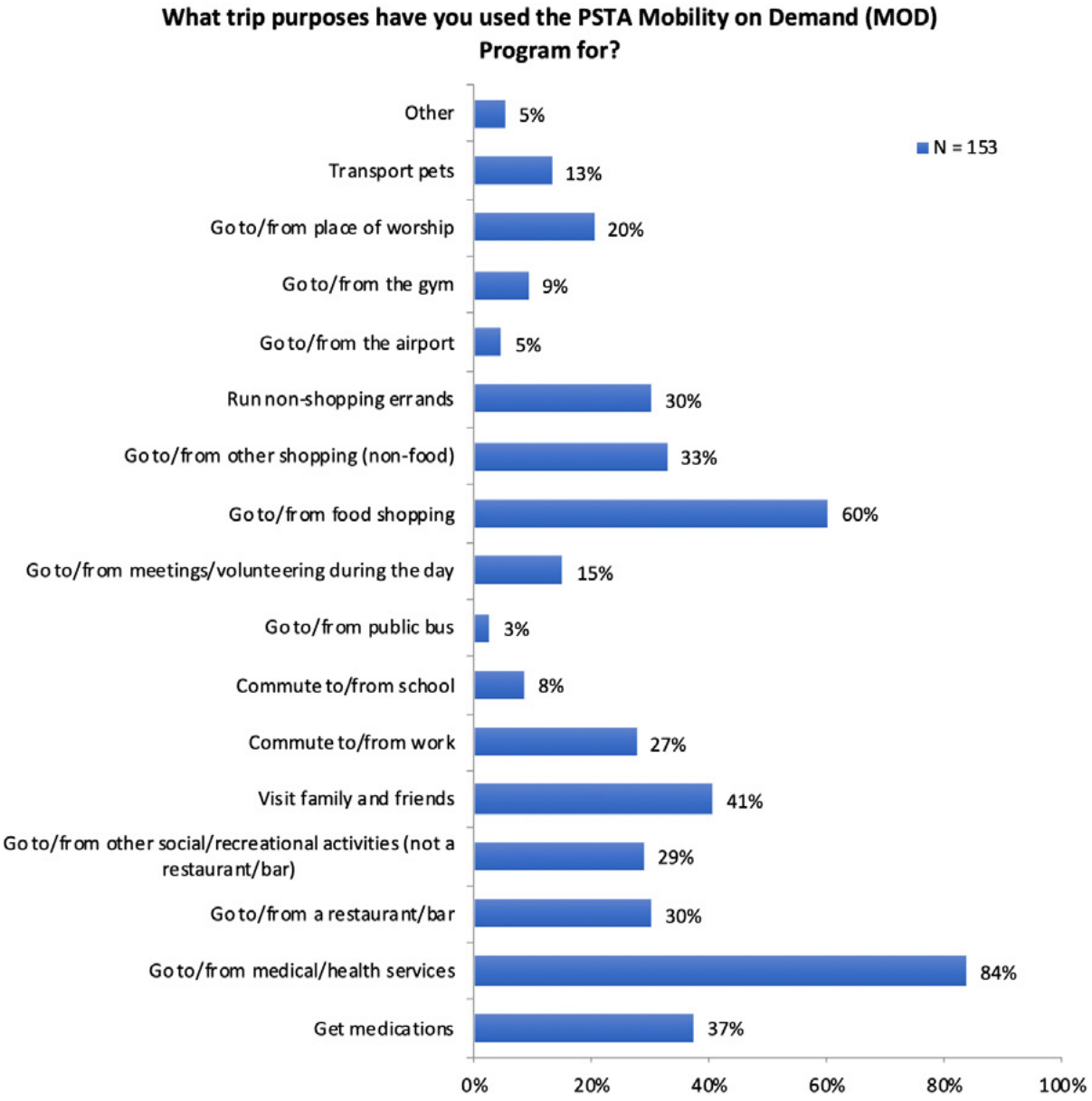


Figure A-26 *After Survey – PSTA MOD Trip Purposes*



Note that data labels are rounded to the whole percent. Some data displayed with equal labels may differ by one or more tenths of a percent in actual value.

Figure A-27 *After Survey – PSTA MOD Advanced Booking*

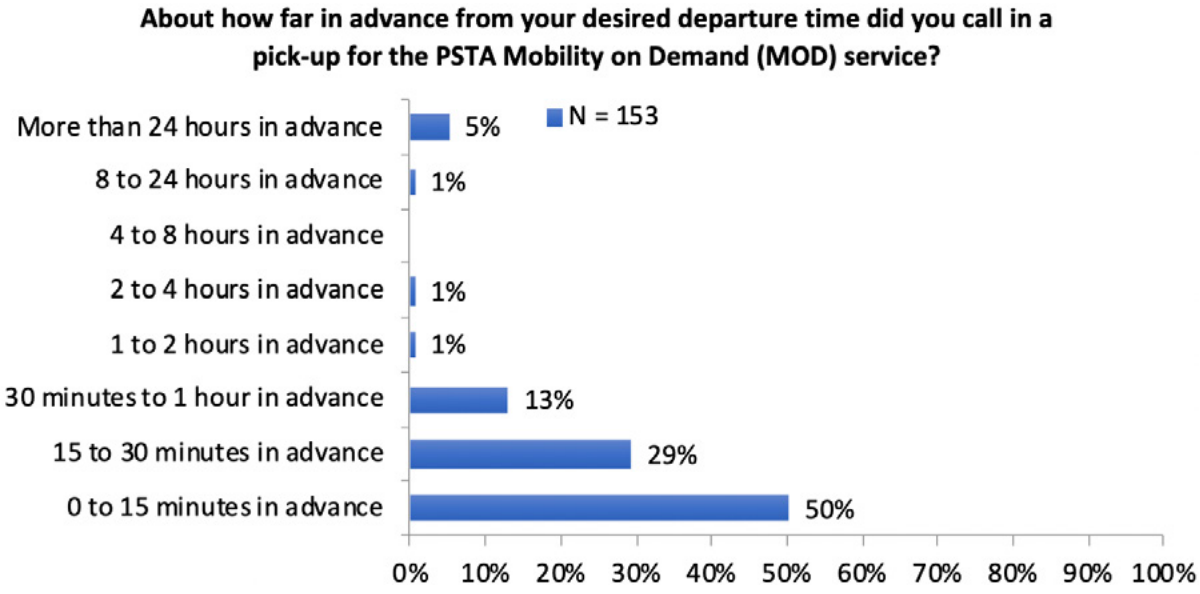


Figure A-28 *After Survey – Effect of PSTA MOD on Mode Frequency of Use*

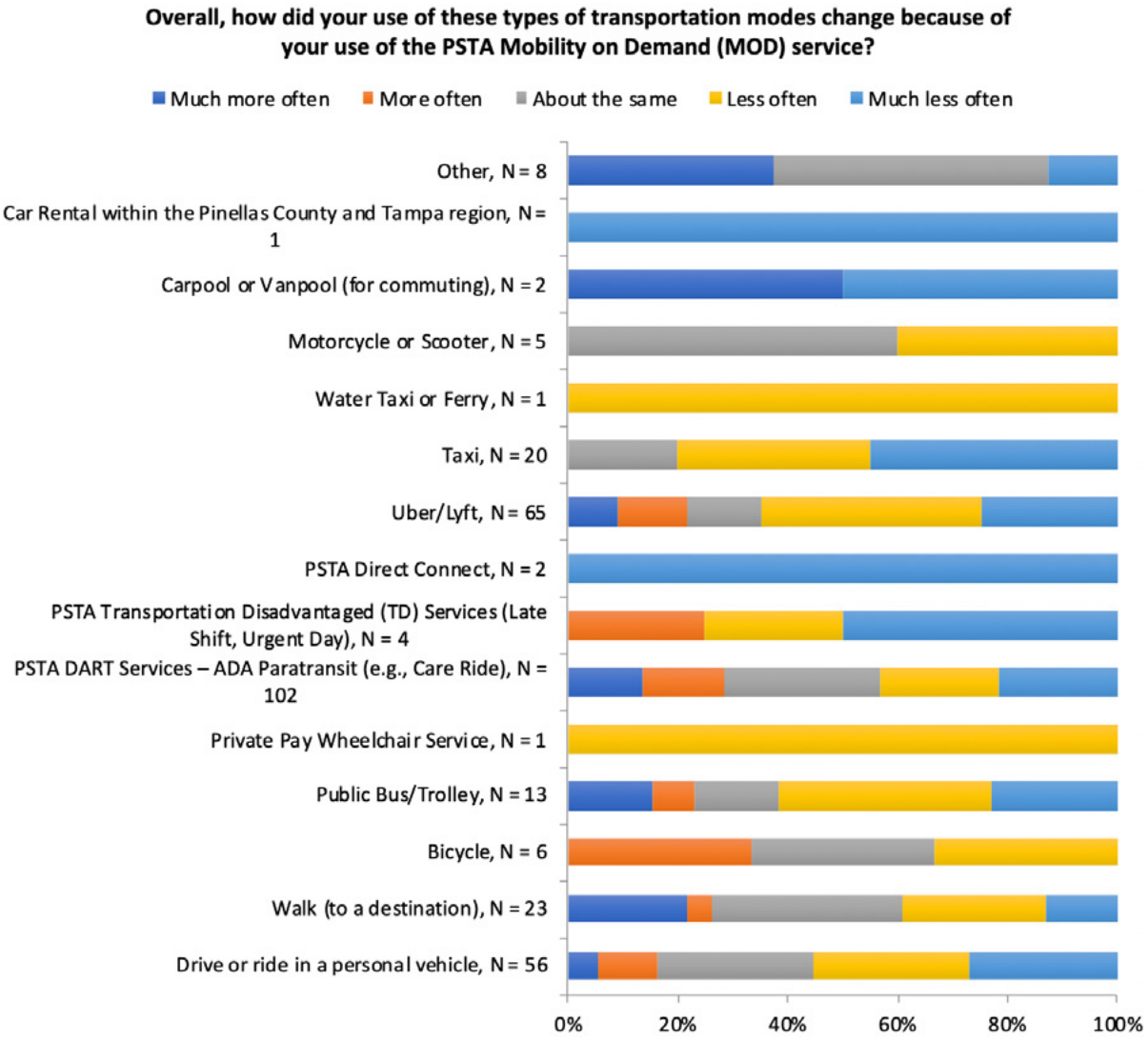


Figure A-29 *After Survey – Personal Disabilities*

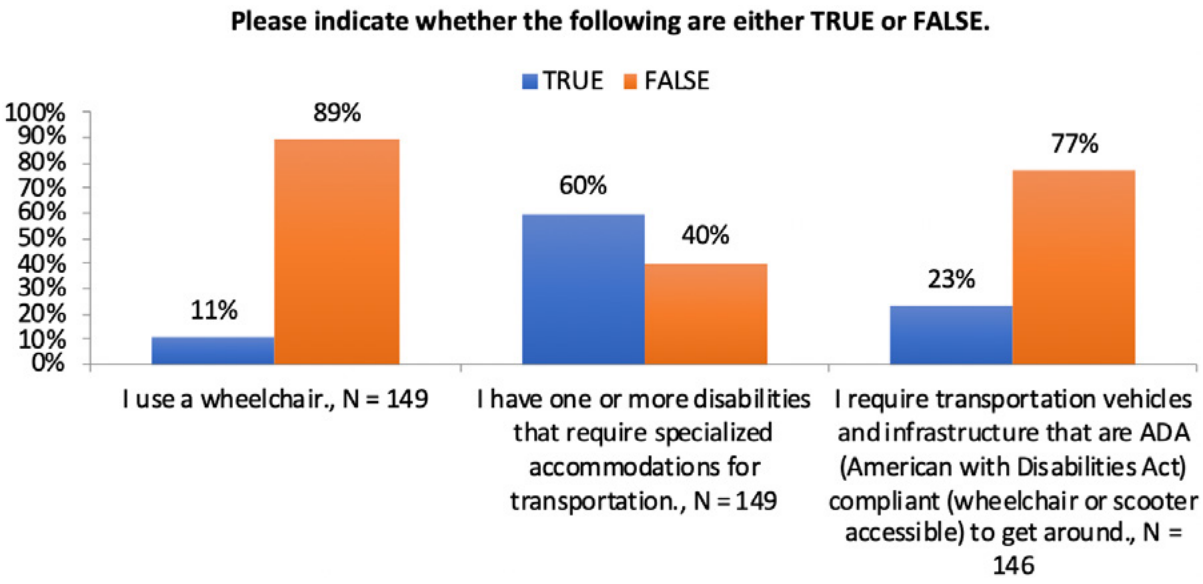
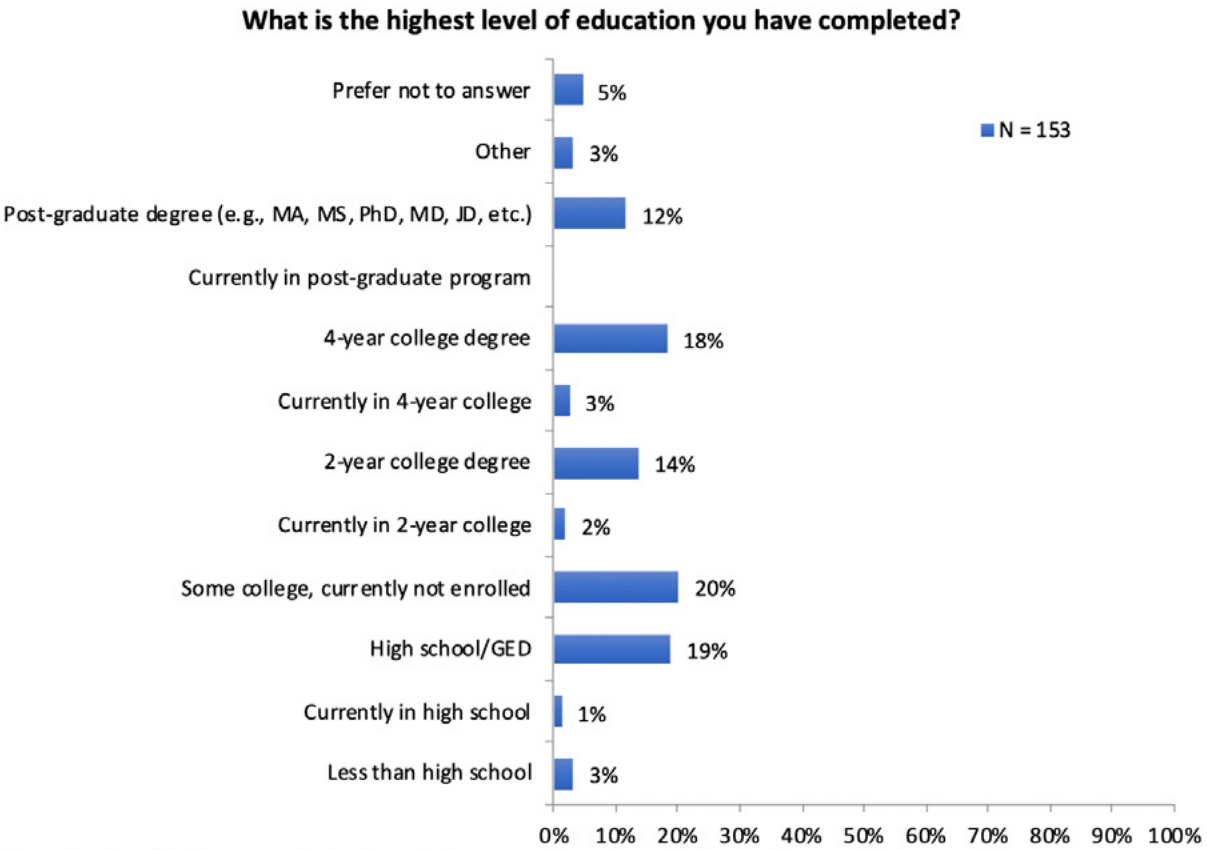
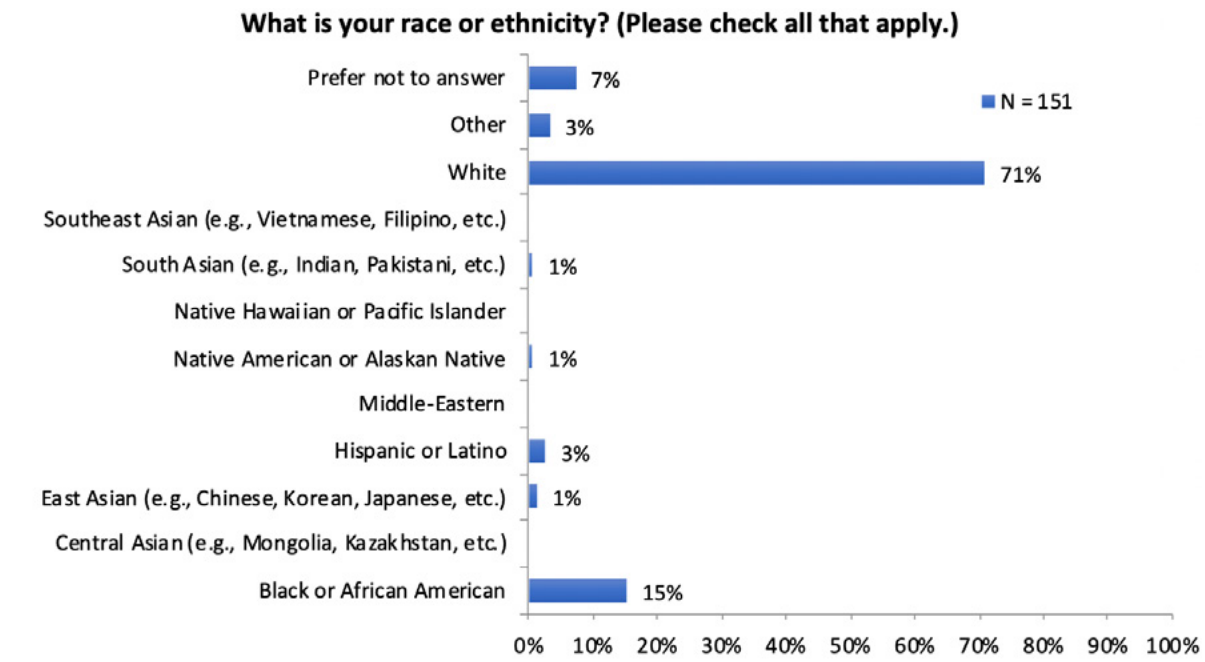


Figure A-30 *After Survey – Personal Disabilities*



Note that data labels are rounded to the whole percent. Some data displayed with equal labels may differ by one or more tenths of a percent in actual value.

Figure A-31 *After Survey – Race or Ethnic Identification*



Note that data labels are rounded to the whole percent. Some data displayed with equal labels may differ by one or more tenths of a percent in actual value.

Figure A-32 *After Survey – Household Age Groups*

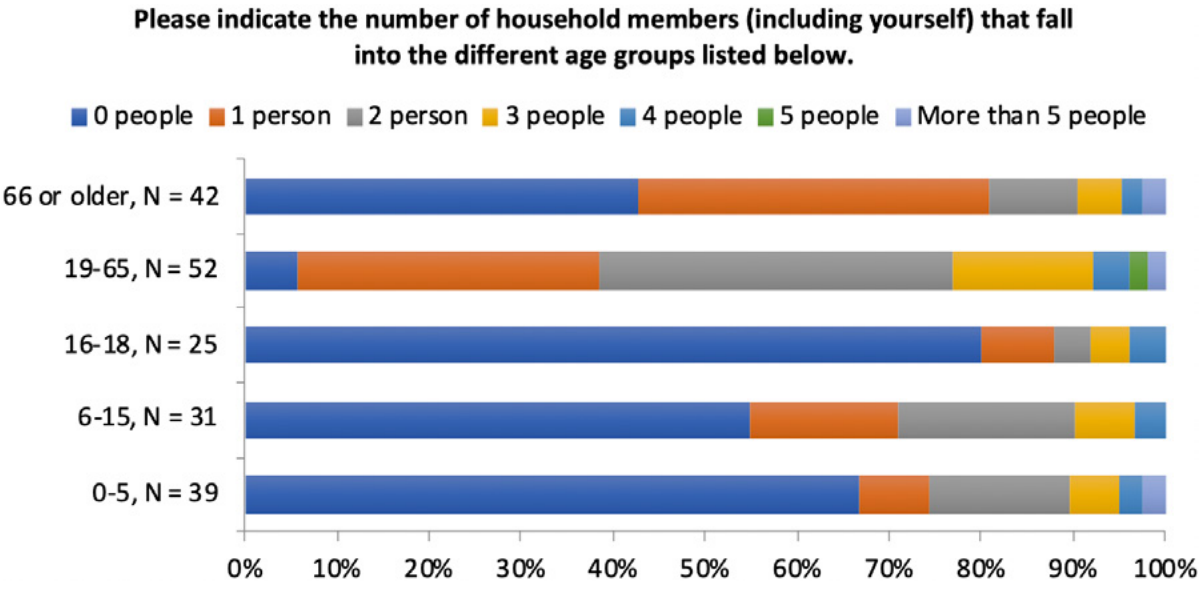


Figure A-33 *After Survey – Household Income*

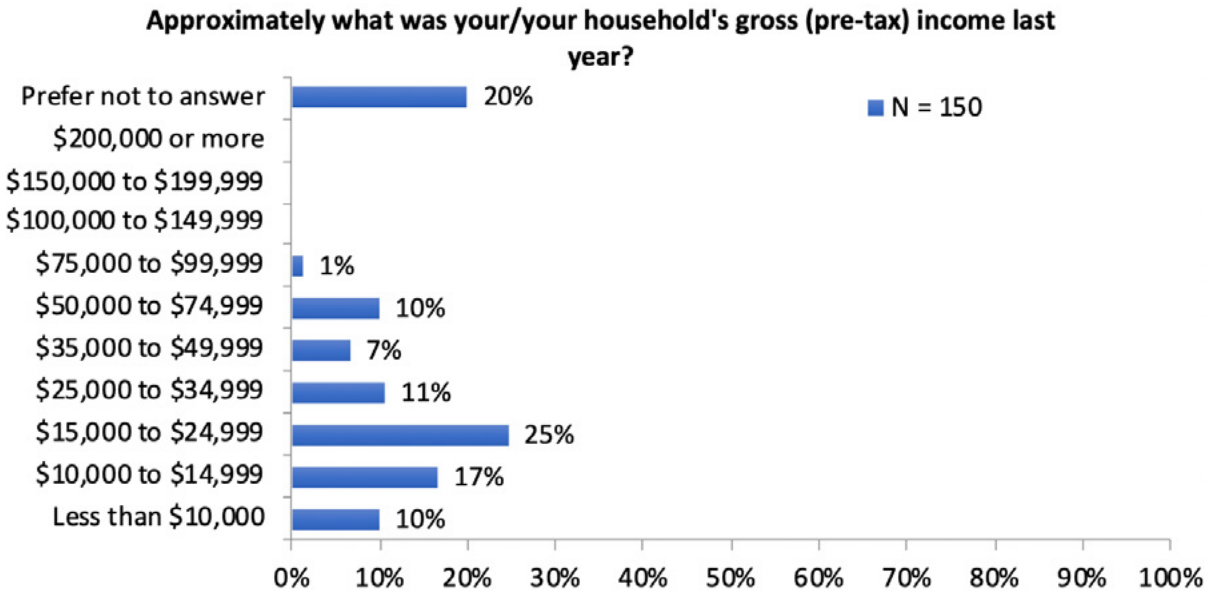


Figure A-34 *After Survey – Employment Status*

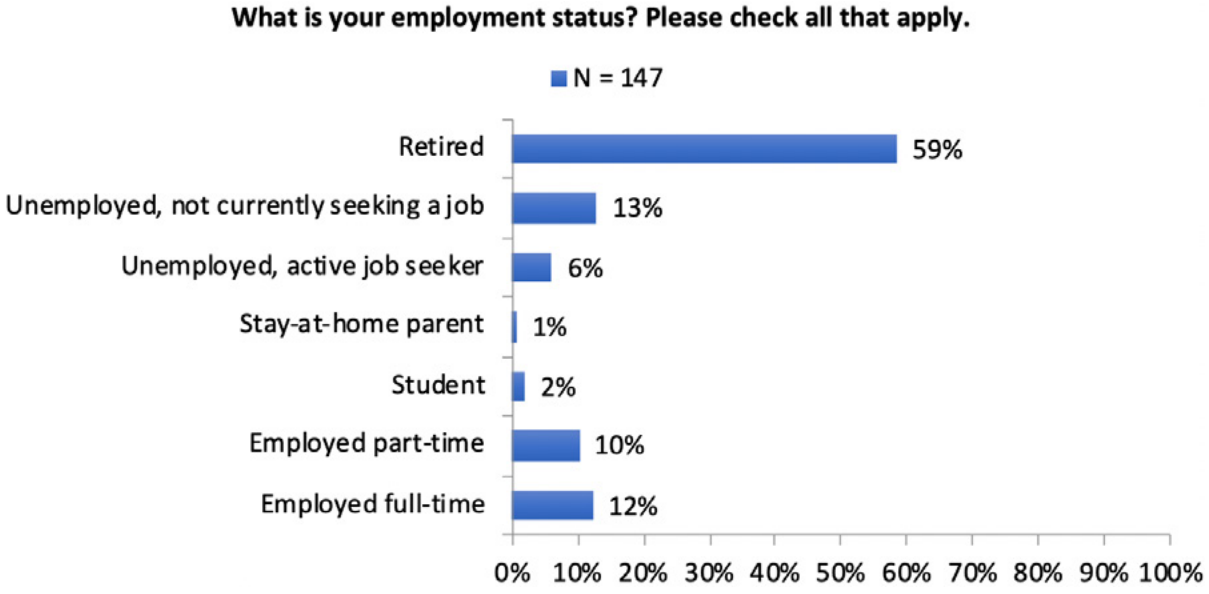
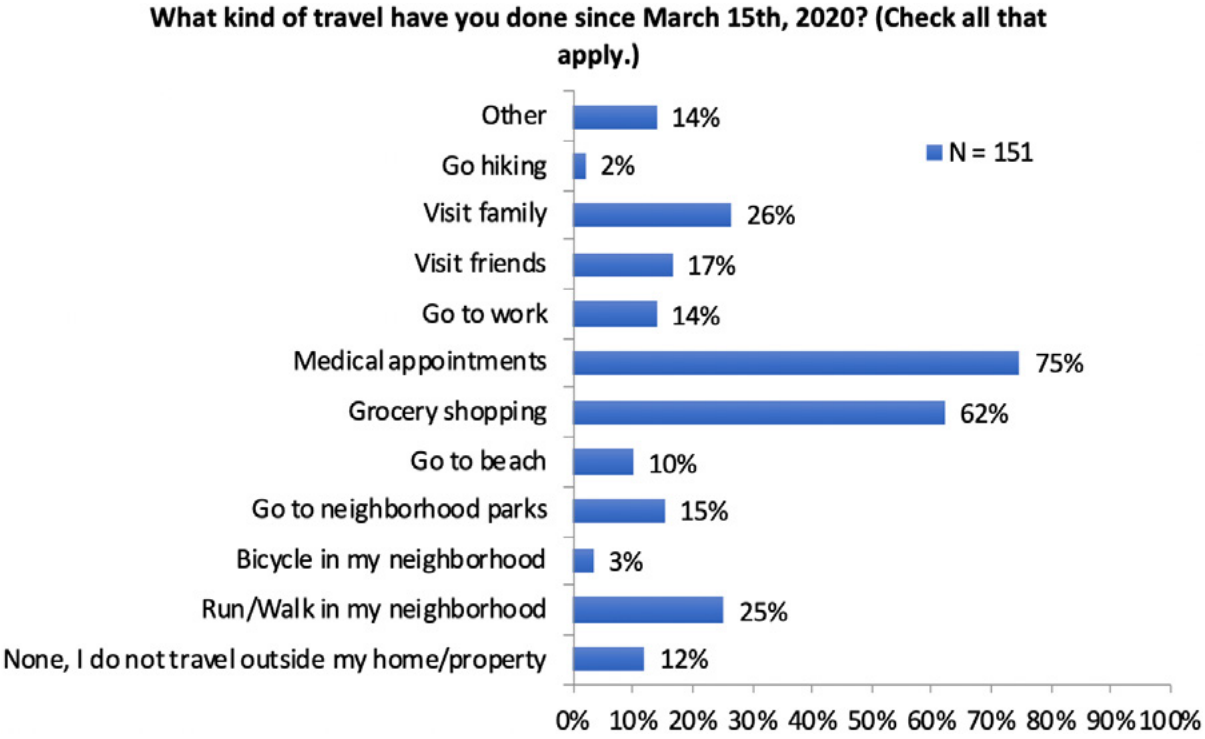


Figure A-35 *After Survey – Travel during COVID-19 Pandemic*



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