Assessing the Experience of Providers and Users of Transportation Network Company Ridesharing Services

Final Report

by

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May 2019

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ACKNOWLEDGMENT

TECHNICAL REPORT DOCUMENTATION PAGE

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.

4. Title and Subtitle	5. Report Date
Assessing the Experience of Providers and Users of Transportation Network Company Ridesharing Services	May, 2019
	6. Performing Organization Code

7. Author(s)	8. Performing Organization Report No.
Eric A. Morris, PhD; https://orcid.org/0000-0001-8690-6644 Angela N. Pratt, PhD; https://orcid.org/0000-0002-8325-5548 Anne Brown, PhD; https://orcid.org/0000-0001-5009-8331 Sakib M. Khan; https://orcid.org/0000-0002-3491-5562 John L. Derochers; https://orcid.org/0000-0002-7367-2647 Harry Campbell; https://orcid.org/0000-0002-1484-2204 Mashrur Chowdhury, PhD; https://orcid.org/0000-0002-3275-6983	

9. Performing Organization Name and Address	10. Work Unit No.
Department of City Planning and Real Estate Development Clemson University Lee Hall 2-315, Clemson, SC 29634 Clemson, SC 29634	
	11. Contract or Grant No.
	69A3551747117

12. Sponsoring Agency Name and Address	13. Type of Report and Period Covered
Center for Connected Multimodal Mobility (C^{2}M^2) Clemson University 200 Lowry Hall, Clemson Clemson, SC 29634	Final Report (09/20/2017 - 5/31/2019)
	14. Sponsoring Agency Code

15. Supplementary Notes

16. Abstract

This report studies driver and traveler attitudes towards UberPool and Lyft Shared, Uber and Lyft's services that take advantage of data connectivity and analytics to match travelers on the fly so they can share rides. We conducted a survey of over 300 drivers and over 1100 Uber/Lyft travelers in the cities where shared service is offered. We included travelers who use the services regularly, those who have tried the services but have given them up, and those who use Uber/Lyft but do not use the shared services. We also mined Twitter and examined over 2000 tweets about the services. We find that drivers tend to be dissatisfied with providing these services, citing what they perceive to be unfair compensation, the difficulty of the work (such as picking up and dropping off numerous passengers), and problems dealing with passengers (for example when passengers do not get along with each other or become frustrated with the travel time). Passenger attitudes are more mixed, with passengers appreciating the cost savings but citing problems such as long travel times and unreliability. Some users and non-users, particularly women, also express concerns about safety. The social experience and helping the environment do not appear to be major attractions for riding, although we find that sharing humorous anecdotes about other passengers has become something of a meme on Twitter. We find that a substantial number of respondents will not try the services or have given up use of them, and thus we offer numerous suggestions for improving shared service, including increasing driver compensation; changing the pricing system by increasing the cost of non-shared rides and reducing and restructuring the cost of shared rides; and improving the social experience, for example by allowing passengers to rate each other, more aggressively banning bad passengers, allowing women the option of sharing with only women, and using Facebook to inform passengers when they have things in common.

17. Keywords	18. Distribution Statement
UberPool; Lyft Shared; Dynamic Ridesharing; TNC; Ridehailing; Uber; Lyft	No restrictions.

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
Unclassified	Unclassified	156	NA

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EXECUTIVE SUMMARY

This research, conducted under the auspices of the Center for Connected Multimodal Mobility (C^2M^2), a United States Department of Transportation Tier 1 University Transportation Center, focuses on transportation network companies (TNCs) which provide connected mobility services. Without doubt, TNCs, such as Uber and Lyft, are reshaping urban transportation. By using connectivity and data analytics to link drivers and riders in real-time using smart phone technology, they have shaken up the taxi industry by making it far easier to hire on-demand rides. However, these services threaten to put more vehicle miles traveled (VMT) on the roads. One potential way to combat rising VMT is to encourage more people to hail shared ride services, such as Uber and Lyft's services entitled "UberPool" and "Lyft Shared" (formerly called "Lyft Line). Shared ride services involve taking advantage of real-time connectivity to match travelers who have similar origins and destinations; these passengers then share the rides for parts of their journeys. If successful, it is possible that Pool and Shared will increase vehicle occupancy and allow travelers to enjoy the convenience of Uber and Lyft travel while causing less pollution, congestion, and crashes. However, given that Americans have become accustomed to fast, direct, and private travel, it remains to be seen whether shared services, which face issues such as unpredictable delay and potentially awkward social situations, have the capability to serve a large share of travel.

In an effort to generate ideas on how to improve shared and connected mobility services so that they can attract new riders and retain existing ones, this study analyzes attitudes towards shared TNC travel on the part of both travelers (including those who do and do not use the services) and TNC drivers. We do so to see what barriers might be preventing people from making greater use of the services and how sharing might be made more appealing. We first analyzed existing research on, and opinions about, shared TNC service by academics, journalists, drivers, and users. We then conducted a large-scale online survey of 309 drivers and 1,125 TNC riders, including 365 current, ongoing users of Pool/Shared, 330 former users who have tried the services but do not plan to use them much again, and 413 Uber and/or Lyft users who have never tried the shared services. The survey sought to determine what people think about the services, why they do or do not use the services, what experiences they have had using the services, and what may make them more likely to use the services more frequently in the future. To determine how the services are discussed in the popular culture, we also analyzed commentary about them on the popular micro-blogging site Twitter.

In general, our survey results show that drivers are much less satisfied with providing the shared services than they are with providing non-shared service such as UberX or Lyft Classic. Nearly 60 percent of drivers stated they would refuse shared trips if it were easier to do so, and a majority of former drivers stated that having to provide the shared services was at least part of the reason they quit driving. The most common complaint was low compensation for shared rides relative to serving the trips individually through services like UberX and Lyft Classic. Further, many drivers also complained about other things such as indirect routing and excessive pick-ups, high stress, inadequate information from the app, and various issues about passengers, such as passengers who do not get along with each other or become disgruntled, and sometimes angry and frustrated with the

driver, due to the time their trip is taking. On the other hand, drivers did offer some positives about providing the services, such as the fact that they may bring more rides (reducing "deadheading" when the vehicles travel empty between rides, and helping drivers to achieve performance targets and win bonuses from Uber and Lyft, which are based on the number of rides given), the fact that they drivers appreciate that they are saving their passengers money, and the fact that the social interactions between passengers can be enjoyable.

To determine who uses the shared and connected mobility services, we ran a multinomial probit regression model to determine which demographic characteristics contribute to the likelihood of being in one of our three groups: ongoing riders, former riders, and TNC riders who have never shared. We find that those with more vehicles in the household have a considerably lower likelihood of trying shared service and being a regular user, all else equal. We also find that being black or Hispanic is associated with a higher probability of trying the services, but also a higher likelihood of discontinuing using them, so that blacks, Hispanics and whites have about an equal likelihood of being ongoing users, all else equal. Finally, we find that men and women are about equally likely to try the services, but that women are more likely to discontinue use of them than men are, again holding all other variables constant. The latter finding probably is related to the fact that women are more likely than men to rate safety as a concern, with women former riders ranking safety much more highly as a reason they stopped using the services than men did. Further, female ongoing riders rated the social experience of sharing as considerably less of an enticement for riding than men did.

As would be expected, former users rate their satisfaction with the shared services much lower than their satisfaction with solo services like UberX or Lyft Classic; ongoing users also rate their satisfaction with the shared services lower than solo TNC travel, but by a much smaller amount. When users were asked what they like about the shared services, by far the most common response was the monetary savings. Some travelers praised the convenience of the services and the fact that they typically don't take too long. Some said they enjoy the social experience involved with sharing, and a few said they enjoy helping the environment. Common complaints were about excessive pick-ups and travel times, seemingly irrational routing, unpredictable trip durations, inaccurate predictions by the TNCs of how long the trip would take, crowding in the vehicle, and problems with the behavior of other passengers such as odor, rudeness, talking loudly on the phone, drunknesses, not being ready for the pickup, or simply being too talkative.

In terms of why people use the services, by far the most prominent reason given by ongoing riders was the cost savings. Enjoying meeting others rated dead last among the 12 choices given to ongoing riders as to why they share. Interestingly, the social dynamic of sharing with strangers was cited as both a positive and a negative by riders, but the preponderance of opinion seems to be that it is on balance a negative. Non-riders gave excessive travel time, unreliability, not wanting to meet and share with others (including both the social experience and safety concerns), and possible overcrowding of the vehicles as the four most important reasons they do not use the services. When we asked former riders why they gave up on the services, the unreliability of travel time was the

most important reason by a considerable margin, with long travel times and not liking sharing the vehicle with others in second and third. It is also worth noting that most former riders gave up on the services after a limited number of experiences with them.

We asked travelers in all three groups riders how much they would pay for shared service with varying levels of delay. The results show that there is a price at which non-users and even former users could be enticed to use the services, but that they would require very steep discounts, particularly if the trip involves a long potential delay, in order to do so.

Riders reported that if the shared services were not available they would replace the largest share of the trips they currently take with Pool/Shared with solo TNC service, but many of the trips would be taken by personal vehicle and transit. Few shared trips would be replaced by walking or not taking the trip at all. On balance, this suggests that shared service is contributing to sustainability.

Our analysis of Twitter commentary on the shared services show that negative online commentary is more prevalent than positive commentary, though this may be the result of the fact that customers generally tend to pass along negative "word of mouth" about products and services more frequently than positive. Much more prevalent on Twitter than straightforward praise or complaint about the services, however, were humorous stories and commentary about the unusual or amusing behavior of other passengers; passing on such stories seems to have become something of an online meme.

We conclude by offering policy recommendations for how the services might maximize the positives and minimize the negatives in order make drivers happier and to attract and retain more riders. In terms of the former, an obvious possibility is raising driver compensation. The TNCs might also better publicize to drivers the fact that in some ways the shared services are increasing compensation, such as by increasing the size of the customer base and leading to less deadheading. Other possible changes would be giving drivers more information (such as the destinations of the rides in advance of when they begin), and giving drivers a greater ability to refuse shared rides (they currently have some ability to do this, but can be penalized if they do it too often).

In terms of attracting more riders, the most obvious possibility is reducing the fare for shared rides. In addition to a straightforward fare cut, the fare system might be restructured in certain ways, like offering a small discount for each pick-up along the route or giving a discount if the travel time far exceeds the initial prediction. Restructuring the rider loyalty rewards program (Uber recently launched this) to more heavily reward Pool/Shared versus solo rides (currently solo rides count twice as much as Pool rides) may be worth exploring. Conversely, in some ways the TNCs might incentivize sharing by increasing fares. For example, the price of solo rides might be raised in order to make sharing more attractive, and there might be greater financial penalties to disincentivize bad behavior when sharing such as not being at the pickup point on time.

Some unpredictability and indirect routing are part and parcel of a shared service, but Uber and Lyft should continue to optimize their algorithms for matching riders to cut down

on excessive delay. Other potential policy changes to address driver and rider dissatisfaction with routing and travel times might including limiting the number of pick-ups and drop-offs a rider has to endure in any given trip, giving riders a longer projected travel time upfront to reduce disappointment with the trip, and reducing vehicle crowding through either fewer passengers per vehicle or larger vehicles.

A number of policies might improve the social experience of sharing. Passengers might be allowed to rate each other, the TNCs might promulgate a "code of conduct," the services might be more aggressive in banning "bad" riders, passengers might be given more control over whom they share with (for example women might be given the option of sharing only with women), and Facebook profiles might be used to alert riders when they have friends or interests in common with their co-travelers.

Finally, the shared and connected mobility services might be advertised better. For example, the TNCs might get the word out about the positive social encounters that take place while using the services; some of our riders reported making friends during shared rides.

Not all of these policy recommendations are equally feasible or desirable, and some would be more effective than others. Recommendations we find promising would be 1) to reduce fares by offering a discount for each pick-up during the trip, offsetting the revenue loss by increasing fares for solo TNC services like UberX and Lyft Classic, 2) to offer a discount when a trip greatly exceeds the ETA the rider is given at the beginning of the trip, 3) to explore the possibility of allowing women to share only with women, 4) to move ahead with the idea of using Facebook profiles to promote social bonding among riders, 5) to allow passengers to rate each other, and 6) to raise driver compensation for shared rides.

CHAPTER 1

Introduction

Pool and Shared – Why We Should Care

Our vision for the Center for Connected Multimodal Mobility (C^{2}M^2), a Tier 1 University Transportation Center, is to become a globally recognized multimodal mobility innovation center for moving people and goods, specializing in connectivity, data analytics and automation. To achieve this bold vision, our multidisciplinary research team from five leading higher education and research institutions in the state of South Carolina are working together to create and develop new initiatives and inventions by combining our complementary research strengths, our education and workforce development activities, our commitment to diversity, and our expertise in emerging communication and computing technologies.

The Center for Connected Multimodal Mobility (C^{2}M^2) Mission Statement

This research was conducted under the auspices of, and funded by, the Center for Connected Multimodal Mobility (C^{2}M^2), a United States Department of Transportation Tier 1 University Transportation Center). C^{2}M^2's vision is to serve as an innovation center for transforming multimodal transportation through connectivity, data analytics, and automation. It focuses on advancing the use of technology and connectivity to foster more efficient and effective mobility for our society. C^{2}M^2 addresses the USDOT's priorities of:

» Promoting access to opportunities and equity
» Improving the mobility of people and goods
» Optimizing passenger movement

Specifically, this research explores connected mobility as it is being developed by the transportation network companies (TNCs) Uber and Lyft. Without doubt, the rise of these firms and other TNCs like them is shaking up urban transportation. Taking advantage of the connectivity enabled by cell phone and internet technology, TNCs have revolutionized the previously stodgy and unresponsive taxi industry. By allowing travelers to use their cell phones to call for-hire rides wherever and whenever they want them, TNCs have made hailing a ride vastly easier compared with the days of standing on a street corner hoping a cab would happen by. Because riders have an account where their credit card is on file with the TNCs, the process of paying for a ride has also become more convenient. By allowing passengers to rate their driver through the app, TNCs have given new incentives to drivers to provide better service.

In many ways TNCs have made life easier for drivers as well. TNCs typically work with "partners" who are considered independent contractors and who may drive wherever and whenever it is convenient for them. Because TNCs don't pick up "street hails," they are not subject to many of the regulations that apply to taxi drivers, such as the need to

purchase a very expensive "medallion" in order to provide rides. So it is now much easier for people to provide taxi service as a full-time job or a part-time "gig."

As a result of these advantages, "ridehailing" service has been growing dramatically in the U.S. and across the world. Note that throughout this report we will use the term "ridehailing" to describe these services. In the past, they were sometimes described as "ridesharing" services, but use of this label is being discontinued (for example by the Associated Press Stylebook) because it is quite misleading; most TNC trips do not involve sharing the vehicle at all, except with the driver. This report focuses on services that involve the actual sharing of rides with other passengers, so when we use the terms "sharing" or "ridesharing" we refer specifically to TNC trips that pick up and drop off multiple passengers, reserving use of the term "ridehailing" to describe TNC service in general.

Uber, the leading ridehailing firm, was founded less than 10 years ago and did not launch its first service, in San Francisco, until 2011. In just seven short years, Uber has expanded to 814 cities in 84 countries across the world (Uber Estimator, 2018). It had provided 10 billion rides globally by September 2018 (DMR, 2018), including four billion rides globally in 2017 alone (Bosa, 2018). Uber has been rapidly growing; in the second quarter of 2018 its revenue rose 63% year-over-year (Iqbal, 2019). Uber has a dominant market share of roughly 65-80% of the U.S. ridehailing market (Bosa, 2018).

Many other firms are following Uber's lead, including Didi in China and Ola in India. In the U.S., which is the focus of this report, Uber's main competitor is Lyft, which provided roughly 375 million rides in 2017 in the U.S. and Toronto, for a total of one billion rides by 2018 (Frommer, 2018). Lyft reported 168% growth in the year 2017 (Frommer, 2018). Estimates vary, but Lyft serves nearly all of the U.S. market not currently served by Uber (Bosa, 2018; Gessner, 2019), particularly outside of New York City. Other, much smaller, competitors include Gett, Via, and Juno. In total, TNCs are estimated to have served 2.6 billion rides in the U.S. in 2017 (Schaller, 2018).

As we have noted, the rise of TNCs has brought great benefits for urban transportation. Supporters argue that Uber and Lyft offer people a form of fast, flexible, convenient, and economical mobility in urban areas; reduce vehicle ownership and the need for parking spaces by increasing the occupancy of private vehicles and making it easier to lead a "car-free" lifestyle; fill gaps in the public transit network; and achieve higher efficiency than taxis in terms of the capacity utilization rate, which is the fraction of time or miles that the drivers have a passenger in the car (Cramer & Krueger, 2016; Dawes, 2016; Gil, 2017; Henao & Marshall, 2018; Rayle et al., 2016; Rogers, 2015; Zhen, 2015).

However, given its explosive growth, it is not surprising that ridehailing has been the subject of intense public scrutiny and debate. The services have plenty of detractors. Some of the controversies surround the effects TNCs have had on the taxi industry and cab drivers; Uber's aggressive business practices under former CEO Travis Kalanick; Uber's battles with regulators worldwide; TNCs' treatment of their driver "partners" and

whether their drivers are employees or independent contractors; and the appropriate role of government regulation and supervision of the industry.

Some think Uber and Lyft unfairly compete with other transportation modes, mainly public transit and taxis. The established taxi industry criticizes the TNCs for entering its markets without following the onerous regulations taxis face, and for undercutting their fares (Gil, 2017; Rogers, 2015). By offering lower-priced service that is easier to hail, TNCs have certainly caused a seismic shakeup in the taxi industry, as evidenced by the fact that taxi medallions in New York, which once sold for as much as $1.3 million, are now changing hands for prices as low as $160,000 (Walker, 2018). Taxi ridership in the U.S. was cut in half between 2012 and 2017 (Schaller, 2018). Uber has been blamed for depression, despair, and even suicides among taxi drivers (Fitzsimmons, 2018).

As for transit, the effects are more unclear. Uber and Lyft maintain, with some justification, that their services can complement public transit system by providing the "first-mile, last-mile" connection, allowing the use of transit in cases where riders might have origins or destinations that are not within walking distance of transit stops. Hall et al. (2018) examine the impact of Uber on public transit ridership from 2004 to 2015 in 196 Metropolitan Statistical Areas (MSAs) in the U.S. where Uber is available. They find that, overall, the entry of Uber into an MSA is associated with increased public transit ridership, and that the magnitude of the association increases over time, suggesting TNC services do complement public transit systems.

However, it is also clear that in many cases TNCs actually compete with transit, as well as active modes like walking and bicycling (Campbell, 2016; Gehrke et al., 2018; Graehler et al., 2019; Rayle et al., 2016). Although data on the subject is limited, Clewlow and Mishra (2017) conducted a survey of TNC riders and find that 49% to 61% of the trips made by TNCs either would have not been made or would have been made via other transportation modes (particularly transit). A survey by Gehrke et al. (2018) reaches similar conclusions, finding that 59% of the ride-hailing trips would have been made by alternate modes. In a contrast to Hall et al.'s findings, Graehler et al. (2019) used data from National Transit Database, American Community Survey, U.S. Census Bureau, Bureau of Labor Statistics, U.S. Energy Information Administration, and other sources to analyze the determinants of the decline in public transit ridership in recent years among 22 transit agencies. They find that after the entry of TNCs into an MSA, heavy rail ridership experiences a 1.3% decrease per year, and bus ridership decreases 1.7% per year.

Further, Uber and Lyft are undoubtedly "inducing" trips that would not have otherwise been made without the services. Rayle et al. (2014) find that 8% of the 380 respondents to their survey reported they would not have made trips were Uber and Lyft unavailable, and Zhen (2015) finds that 27% of 89 survey respondents reported having made more trips with the help of Uber and Lyft, while only 6% made fewer trips.

In a sense, both modal shifts and induced travel are to be celebrated. Presumably, travelers would not be switching from alternate modes to Uber and Lyft if there were not substantial benefits in terms of things like travel speed, convenience, and comfort. New

trips facilitated by Uber and Lyft are allowing people to travel to work, school, social events, and all of the other out-of-home opportunities which are so important for quality of life.

However, the implications in terms of putting more private vehicles on the road are sobering. It seems almost certain that induced travel and modal substitution, plus the deadheading that Uber and Lyft cars do when driving empty between pick-ups and drop-offs, are putting more vehicles on the roads. Henao (2017) finds that the vehicle miles traveled (VMT) for the trips made by Uber and Lyft was approximately 184.6% of what it would have been without Uber/Lyft, considering the lower VMT that would have been created by the alternate modes that would have been used (such as personal vehicles, transit, car rental, walking, and taxis) plus induced travel. In another study, Schaller (2018) calculates that the TNC services put 2.8 VMT on the road for each mile of private vehicle travel they replace.

So while TNCs undoubtedly bring private benefits, the fact that they are adding substantially more VMT to the roads may have considerable social costs. Unless they are replacing trips that would have been taken by taxi or private vehicle, Uber and Lyft trips may exacerbate the familiar problems caused by excessive auto travel, including pollution, congestion, energy consumption, and crashes. The congestion issue is particularly vexing since Uber and Lyft's best markets are the centers of the largest, densest cities, which already suffer from the most traffic congestion.

Uber and Lyft are cognizant of this, and, in part to reduce excess VMT, they have introduced services entitled UberPool and Lyft Shared. (Note the latter service was formerly referred to as "Lyft Line.") These services take advantage of real time connectivity and data analytics to facilitate the sharing of rides among strangers with similar trip origins and destinations. Riders are offered a price discount if they are willing to do a Pool or Shared trip, and in exchange they accept that other passengers may be picked up or dropped off on the way to their destination. Uber and Lyft then seek to match riders "on the fly" if multiple passengers can be served without too much route deviation; for this reason, some have termed Shared/Pooled services as "dynamic ridesharing" (Sarriera et al., 2017). It is possible that no match will be made and a rider may get an "UberX ride" (UberX is the most commonly used single-passenger Uber service) for an UberPool price. Or it is possible that there may be substantial deviations from the route as multiple passengers are picked up and dropped off.

Clearly, Pool and Shared have the potential to offer substantial benefits. The empty seats in cars are perhaps America's greatest untapped transportation resource. Promoting ride sharing offers the potential to remove cars from the road, reducing congestion, crashes, and energy consumption, and improving air quality. There may be substantial economic benefits for riders, drivers, and the TNCs themselves, as it will be more economical to serve multiple trips simultaneously with the same driver and vehicle. For these reasons, Uber and Lyft have been promoting Pool and Shared aggressively, and rolling them out in more cities. As of this writing, UberPool is available in about 18 American cities, plus Mexico City and Toronto.

However, there are important questions about these services that need to be answered. Will customers be willing to accept lengthier and more unpredictable travel times? Will people be enthusiastic about the social experience of sharing a confined space with strangers? Will people consider these services to be safe?

And what about drivers? Are they happy with providing Pool and Shared trips? Is it more difficult to provide this type of service than driving single passengers straight to their destinations? How do drivers feel about their compensation for providing shared service? Will it reduce driver income to provide a large share of trips at a discounted rate instead of having everybody pay full price for solo rides?

It is these questions that this report addresses. We seek to determine what both drivers and travelers feel about Pool and Shared. We are interested in ways the services work well, and the ways in which they are producing happy travelers and drivers. But we also seek to determine what the sources of dissatisfaction are for travelers and drivers. We do this in order to generate suggestions for how the services might function better and overcome potential obstacles that might be preventing a broader swathe of travelers and drivers from using these services.

We have investigated UberPool and Lyft Shared in a number of ways. First, we conducted an extensive review of existing study of, and commentary on, these services. This includes academic literature, journalistic coverage, and websites and online bulletin boards where opinions about the services are proffered. We summarize our findings from this review below.

Second, we have conducted a survey of over 300 drivers and over 1100 travelers. We asked drivers about their level of satisfaction with the services and various aspects of them, and for ways in which the services might be improved. We selected travelers from three groups: current, ongoing Pool and/or Shared customers; people who have tried Pool and/or Shared but plan to rarely or never use them in the future; and users of non-shared Uber and/or Lyft services who have never tried Pool or Shared. We seek to understand why people do or do not use the services, what they like and do not like about them, what their experiences of using the services have been like, how they feel the services might be improved, and what make them more likely to use the services, or use them more frequently, in the future.

Finally, we have analyzed commentary on UberPool and Lyft Shared on the popular micro-blogging site Twitter. We examined over 2000 "tweets" (short messages) about the shared services to determine what passengers, drivers, and others are saying about their Pool and Shared experiences, both positive and negative, on social media. We are particularly interested in what this says about how sharing rides are perceived and discussed in the popular culture.

With the advent of the internet and smart phone technology, our world is getting more connected every moment. This connectivity has the potential to dramatically improve mobility and travel reliability while at the same time reducing pollution, congestion and

crashes. By capitalizing on these new developments in real-time connectivity and data analytics to match drivers and passengers, and make it far easier to hire on-demand rides, TNC connected mobility services providers are already reshaping urban transportation, and it is quite possible that the role they play will continue to grow in the future. But given that sharing rides is perhaps the only way we can enjoy all the benefits of TNC service without substantially increasing vehicle miles of travel (VMT), it is critical to understand how we can make ride sharing more attractive to travelers and drivers, and thus persuade more people to share vehicles. Or, if there are limits to how much travelers may ultimately be willing to utilize even the best-planned and implemented sharing services, we may have to confront the possibility that sharing will not solve the potential VMT problems caused by rising TNC use. It is these questions that we explore in this report.

CHAPTER 2
What Are Scholars, Journalists, Commentators, Drivers, And Riders Saying About Shared Rides?

2.1 Prior Perspectives on the Rider Experience

What are people saying about UberPool and Lyft Shared? Dynamic ride sharing is a very new form of transportation, with UberPool only being introduced at the end of 2014. As a result of this, and longtime lags in the academic publishing process, scholars are just beginning to weigh in on the various aspects of the services. So the large majority of available opinion about what people—both drivers and passengers—think about Pool/Shared appears in journalistic accounts, on bulletin boards where drivers congregate, and in other places where opinion is expressed online. These places may offer interesting anecdotal evidence about various aspects of the services, but may not be representative of broader opinion. Overall, though, it is clear that in a short time Pool and Shared have generated a lot of strong opinion, both positive and negative.

There are two extant studies of Pool and Shared riders that have appeared in the academic literature. Sarriera et al. (2017) did an online survey of people who live in the roughly 18 U.S. metropolitan areas where UberPool and Lyft Shared are available. They collected 752 responses. They find that a disproportionate share of travelers who use shared services are young (under 30), have no car, and are unmarried. Pool and Shared are used for a variety of trip purposes, from commuting to work or school, to airport trips, to leisure travel. The three reasons cited most by riders for why they use the services are reducing travel time, saving money, and enjoying the comfortable environment of traveling by car. They also mention upfront pricing (i.e., knowing the trip fare before a ride request is sent out), helping the environment by reducing the number of car trips, and excitement about the novelty of the business model. However, respondents did find a number of things to complain about, including the risk of being matched with an unpleasant co-rider, uncertainty about trip duration, and privacy issues. In all, users were about as likely to report shared trips as pleasant as they were to report them as unpleasant.

Sarriera et al. (2017) also find troubling evidence of prejudice among some riders, who professed negative opinions about having to share vehicles with people of different races and ethnicities, social classes, etc. Another study, conducted by Moody et al. (2019), also focuses on examining discrimination among sharing riders. They find that those who harbor negative feelings about characteristics of co-riders (measured by six survey questions regarding riders' opinion about sharing a Pool or Shared ride with people from different social, racial, and ethnic backgrounds) are also less likely to be satisfied with the shared services. Those who express prejudice also take a lower proportion of their TNC trips by the shared options, although this effect is only marginally significant. The authors also find that, among TNC riders who have not used shared services, a discriminatory attitude is negatively associated with the rider's likelihood of hailing a Pool or Shared ride in the future.

Opinion as expressed in more informal media such as journalism and online blogs corroborates these findings. Interestingly, our review has there found two aspects of Pool and Shared that are "double-edged swords." The first is the pricing structure. Certainly passengers appreciate the lower fares, and clearly this is one of the main appeals of the services. However, prior to hailing a ride, passengers must determine the value of the discount they are offered, and then make a mental calculation as to whether these monetary savings are worth the potential extra time that might be spent ferrying others (Koebler, 2016). Uber and Lyft provide estimated arrival times, but do not guarantee how long trips will take. Customers who select Pool and Shared therefore have only imperfect information when they opt in or out of a shared service; as a result, many are disappointed when trips take longer than expected or include lengthy or frequent detours (Fiorillo, 2016). On the other hand, when a match is not made and no other travelers are added to a passenger's journey (this happens quite frequently), the passenger gets an UberX trip for an UberPool fare; in this case she may be quite pleasantly surprised. It is thus unsurprising that anecdotal evidence suggests travelers have even adopted strategies to take UberPool but prevent the driver from picking up other riders (Kachroo-Levine, 2016).

To an extent, this unpredictability is part and parcel of making ridesharing work economically. It is not necessarily easy to match multiple passengers with similar origins and destinations in real-time. Picking up additional riders who appear "on the fly" during a trip is central to operating a successful ridesharing service. The requirement that there must be enough potential shared trips at specific times and in specific areas is probably the major reason that, despite the fact that UberPool has been in existence for over four years, it has only been rolled out in about 18 U.S. metropolitan areas and two abroad.

Uber and Lyft are aggressively promoting their shared ride services, no doubt in part to address criticism that TNC service is adding to VMT. Uber reports that 20% of Uber rides are by UberPool (Schaller, 2018), while Lyft reports about 35% of its rides are by Lyft Shared (and it aims for a 50% share by 2020) (Dickey, 2018). However, these statistics likely vary by city; for example, Brown (2018) finds that 29% of all Lyft trips in Los Angeles County made between September and November 2016 were on Lyft Line. These statistics may be misleading, however, as they report the share of passengers who request the shared services, not the share of passengers who are actually matched (as opposed to requesting Pool or Shared but getting a solo ride). Henao and Marshall (2018) have investigated this with a survey conducted in Denver, and find that among a total of 416 surveyed ridehailing trips, 54 riders requested shared rides, but only 8 of those trips (15%) were successfully matched with another rider.

To address rider complaints about long and/or frequent detours, Uber is experimenting with ways to optimize routing to improve convenience for both drivers and passengers (Hawkins, 2017a). Uber and Lyft, however, face steep challenges given how difficult it is to successfully match rides while minimizing detours and delays.

Perhaps the most novel and fascinating aspect of ridesharing is the social dimension. While transit involves sharing a vehicle with others, sharing a small vehicle in close confinement with strangers for a substantial period of time is largely novel, at least in the

U.S., where jitneys and informal transit are very uncommon. In fact, there are few, if any, cases where Americans are ever confined so intimately for such a long period in such a small space with strangers, making Pool and Shared a truly novel social dynamic.

This does not always work out well. In addition to issues of discrimination discussed above, we found many online complaints about the behavior of others during shared rides. People often express annoyance when riders do things like talk loudly on the phone, play loud music, demand that the in-vehicle temperature be changed, etc. There are also complaints about co-riders smelling of alcohol and being drunk (Hughes, 2017; Ince, 2017; Kachroo-Levine, 2016; Tell, 2015). Troublingly, some passengers may feel like they are receiving unwanted romantic advances or are even being sexually harassed (Hess, 2015).

Online commentary suggests that some potential riders hesitate to use shared services due to safety concerns. There are anecdotal examples about threats from Pool or Shared co-riders; in 2017, a woman in Chicago sued Uber claiming she was stabbed in the face by a fellow UberPool passenger (Marotti, 2017). Some are troubled by the fact that their Pool/Shared co-passengers learn their destinations, particularly the locations of their homes or workplaces (Koebler, 2016).

However, online commentary makes clear that there is also the potential for pleasant social encounters. Some riders have reported enjoying the social experience and "vibe" inherent in taking one of the shared ride services. Tell (2015), reporting on users in New York City, finds that many passengers consider Pool or Shared a good place to make new friends. Some even get a date with the person they share the ride with.

Uber recognizes that social experiences may attract riders to shared services. It has investigated using Facebook profiles to find riders' interests and friends, to potentially alert travelers when they have things in common with the people with whom they are sharing (McFarland, 2017). However, this may be controversial; some may enjoy this tool for social bonding, but others may feel their privacy is invaded if their personal information is shared with strangers (Gilbertsen, 2017; Hughes, 2017).

2.2 Customer Satisfaction and Word of Mouth

When evaluating online commentary on Pool and Shared, as we do here and below, it is important to note the way customer satisfaction tends to be expressed by "word of mouth" (WOM) (Anderson, 1998). (Of course, today word of mouth is greatly amplified by the internet.) According to Anderson, customers are more likely to express their opinions when they are either very satisfied with, or, especially, when they are very dissatisfied with, a product. Greater reporting of negative experiences may be due to "negativity bias" or the "negativity effect," a theory which holds that negative events have a greater impact on people's physiological, emotional, and cognitive processes and are more likely to lead to actions than positive events (Taylor, 1991). This suggests that there may be more WOM from dissatisfied customers (Söderlund, 1998). As a result, anecdotal online commentary likely does not fully reflect true customer satisfaction with Pool and Shared.

We address this problem using a survey designed to elicit both positive and negative responses.

2.3 Prior Perspectives on the Driver Experience

Our review of prior research and opinion suggests that drivers have more unequivocally negatives views of Pool and Shared than travelers do. One survey of 1000 ridehailing drivers, conducted by Harry Campbell (the publisher of "The Rideshare Guy" blog and a consultant for this report), found that 64% of drivers who provided both UberPool rides and solo Uber rides stated they either "somewhat disagree" or "strongly disagree" with the statement "Overall, I am satisfied with my experience driving UberPool" (Campbell, 2018). Only 25% of drivers "somewhat" or "strongly" disagreed with this statement about driving for Uber in general. Sentiment among Lyft Shared drivers was somewhat more positive about that service, but still 34% of Lyft drivers "somewhat" or "strongly" disagreed with the statement "Overall, I am satisfied with my experience driving Lyft [Shared]," while only 17% "somewhat" or "strongly" disagreed with this statement about driving for Lyft in general.

Our review suggests that the most prominent source of driver dissatisfaction is the fares and monetary compensation. Originally, drivers received no additional compensation for UberPool trips, being paid the same (based on miles driven) no matter how many riders are in the car. Despite this, Uber maintains that UberPool increases net driver earnings compared with a system of only offering solo rides through services like UberX (Uber, 2017). Uber asserts that UberPool brings more total trips into the system because some Pool passengers would likely not use Uber at all if there were no shared option. Uber also argues that Pool trips save drivers on fuel costs because multiple travelers are sharing the vehicle as opposed to having to serve each trip separately. Some argue that Pool and Shared also reduce the amount of deadheading when drivers travel with no passengers in the vehicle—and no revenue—while they wait for new assignments (Gurley, 2015; Preston, 2016). The SherpaShare Blog (2015) analyzed the math behind UberPool, finding that, in theory, drivers earn more per hour of driving for UberPool trips than for UberX trips because UberPool rides often last longer and therefore are more profitable than typical UberX rides.

In 2017, Uber implemented a "180 Days of Change" campaign to help combat negative perceptions about the company. The company took several steps to improve the driver experience, including enabling in-app tipping (O'Brien, 2017). This has improved the prospects for UberPool drivers, since tips can be expected to come on a per-rider basis—provided, of course, that Pool customers do tip. To further make Pool more appealing for drivers, Uber added compensation for each additional pick-up during UberPool rides (Uber, 2018a). This compensation varied across cities, ranging from $0.50 to $1.00 (Hawkins, 2017b). For example, in Los Angeles drivers got $0.95 for every pick-up (except for the first one), but only an additional $0.60 in nearby San Diego (Grove, 2017; Lien, 2017). Uber continues to offer these bonuses, though Lyft does not.

However, forums where drivers express themselves (such as UberPeople.net and UberForum.com) are filled with drivers arguing that Pool trips make drivers work more but

get paid less than for UberX rides, considering the distance and time it takes to fulfill the ride requests (Gil, 2017; Ince, 2017; Koebler, 2016; Perea, 2016). Even with tipping and per trip payments, some drivers hold that they are still underpaid because Uber has lowered all fares in order to win market share (Bhuiyan, 2018).

In addition to earning less money, many drivers assert that Pool and Shared add to their workload, and cause their work to be more stressful. One driver notes that frequent changes in navigation instructions in response to new Pool requests cause stress and inhibit his ability to interact with passengers socially, which may in turn reduce his ratings from passengers (Ince, 2017). Maintaining a good driver rating is important, since frequent low ratings can lead to Uber or Lyft terminating a driver (Lyft, 2018a; Uber, 2018b).

Another problem comes from the "lottery" nature of the Pool experience discussed earlier, where travelers do not know in advance if they will suffer from lengthy detours and delays or travel straight to their destinations with no additional pick-ups or drop-offs. Drivers often feel that passengers who lose at this "gamble" are upset and frustrated, which leads to tension in the car, unpleasant interactions with the driver, and potentially lower driver ratings (Ince, 2017; Kachroo-Levine, 2016).

Given that most evidence suggests drivers are on balance unhappy with the shared services, it is not surprising that some drivers try to avoid Pool and Shared requests by ignoring them. While drivers are permitted to do this, Uber can put riders who ignore too many requests in a "time-out" where they will not receive new ride requests for a while (Lyft, 2018b; Uber, 2018c). Even so, anecdotal evidence suggests that some drivers are willing to make this trade-off and shun Pool and Shared requests. This phenomenon was widespread enough that Uber started to offer drivers four options for accepting ride requests: Deliveries, Select, UberXL, and UberX/UberPool (Griswold, 2017). Thus those who do not wish to take UberPool rides can exclude the UberX/UberPool trips. However, by bundling UberX and UberPool together, the company has kept it difficult to avoid giving Pool rides, since UberX trips comprise the majority of Uber rides (Griswold, 2017).

2.4 Summing It All Up

In all, a limited amount of high-quality research investigates driver and rider perceptions of UberPool and Lyft Shared. Although there have been two strong studies that have been done (Sarriera et al., 2017; Moody et al., 2019), the short amount of time the services have been operating, plus the lengthy time it takes to get academic journal articles into print, mean that relatively little rigorous academic research has been published about the topic. As a result, studies of Pool and Shared must often rely on journalistic accounts, blogs, online bulletin boards, etc. While these are valuable sources of information, they have to be viewed critically. For example, opinions posted online are not necessarily representative of the community as a whole. Opinion online may be disproportionately negative due to the WOM effect. Also, posted opinions also often conflict; for example, some online sources claim that Pool and Shared drivers are underpaid, while others claim they are better compensated compared to non-shared services. Riders, too, express conflicting opinions, both complaining about and praising the social dimensions of

ridesharing. Clearly more rigorous study is required in order to untangle the complex thicket of emotions that Pool and Shared elicit. We outline our efforts to do this in the pages that follow.

CHAPTER 3

The Survey: Do People Care to Share?

3.1 Methods

In order to gauge attitudes about the shared services from both travelers and drivers, we have conducted an extensive survey.

3.1.1 Composition

In composing the survey, we took care to:

- » Cover all constructs in which we had interest, and be sure those constructs were accurately reflected in the questions to maximize construct validity
- » Adopt as neutral a tone towards the shared services as possible
- » Avoid leading questions, particularly towards attitudes that we a priori suspected people would harbor towards the shared services
- » Be sure questions were as unambiguous as possible, such as avoiding asking multiple things within a single question
- » Use simple language free of jargon and complex vocabulary, grammar, and constructions
- » Be sure answer choices were complete, exhaustive, and unambiguous
- » Keep questions as short as possible while still leaving no ambiguity about what the questions were asking
- » Keep the survey as short as possible, while still comprehensively covering the topics in which we had interest

3.1.2 Construction

We programmed the survey on the Qualtrics platform. Qualtrics is widely recognized as a leader in survey and market research (Qualtrics, 2019).

3.1.3 Testing

We tested multiple iterations of the survey on small groups of TNC drivers and riders to check for potential issues such as a lack of clarity in question wording, unsatisfactory or incomplete answer choices, burdens on the respondent such as excessive length, etc. In some cases, respondents gave us thoughts about the Pool/Shared experience that led to changes in the survey. In all, we had dozens of test subjects, who ran the gamut from students, to non-student users, to drivers, to academic experts in the field of ridehailing and ridesharing. Note however that Uber and Lyft themselves were not consulted at any point during the process and have had no control over, or input into, the survey and our analysis of its findings.

3.1.4 Sample Recruitment

We engaged Qualtrics to recruit the sample and distribute the survey. Qualtrics in turn engaged its market research partners who directly recruited the sample. In terms of identifying respondents, each research firm has its own method of recruitment, though all are fairly similar. Typically, respondents can choose to join a panel through a double opt-in process. Upon registration, they enter some basic data about themselves, including demographic information, hobbies, interests, etc. Whenever a survey is created that individuals would qualify for based on the information they have given, they are notified via email and invited to participate in the survey for a given incentive. The email invitation is very simple and generic, with no specifics as to the topic of the survey itself. They are just told that they qualify for a survey, given a link, and told to follow the link if they would like to participate for the given incentive. They are also told the duration of the survey. Incentives are most often given on a points system. Those points can be pooled and later redeemed in the form of gift cards, skymiles, credit for online games, etc. The amount of compensation varies by partner.

Perhaps the largest shortcoming in our research is that we do not have a truly random sample of either drivers or travelers; our sample is drawn from people who have signed up to take market research surveys for rewards. The people who have done so may somehow have different attitudes towards ridesharing than would people who have not signed up to take such surveys, so we might have gotten different answers if our respondents were randomly drawn from the whole universe of TNC travelers. However, we see no clear reason why those who have signed up to take market research surveys would differ from others in how they view Pool and Shared, and thus are confident that our results are representative of the general driving and traveling public. However, future research might attempt to assemble a more random sample, though this promises to be quite difficult without the active cooperation of TNCs themselves.

3.1.5 Quality Control

We carefully screened survey responses for quality. Large numbers of responses did not meet our quality standards and were discarded. Criteria for discarding respondents included:

> » We discarded responses when answers to open-ended questions were inappropriate, for example when they were text unrelated to the question being asked.
> » We discarded responses when numerical values that needed to be filled in were completely implausible (and, in some cases, were not numbers at all).
> » We tended to discard responses where a series of Likert-scale questions were "straightlined," that is to say respondents gave the same answer to every question. We did not discard these responses when there was strong evidence from the other questions that the respondent did indeed pay attention.

3.1.6 The Final Sample

We stratified the sample into four groups, for which we sought at least 300 responses each. We attained this target for each group. The final totals of quality responses were:

- » 309 drivers who have provided Pool and/or Shared service in the last two years
- » 365 current, ongoing Pool and/or Shared users
- » 330 former Pool and/or Shared users who have tried the services but plan to use them very rarely or never in the future
- » 413 current Uber and/or Lyft users who have never used Pool and/or Shared

Because we deliberately stratified our sample with a target of 300 in each of our groups, we stopped collecting as many responses from groups that were over our quota. The sample sizes, therefore, do not reflect each group's representation within the broader respondent pool. The total number of respondents falling in each group, which includes our quality responses plus the number of respondents screened out when we reached our total in that group are:

- » Drivers: 849
- » Current Pool/Shared users: 3610
- » Former Pool/Shared users: 363
- » Uber and Lyft users who have never used Pool/Shared: 1245

Interesting facts include that, in our target cities where Pool/Shared are available, most travelers in our sample have used the shared services and plan on continue using them, at least for some trips. Figure 1 presents the distribution of sample of all TNC travelers' by rides per month. About 10% of the total sample indicated they have tried the services but have discontinued their use of them. We oversampled this group because we are particularly interested in being sure that Pool/Shared are retaining customers, and in learning how Uber and Lyft might be able to more effectively retain riders in the future. The large majority of respondents were only occasional riders.
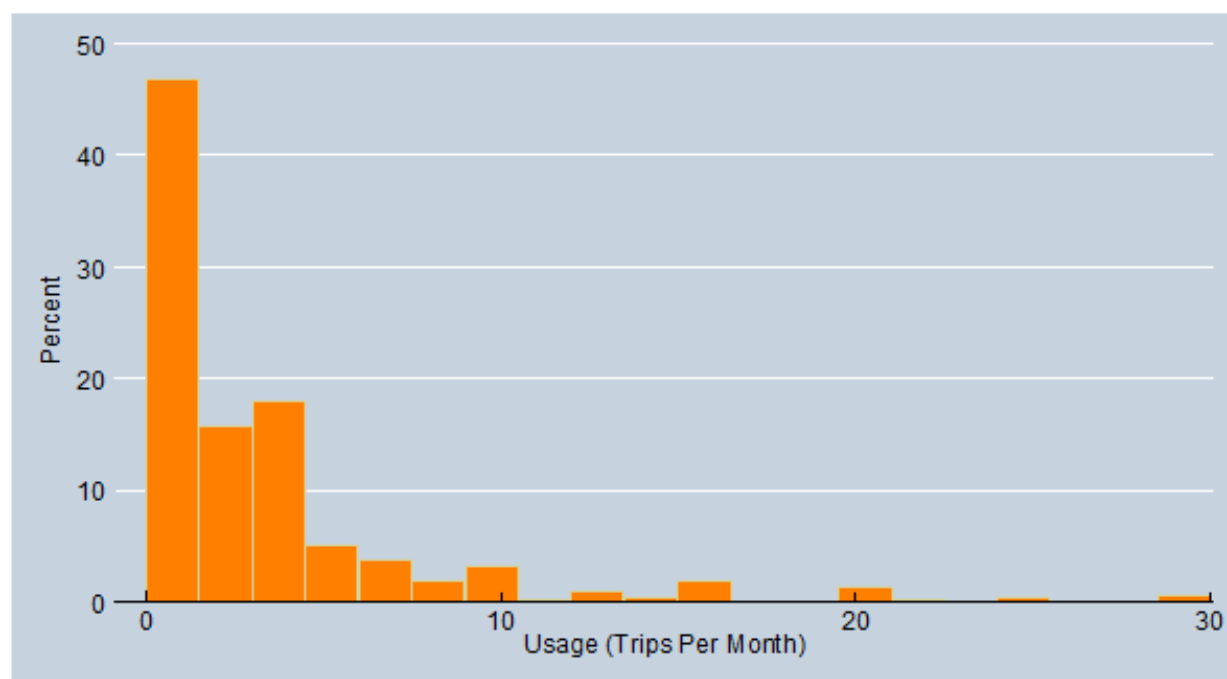
Figure 1: Distribution of Sample of All TNC Travelers' by Rides Per Month

Thirty percent of respondents said they ride Uber and/or Lyft only once a month or even less on average, and a further 17% use them twice a month. This finding is in line with the study conducted by Conway et al. (2018), who uses data from 2017 National Household Travel Survey to find that among the respondents who reported having used TNC services in last month, about 25% of them used the services only once. Similarly, Brown (2018) finds that 40% of the 571,115 Lyft users in Los Angeles County in her sample hailed a Lyft ride less than once per month.

The riders and drivers for our study were geographically dispersed among cities that had Pool/Shared service at the time the survey was designed. Table 1 shows the distribution of the sample by metro area.

Table 1: Distribution of Sample by Metro Area

Metro Area	Freq.	Percent
Austin	18	1.6%
Boston	62	5.6%
Chicago	115	10.4%
Denver	34	3.1%
Las Vegas	36	3.2%
Los Angeles	149	13.4%
Miami	43	3.9%
Nashville	23	2.1%
New Jersey	74	6.7%
New York City	147	13.2%
Philadelphia	74	6.7%
Portland	31	2.8%
San Diego	34	3.1%
San Francisco Bay Area	61	5.5%
Seattle	50	4.5%
Washington DC	79	7.1%
Total	*1110*	*100%*

3.2 Driver Attitudes

There are 309 drivers in our sample. This includes 259 Uber drivers and 178 Lyft drivers: this sums to more than 309 because many drivers (128, or 41% of our sample) drive for both services.

In general, we find that drivers are as not happy providing shared rides as providing unshared rides. We asked Uber drivers to rank their satisfaction with driving for Uber in general, driving for UberX trips, and driving for UberPool trips, on a 5-point scale. The scale, which will be used throughout this document, is:

0   Not at all satisfied
1   Somewhat dissatisfied
2   Neither satisfied nor dissatisfied
3   Somewhat satisfied
4   Very satisfied

Assigning the scores numerical values from 0 to 4 and averaging them, the mean satisfaction scores for Uber in general, UberX, and UberPool shown in Figure 2.

N = 259 drivers
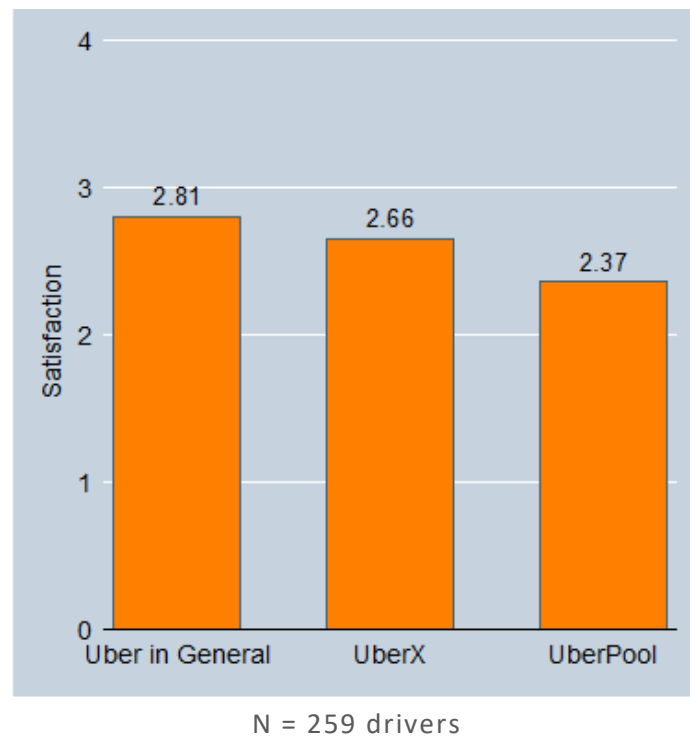
Figure 2: How Satisfied are You with Driving for Uber in General, Driving for UberX Trips, and Driving for UberPool Trips?

A difference in means paired t-test shows that the difference in scores between UberX and UberPool is statistically significant at the level of $p < 0.001$ ($t = 4.92$). Despite lower average satisfaction for UberPool, it should be noted that 36% of drivers said they were "somewhat satisfied" driving for UberPool trips, and almost 18% said they were "very satisfied." A higher share (26%) of drivers, however, said they were "very satisfied' driving for UberX trips.

Figure 3 presents the mean scores for satisfaction with Lyft in general, Lyft Classic (the solo service) and Lyft Shared. The satisfaction scores for Lyft were similar to those for the Uber services.

N=178 drivers
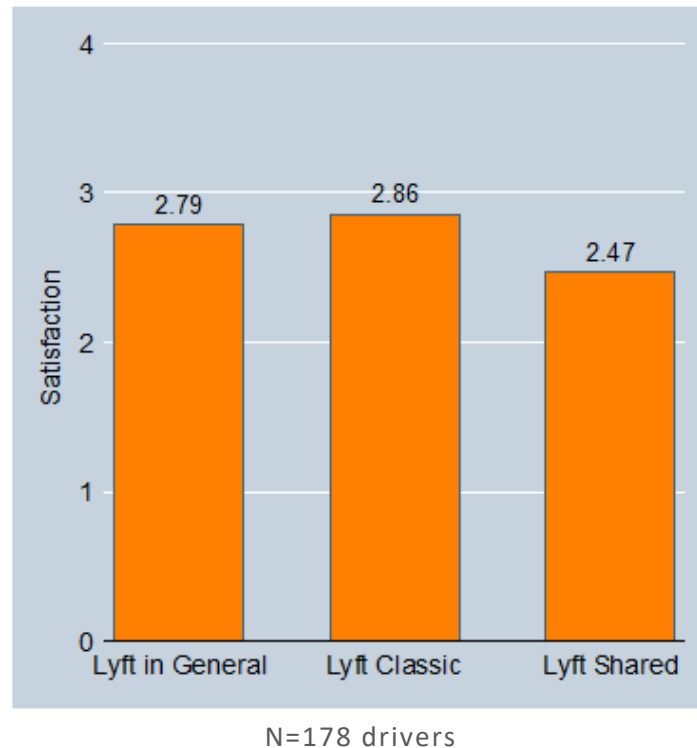
Figure 3: How Satisfied are You with Driving for Lyft in General, Driving for Lyft Classic Trips, and Driving for Lyft Shared Trips?

Again, the difference between the score for Lyft Classic (the solo service) and Lyft Shared was statistically significant at the $p < 0.001$ level ($t = 4.91$), with satisfaction with Lyft Shared being considerably lower.

We asked former drivers (our sample included drivers who have recently driven for the service but are not doing so any longer, as well as current drivers) if having to provide Pool and/or Shared trips was a factor in their decision to stop driving for Uber and/or Lyft altogether. As shown in Figure 4, only 35% said it was not at all a reason. Almost 20% said it was a major reason, or one of the most important reasons, they stopped driving.
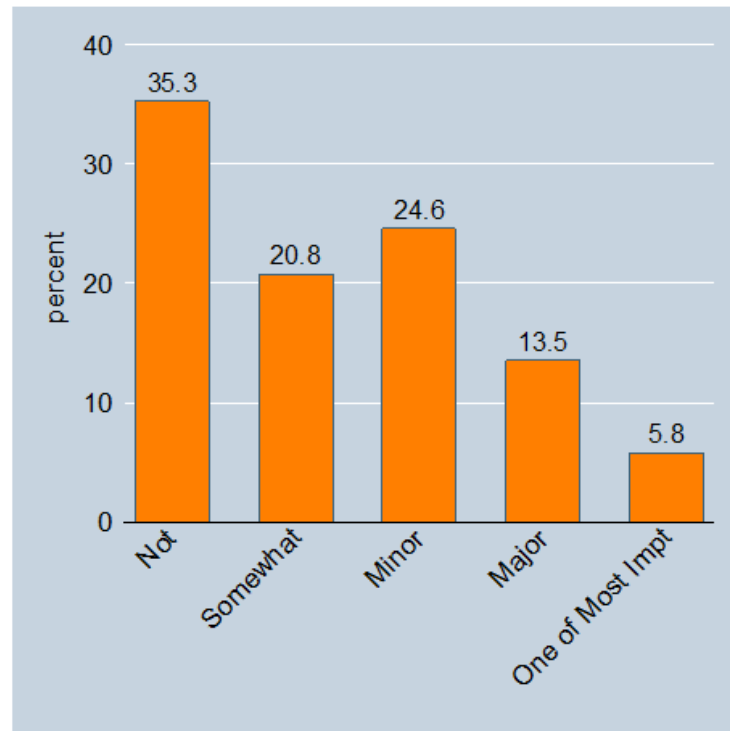
N = 207 drivers.

Note this is lower than our overall sample size of drivers because some drivers have not stopped driving.

Figure 4: Was Having to Provide Shared Service a Reason You Stopped Driving?

We asked drivers if they would refuse Pool/Shared trips if it were easier to do so. As shown in Figure 5, almost 60% of drivers said they would, and if possible would only accept solo trips using services such as UberX and Lyft Classic. This sentiment was more prevalent among former drivers (72%), but was also widely expressed by current drivers (49%).

N = 309 drivers
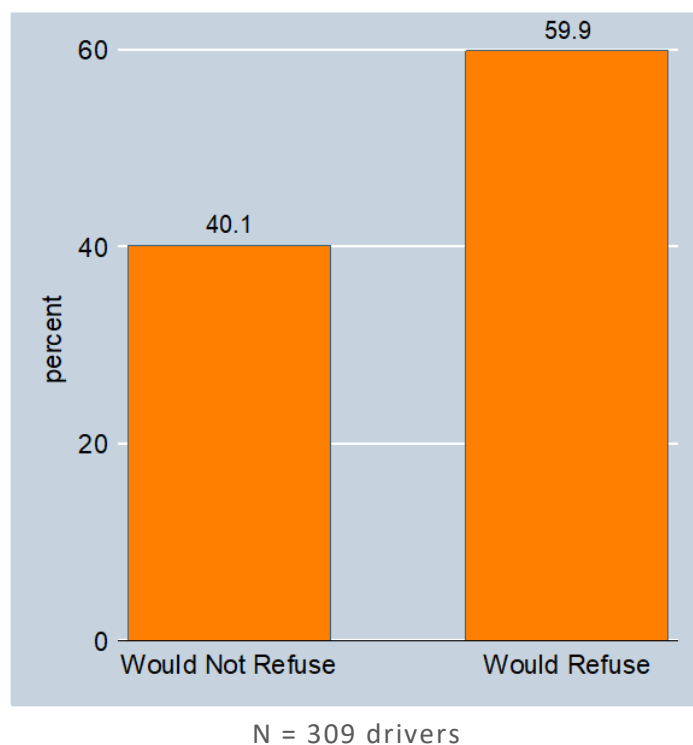
Figure 5: Percent of Drivers Who Would Refuse Shared Trips

What are the specific sources of dissatisfaction for Uber and Lyft drivers who serve Pool and Shared trips? Including both Uber and Lyft drivers, we asked how easy the work of providing solo trips versus shared trips was. Respondents rated this on a 0-4 scale:

0   Very difficult
1   Somewhat difficult
2   Neither easy nor difficult
3   Pretty easy
4   Very easy

Again assigning the scores numerical values from 0 to 4 and averaging them, Figure 6 presents the perceived difficulty level of serving non-shared versus shared trips.

N = 309 drivers
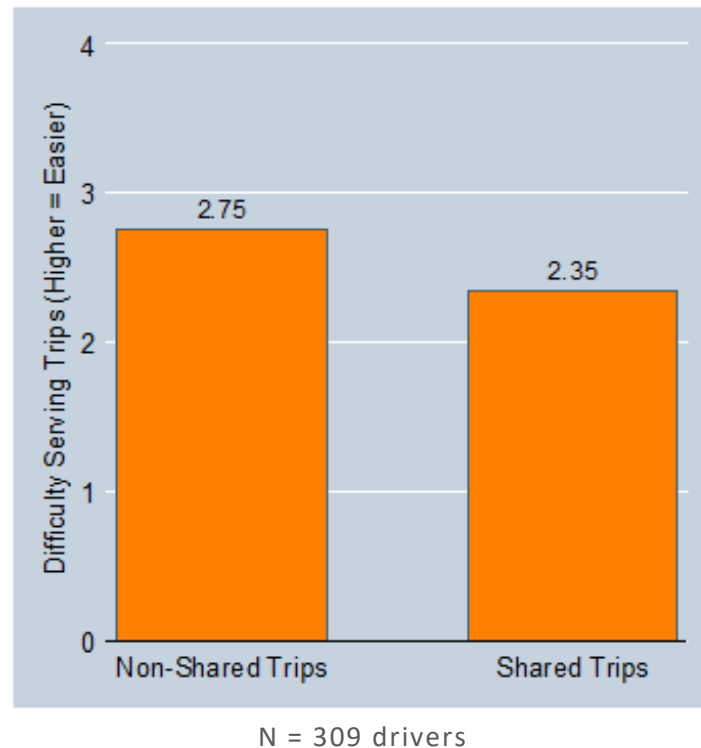
Figure 6: How Difficult is it to Serve Solo Versus Shared Trips?

Clearly, drivers view serving shared trips as considerably more difficult than serving solo trips. The scores differ significantly at the $p < 0.001$ level ($t = 6.33$).

We believed based on our literature review that one possible source of driver dissatisfaction with the shared services might be unhappy passengers (Ince, 2017; Kachroo-Levine, 2016). So we asked drivers how happy they perceive their passengers are when they are using a shared service like Pool/Shared versus solo travel services such as UberX and Lyft Classic. Admittedly, drivers may not always be in an ideal position to judge passenger satisfaction, but we have heard anecdotal evidence that drivers do sometimes have considerable problems with unhappy passengers for reasons specific to Pool and Shared service, for example when passengers become angry and frustrated about what they perceive to be excessive stops and delays. Some drivers fear they sometimes receive low ratings from passengers as a result of this. Figure 7 presents the scores for driver perception of customer satisfaction for sharing and non-sharing customers.

N = 309
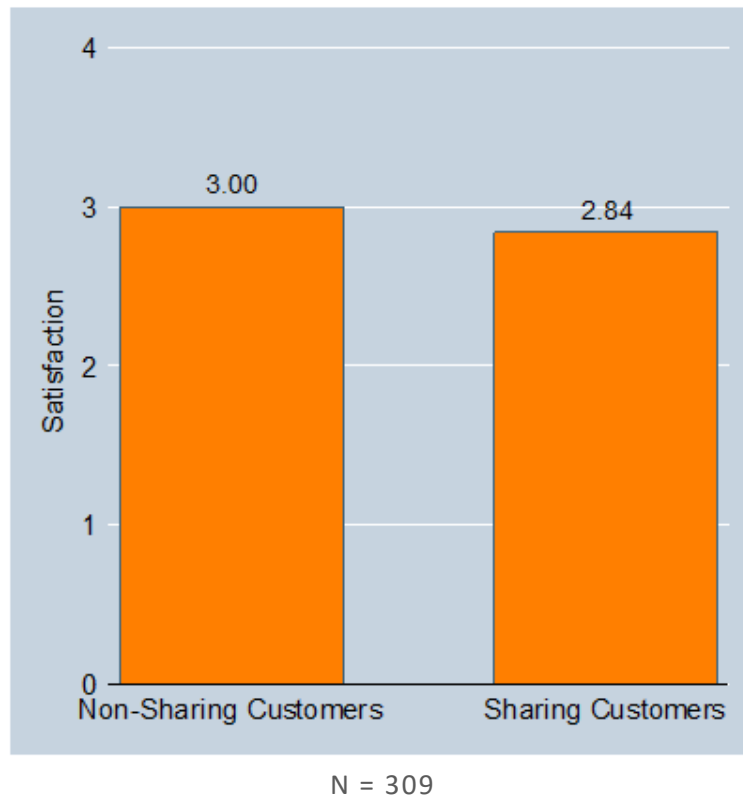
Figure 7: Do Drivers Think Their Sharing Customers are as Satisfied as Their Non-Sharing Customers?

Drivers view passengers as somewhat less satisfied when taking shared trips. The difference in means, though as large as for the responses for driving difficulty, is significant at the $p < 0.05$ level ($t = 2.51$) according to a paired t-test. Below, in our survey of passengers, we ask passengers themselves about their satisfaction with the two services.

In addition to the difficulty of the work and potential customer relations issues, the third major potential source of dissatisfaction with sharing rides we learned about from our review of prior evidence was driver compensation. Because Uber and Lyft compensate somewhat differently (Uber offers a small bonus per pick-up but a slightly lower per mile fee than for UberX rides, while Lyft does not have the fee but compensates the same as for Lyft Classic), we broke this down by service.

N =259 drivers
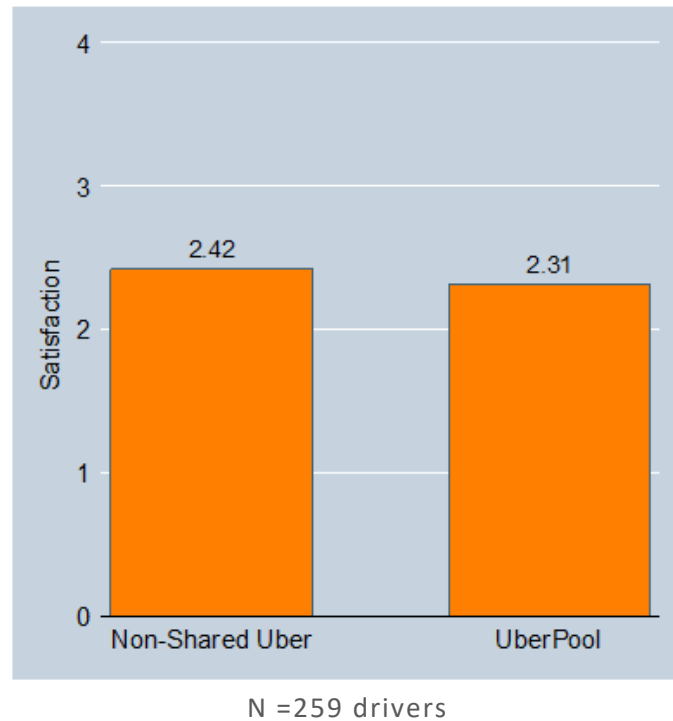
Figure 8: Are Uber Drivers Satisfied with Their Compensation for UberPool?

Drivers do report some dissatisfaction with their compensation for Pool, in comparison with their satisfaction with compensation for providing non-shared services. The results are shown in Figure 8. The difference in the mean scores is not large, but is statistically significant at the $p < 0.05$ level ($t = 2.25$).
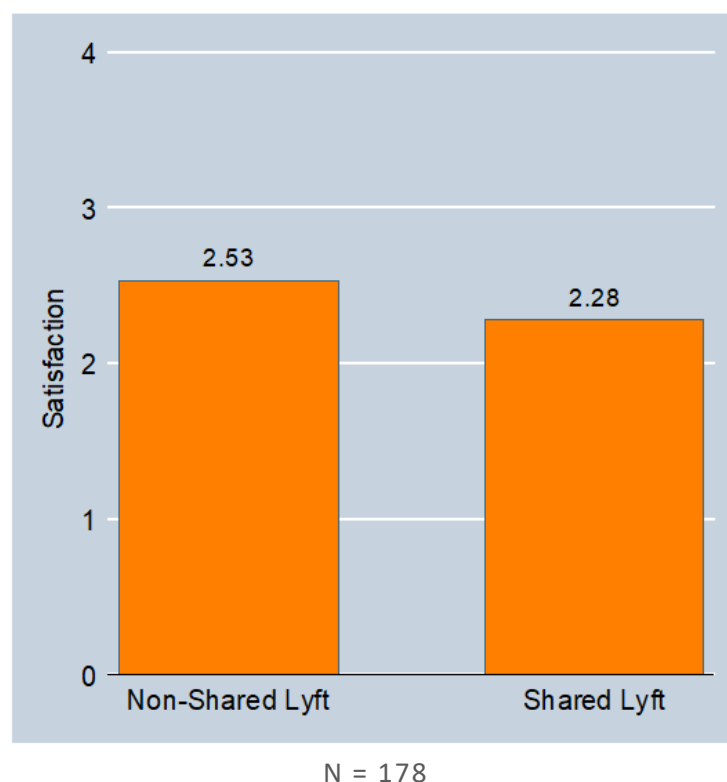
Figure 9: Are Lyft Drivers Satisfied with Their Compensation for Lyft Shared?

As with Uber, drivers report dissatisfaction with their compensation for providing shared Lyft rides, as shown in Figure 9. The difference is considerably larger than the Uber difference, and is significant at the $p < 0.01$ level ($t = 3.08$). In all, it seems clear that drivers are less satisfied with the compensation structure for UberPool and Lyft Shared service than they are with that for non-shared services.

To further understand the issue of attitudes towards compensation, we also asked drivers how much extra they would need to be paid to make providing Pool/Shared rides as appealing as providing solo rides. We were curious about this because certainly there must be a price which would eliminate what appears to be considerable driver dissatisfaction with the services. Further, as has been noted Uber does provide additional per trip compensation, and we wanted to see if this is large enough to assuage driver unhappiness. We thus asked drivers how many extra dollars they would require in compensation per additional pick-up on a Pool/Shared trip to make them as happy serving those trips as they would be serving regular UberX/Lyft Classic solo trips. Twenty-seven percent of drivers said they would require zero additional compensation, indicating they are equally happy serving trips whether they are solo or shared. However, most drivers indicated that they would require extra compensation on a per trip basis to make them satisfied with handling the additional shared trips. The most common responses were one extra dollar (7% of responses), two extra dollars (15% of responses), three extra dollars (15% of responses), and five extra dollars (15% of responses). On average, including the people who said "zero," the extra money required was $3.40 per pick up. Given that current compensation from Uber has considerably lower than this, and that there is no

compensation per pick-up from Lyft, it suggests that the TNCs are underpaying drivers relative to the hassle they experience from extra pick-ups and drop-offs, at least as drivers see things.

3.2.1 What do Drivers LIKE about Pool/Shared?

We asked an open-ended question of drivers about what they like about driving for Pool/Shared service. It should be noted that the answers were sometimes difficult to code because drivers often failed to follow instructions and gave reasons they like driving for Uber and Lyft in general, such as the ability to make their own schedule and be their own boss. With this caveat, a tally of their answers is shown in Table 2. It should be noted that in this and all other tables which summarize open-ended responses, responses could be counted multiple times if more than one issue was raised within a single comment.

Table 2: Drivers' Likes About UberPool/Lyft Shared

Driver Responses	Freq.	Percent
Made negative comments when prompted for positive	49	15.9%
General positive statement	14	4.5%
Compensation		
Make more money/pick up more rides	80	25.9%
Helps to meet incentive/performance targets	9	2.9%
Conditions of driving		
Route assignment is sensible	5	1.6%
Less stress while driving	1	0.3%
Relations with and between passengers		
Meet more passengers this way	7	2.3%
Passengers are happy with service (general)	3	1.0%
Positive social interaction between passengers	25	8.1%
Passengers make conversation so driver doesn't have to	2	0.6%
Ride more likely to be quiet	1	0.3%
Passengers save money	8	2.6%
Convenient for passengers	2	0.6%
Helps low-income passengers	1	0.3%
Other		
Helps the environment	3	1.0%

N = 309

As can be seen, many drivers (15.9%) actually gave *negative* comments even when prompted to say something positive about Pool/Shared. Examples of what they said are included in the section about dislikes about the services, which appears below.

Moving to the positive comments, some drivers expressed generally positive opinions about Pool/Shared services:

> » *I really like the concept in the first place*
> » *Meet new people and more effective way of driving*

Interestingly, given the evidence shown above which suggests that in the net drivers are unsatisfied with their compensation for providing shared rides, by far the most considerable source of positive opinions about Pool/Shared proffered in the open-ended section relates to extra compensation. Note this category was difficult to code due to the fact that in many cases respondents may have been referring to extra pay from Pool/Shared or simply pay from Uber/Lyft in general. Still, many drivers specifically noted that Pool/Shared may involve extra compensation due to more pick-ups while traveling along roughly the same route:

> » *I like that I can get more rides done which allows me to make more money.*
> » *Quicker pickups for more tips*
> » *I like how I can pick up more customers and get paid more even though I am headed in the same direction.*
> » *We can make more money in less trips.*
> » *I think it is a way to make a little extra money in the same ride with different people that could also give you some extra tips*
> » *Multiple fares in same direction.*
> » *The compensation is well worth the extra trouble of coordinating the details of an added rideshare.*
> » *Having a pool trip keeps the trip going without having to keep looking for rides.*
> » *Love i could pick up 4 people on one drive make less trips and get more*
> » *Driving pool was good to keep passengers in your vehicle more often instead of driving around just to get a rider.*
> » *i love most about driving uber pool is killing two birds with one stone it doesnt count as just one ride .*
> » *It gives you back to back rides and I'm trying to do non stop pick ups the whole time I'm driving*
> » *I love it because it saves me time and I don't have to take too many detours to get to my next customer.*
> » *I like driving for uberpool because you can get extra money and you can knock out 2 or 3 birds with one stone. The people in my car the more money I make.*
> » *It allows me to do more trips built into one trip. So more money faster.*
> » *it tends to have some more customers so there isn't as long waiting for riders.*

On a related note, drivers also noted that Pool/Shared trips enabled them to meet their performance targets more easily:

> » *The only time I really like pool trips is the fact that they help meet my weekly goals.*
> » *I like the shared rides because it allows you to reach your weekly incentives/bonuses.*
> » *I like transporting the two passengers because it enable to hit my targets and bonus quicker*
> » *What I liked about Uber Pool/Lyft Line is that when you are trying to get a promotion and need those trips fast. Pool and Line will get you there. Plus its more money because you can keep going until the it stops and that can be for 20-30+ minutes sometimes.*
> » *This does allow to hit promo (which is usually a number of rides) faster.*

In terms of the operations of the systems, a few drivers praised Uber/Lyft's routing system:
> » *I like the fact that you drop the passengers off in the order of their location.*
> » *The ability to...be routed in the same direction was a plus.*
> » *The maps and directions are always on point and very helpful.*

One driver felt the services are easy to drive for:

> » *very easy and less stressful*

A number of drivers enjoy the social aspect of Pool/Shared, noting that shared services bring more passengers with whom to socialize:

> » *It is more social to ride eith more people.*
> » *I like ...being able to socialize with groups of people in the car*

A few drivers reported satisfaction due to the happiness that passengers get from the services:

> » *My passengers love pool rides*

More specifically, some drivers commented that passengers, and the driver himself, often enjoy the social interactions that Pool/Shared trips entail:

> » *I like about Uber pool express pool that the passengers seem be happy and share sometimes their opinion with each other*
> » *How we all interact with the other and have a good time*
> » *sometimes conversations and new friendships and relationships occur with having more people.*
> » *I like having the different people riding together getting to know one another.*
> » *I like the idea of having multiple people along with the ride. I like having a third person for the passenger to talk to.*

> » *Passengers were friendly for the most part and able to get along with one another or was at the least cordial with one another.*
> » *I have had great relations with passengers and I get a common conversation going between shared rides.*
> » *I like interacting with the different passengers when they get along and seeing them interact with the differences they have.*
> » *It is...good to see other passengers communicate with each other and get along during shared rides. Everyone seems comfortable which makes it more comfortable for me*
> » *I like the interactions with passengers and especially when I can help people connect in some way.*

However, one driver actually stated he/she likes Pool/Shared because it *suppresses* social interaction:

> » *I like driving uberpool because there's different people in the car who don't know each other. So it is quiet.*

A couple of drivers stated they enjoy passenger interactions because they feel less pressure to make conversation:

> » *I like that there is a little less pressure in the shared rides because the passengers either talk to each other and me, or they don't talk at all. It allows me to feel like I am not expected to talk the whole ride, and gives me the chance to focus.*
> » *When I'm having a day where I just want to drive and not talk, the passengers talk amongst themselves.*

Also speaking to the issue of customer satisfaction, a number of drivers noted they are happy that Pool/Shared save their customers money:

> » *UberPool customers are much happier as they have to split their expenses and hence decreases the financial pressure*
> » *I like the idea of saving the customers some money.*
> » *I like the fact that I can help people by helping them save on gas and transport expenses.*
> » *I saw that my passengers liked saving money*

One driver explicitly noted that sharing helps Uber and Lyft fulfill a social service mission by helping those who cannot drive due to low incomes:

> » *I don't particularly like it but it's necessary for lower income people to have an option.*

Finally, a few drivers touted the services' possible environmental benefits:

> » *Environmentally friendly to pick up multiple passengers and get them to their destinations with one trip rather than multiple separate trips.*

» *I like...coordinating people that are near each other and going to places also near each other, or at least on the way there. That feels good because the rides aren't using as much gas and pollution is reduced by joining people together.*

3.2.2 Drivers' Good Experiences

We asked drivers to share with us any particular good or bad experiences they may have had providing shared rides. We present the good experiences first, focusing on experiences that are specific to Pool (i.e., not just general things involved with Uber or Lyft driving like having likable or interesting customers, getting big tips, or driving people to unusual destinations).

Some drivers commented on the positive camaraderie that sometimes develops between riders in the vehicle:

» *Yes I picked up three people and another person at two different places and they were all going to the airport. They all talked with eachother and got along great and it was a great ride that everyone seemed to have a pleasant time.*

» *For the most part good conversations and music Great conversation and long lasting relationships*

» *Yes. One passenger was looking for a new place to live and the other passenger was a property manager of a building and was able to assist. They exchanged information*

» *I did have good experiences driving multiple passengers and we all would usually engage in conversations during the trips which made it fun.*

» *When I went the extra mile to get someone home because they were running late but didn't have the full fare, everyone in the group I drove pitched in to not only pay for the person but also tip me for being willing to drive them for less pay.*

» *the best experience is just seeing satisfied customers , which whom most of them tip big. some of them like to have conversation most of them don't.*

» *My good experiences have been some people that are understanding and friendly*

» *Some passengers I've met were very friendly with me and other passengers. It's nice to drive people who are friendly and share good conversations*

» *When I drove for Uber pool I love the communications and the conversations that the people had along the way*

» *Yes, I like that unlikely people meet up and conversations that wouldn't normally happen, happen.*

» *Yes Uberpool is always a good experience when both parties are kind and courteous*

» *most of the time you get a fun bunch of people who tend to get along and make some interesting converstations.*

» *I had several very fun groups of people that were all very outgoing and we all chatted and got to know things about the various people in the car, shared funny stories, and then one by one they get out and I leave with a positive attitude and impression about people and the public in general. Sometimes we can hear so much negativity that I found it very refreshing when I got a great group of people in my car who were all random strangers from different experiences but for that block of time we enjoyed each*

other's company. I got great tips on many of the shared rides even though I was not as confident as when I had single riders, go figure.
» *Yes I had a couple hook up*

A couple of drivers noted their satisfaction when the passenger origins and destinations are close enough together to facilitate convenient routing:

» *Yes, it was very convenient when both passengers drop off destinations were very close.*
» *I've had a few good experiences with decent people and close locations even if there were more people in the Uber.*
» *Yes of course there were times when everybody was pleasant and everything lined up perfectly*

There were a couple of other positive comments:
» *Sometime the passagers noticed your struggle and was patient or gave you a large tip*
» *Some passengers give extra tips.*

However, it is noteworthy that even when asked specifically about "good" experiences, many drivers had ambiguous or outright negative things to say about Pool/Shared:

» *Yes, I had both experiences good and bad, the good one you 'll get more customers then you get more tips, and the bad one is some customers wanted me to drop them first even though is not selected by the Uber app to drop them, and that's annoying sometimes.*
» *Most were good, but some were very awkward.*
» *Once in a blue moon you had decent "pool" passengers...however, that was rare.*
» *I don't reallt like the pool/line option and can't recall a good experience.*
» *None of them were particulary good, some were less terrible than others*
» *I didnt have any good experiences*
» *Not really its the lower end of the passengers mostly cheep and really short trips that waste a lot of time in city traffic*
» *As said some great and fun passengers ..course the awful ones made many of us drivers refuse ride share offers for single passengers*
» *I have never had a good experience, but I also have never had a terrible onez*

3.2.3 Driver DISLIKES about Pool/Shared

This leads to negative driver commentary about the shared services. Table 3 shows drivers' sentiment when they are asked what they do NOT like about driving for Pool/Shared.

Table 3: Drivers' Dislikes about UberPool/Lyft Shared

Driver Responses	Freq.	Percent
No complaints	38	12.3%
General dislike	9	2.9%
Compensation		
Poor compensation	81	26.2%
Pool/Shared riders less likely to tip	9	2.9%
Trips tend to be short rides	3	1.0%
Conditions of driving		
Trips take too much time/more work	25	8.1%
Wastes customers' time	6	1.9%
Routing too indirect	18	5.8%
Too many pick-ups during Pool/Shared trips	18	5.8%
Pick-ups not smooth/passengers often not ready	8	2.6%
Driver does not receive enough info/app bad in various ways	23	7.4%
Hard to refuse Pool/Shared trips	4	1.3%
Cuts down on breaks for driver	1	0.3%
Tiring	4	1.3%
Stressful	2	0.6%
Relations with and between passengers		
Multiple passengers talking becomes distracting	5	1.6%
Passengers cheat/lie	4	1.3%
Passengers don't understand the rules of Pool/Shared	8	2.6%
Rude/unpleasant passengers	23	7.4%
Passengers dislike sharing (general)	4	1.3%
Passengers often dislike each other	18	5.8%
Atmosphere among passengers generally awkward	18	5.8%
Passengers angry about route/travel time/pick-ups	26	8.4%
Frustrated passengers pressure driver to rush	2	0.6%
Frustrated passengers give drivers bad ratings	3	1.0%
Passengers demand to be dropped first	8	2.6%
Driver finds it hard to converse with passengers when there are multiple passengers	2	0.6%
Vehicles get too crowded	9	2.9%

N = 309

First, it is noteworthy that 38 drivers expressed no negative feelings about Pool/Shared.

However, there was a considerable amount of complaints. General expressions of negative views toward the shared services include:

» *I do not like it at all. Im not a bus.*
» *Did not care for it at all. Nothing to like except it was money and tips*

» *I cannot think of anything specifically that I like about UberPool.*
» *i really dont like it all actually, i avoid it*
» *I didn't like anything about it.*
» *I'm not a fan of it*
» *Nothing, I very strongly dislike this option and think it should be discontinued.*
» *I like personal one passenger rides better.*
» *I didnt like it so i have nothing nice to say abt the ride shares*
» *Can be too overwhelming*
» *I generally only liked driving with one passenger at a time*
» *It is a hassle.*
» *Everything*

The most frequent source of complain was driver compensation:

» *I didn't think the compensation was enough to cover the wear and tear on my car*
» *The stops are not worth you time and moneyin uberpool drivers lose money and the customers and the company wins*
» *Not enough money to be worth it*
» *Not much. Terrible pay for the trouble.*
» *I don't like that the fare is less. I don't like that you make a fraction of the money but do much more work and driving.*
» *They dont pay enough, and I drive long distances for only $5*
» *the shared ride thing is [bullshit]; No compensation for driving a bunch of people around here and there.*
» *Lyft shared was not worth it at all. More money for solo rides especially the long rides.*
» *Amount per ride was completely unfair*
» *The trips take considerably longer than single rider trips. However, the pay is lower than Uber x.   I can't say how many pool trips I drove that took 90 minutes or more only to receive around 11 bucks. I could have done 3 Uber x trips in that time and made triple the money using less gas.*
» *I do not like it because it is extra service without an adequate compensation*
» *I didnt like driving the shares because it didnt seem it was fair 2 the 1st rider and the pay was nothing for the driver...i felt you shld get paid for both rides*
» *I think the uberpool is grest for passengers and not great for drivers. The passrngers get a great deal and the drivers get the short end of the stick because they do nit get much money for the trip.*
» *Uber won't pay its drivers! People on pool have discounts so they pay pennies to ride far distances! It's not working for the drivers all the Uber drivers I interview when riding always laugh and say they REFUSE pool requests. I did exactly the same thing. Which means the consumer gets even more horrible waiting times as well using pool*
» *Uber eats and pool rip you off*
» *Lyft shared was not worth it at all. More money for solo rides especially the long rides.*

In addition to carrying more than one rider for limited extra compensation, two drivers noted shared rides tend to be short:

» *the people typically take short rides*
» *They don't tip, they are usually quiet, the rides are short.*
» *I dont like the how it seems that there are more shared rides during prime time or peak hours, and then they also turn out to be very short rides.*

A related issue is that a number of drivers expressed the opinion that Pool/Shared riders are poor tippers. This may make sense since shared service riders are opting for a more budget service:

» *No one wants to give tips*
» *Not many tippers*
» *They give bad tips*
» *It just seems like no one tips,*

Some drivers noted that the work of providing shared rides is more taxing than providing solo rides:

» *It was exhausting*
» *It is a bit difficult to pick up passengers and then pick up some more while en route to drop the first off. It's out of the way and sometimes gets frustrating*
» *It's sometimes tiring to drive from place to place and wait for people that are late.*
» *Exhausting and difficult*
» *I felt like there was a lot of pressure to not make a mistake because there were more people inconvenienced if it was a shared Lyft and I made a wrong turn or something trying to get to the other person. I also found the app confusing during shared rides. I would be very nervous the whole time I was giving shared rides because it felt like the app was not as easy to follow as it was when it was a single rider. I am not an expert at technology and usually that was fine because the app was very easy to use, but there was just an added layer of complication and no room for error during the shared rides. I would like to see them change them to repeat the next thing you need to do or when at a stop it should tell the driver a summary or outline of the next move they will be making and maybe the next two or three moves to give the driver more heads up as to what's to come. I guess i felt that I was just driving blind, following the steps it was telling me to do with not much notice for the next step...if that makes sense. I could have relaxed a little had I known a general idea of the rest of the trip and the order of what would be happening along the way. The riders would have probably felt more confident in me as well, not that they ever seemed not to but I am sure there were times when I seemed lost and just waiting for what to do next because things are moving pretty quickly in downtown when you are picking up and dropping off in multiple short trips.*

» *I don't like UberPool, because the compensation does not consider the most challenging part of a trip which is finding the pick up and waiting on them while you have another passenger in the car. Also, the customer is almost always annoyed with the delay.*

Drivers noted that shared trips are too long and time-consuming, both for the driver and the riders:

» *The amount of time it takes*
» *I don't like that it's tome consuming and makes me drive in circles*
» *picked up 4 people on the way took a 20 minute ride to a 45 minute ride*
» *trips are too long and people get stuck in the car, dont pay enough*
» *Riders don't expect the extended time it can take and are sometimes still in a hurry.*

Numerous drivers complained about what they perceived to be the indirect and inefficient routing, and excessive stops, prescribed by the shared services:

» *I didn't really like it I felt we wasn't compasated enough for all the stops and circles and last min adds*
» *Can be redundant and outta the way sometimes*
» *I don't like if I'm in the middle of dropping someone off it'll redirect to pick someone else up when I'm almost to there destination.*
» *It is a bit difficult to pick up passengers and then pick up some more while en route to drop the first off. It's out of the way and sometimes gets frustrating*
» *Also they do not have the passengers dropped off in the order they are picked up, so sometimes the first person that is picked up is stuck riding along while everyone else is dropped off before them.*
» *Sometimes I'll be close to a destination and it'll have me reroute to another person. Which I find to be a major inconvenience at times.*
» *Sometimes the trips don't make sense and the areas aren't that close together*
» *I don't like the way they map out the shared rides, or the fact that you can keep picking up new passengers before dropping off old passengers.*
» *Too many stops. Sometime customer give a not good rating because longer drive and sometime out of there way. Very long g drive during rush hour traffic.*
» *It does not benefit me much when I have to keep picking people up and people get frustrated when they ride so long*

Drivers also expressed dismay that passengers are often in the wrong place, that their pick-up spots are hard to find, that passengers are not ready, etc. While all of these may take place on regular solo Uber and Lyft rides, these issues may be particularly problematic on shared rides because they are delaying other customers.

» *There were passengers who couldn't express much of their location and so finding them is difficult. and with shared, there's time limit.*
» *I don't like how sometimes people can be late, and this affects my current person that I am driving. They tend to get annoyed and I have no control over that.*

> » *When I was working during uberpool the difficulty is picking people up that wasn't ready or wasn't in the pickup spot*
> » *It is really a pain to wait for other passengers.*

Given widespread complaints about Pool/Shared service, it is not a surprise that some drivers expressed frustration that their ability to refuse shared requests is limited:

> » *What I dislike about Uber pool is that we don't have the option to turn off Uber pool to just do Uber X when I'm driving in between shifts on my regular full-time job. Because I have Uber XL and ubereats that's the only way to shut off Uber/Uber pool.*

As was shown in one quote above, drivers complain that the information they receive about shared rides is inadequate and that the app does not work well. Complexity is added when a driver is serving Pool/Shared trips where new pick-ups and drop-offs keep popping up and the route is continually in flux.

> » *My experience in driving Lyft pool was confusing because the passengers had more information about the trips than the driver. We as drivers lost expected earnings because of the extra pick up. Alot of extra communication, more question for customers to figure out who is who, cant choose which passenger to drop off first. The application decides.*
> » *With shared, they will just add the passenger without even asking the driver. And also, we don't see where the location to drop off. It is important to know so that I could budget my time of work.*
> » *I didn't enjoy driving Lyft Line. I didn't like not knowing who's going to get dropped off first, and not being able to speak to a live person through Lyft.*
> » *The information unclear from application regarding where your expected to drive untl the application gets there*
> » * So the riders have more information than the driver, it seems unprofessional and leaves the driver vulnerable.*
> » *It can sometimes be confusing when another person is added. You are unable to see their destination up front. I think it would be better if I knew where they are headed.*
> » *The fact that you do not know where your passenger is being picked up, especially when you're located near unsafe towns.*
> » *Provided software did not clearly show destinations. Getting a second rider's location erased the first rider's information*
> » *Systems start bugging out when too much activity is going on at once, sometimes signal can be lost which leaves you without GPS and makes everyone late.*

Turning to issues with riders, a few drivers averred that the more boisterous social interactions between passengers which Pool/Shared can foster may make it more difficult for drivers to concentrate:

> » *I don't like that many people are talking at the same time and it can be very distracting*
> » *It can get very distracting with more than one passenger in the back seat*

» *I don't like the fact that the passengers make a lot of noise. It adds an added stress to my driving.*

Some riders don't understand the rules and conditions of shared rides, or even realize that they have requested a shared ride:

» *Sometimes the riders and in a hurry and they still request an uber pool instead of uber x.*
» *I think some people don't understand the concept and get upset. That's what I don't like about uber pool.*
» *A lot of customers didn't realize they were sharing a ride*
» *need to educate customers more before they request Uber pool or Lyft Line.*
» *mainly some of the people who didn't know what they were choosing*

A few drivers expressed dismay that some Pool/Shared customers attempt to lie, cheat, or otherwise game the system, including demanding to be dropped off first:

» *People put in the wrong drop off on purpose to get a cheaper ride and it screws everything up.*
» *About 50% of the time, the passengers ask to do something that is against Pool policy such as a different pickup/destination.*
» *I don't like when customers are much demanding for certain spots to be dropped off becusse there are other people that need to be dropped off as well*
» *I don't like having to drive out of my way to drop them off, or the fact they often want to be dropped off first.*

Another source of complaint is that when Pool/Shared riders become upset with long travel times, they put pressure on the driver to go faster:

» *What I don't like about Uber Pool or Lyft shared trips is that some people rush me to drive to the place when I'm cleary trying to follow the law and get them to their destination safely.*

A major source of complaint is that passengers grow unhappy and even angry with Pool/Shared service.

» *I did not like it at all and I don't feel like the passengers like it either they just want to save money*
» *Sometimes i feel like it can make the customers unhappy or anxious*
» *Not everyone likes sharing a ride*

One reason drivers view passengers as being quick to anger is the stress caused when passengers believe that the routing is irrational or too indirect, that too many pick-ups are being made, that other riders are not ready to be picked up, or that in general it is taking too long:

» . most passenger would get upset if ride took to long. Or if a other ride took them out of their way.
» I don't like how sometimes people can be late, and this affects my current person that I am driving. They tend to get annoyed and I have no control over that.
» Sometimes passengers wish we wouldn't be picking up other people and they get disgusted with me but it was their choice to choose the cheaper option of Uberpool
» Riders don't expect the extended time it can take and are sometimes still in a hurry.
» I don't like when the riders complain about making extra stops.
» I have had some customers get very upset that another passenger was added when we were very close to their drop off location, it gets a little inconvient sometimea.
» sometimes passengers are rude and demanding or get upset that we have to pick others up but they chose it so I don't understand why they get annoyed.
» The trips were not lined up in a good order and then it takes too much time specially during rush hour passengers are upset and everybody has a bad time
» I don't like the fact that some passengers complain because off the way the drop offs are calculated.
» I often heard customers say that I should be dropping them off first because I am going past their stop and why arent they first?
» the one thing I didn't really like was it seemed every time I got another rider when on the "shared" rides the riders would complain. I don't know if they are misinformed of what the "pool" rides are or what not.

Aside from displeasure about the characteristics of the ride, some drivers cite passenger rudeness. These comments must be interpreted with caution, however, since it is unclear whether the drivers meant that Pool/Shared passengers are particularly unpleasant, or were responding to the question incorrectly and discussing their experiences with Uber/Lyft passengers in general.

» i hate how there are alot of people that are rude
» I had a couple of passengers that made me very uncomfortable
» Some people think they are riding a taxi and they treat people like shit
» sometimes the passengers misbehave.
» I dont like some of the loud people
» sometimes passengers are mean or rude. sometimes passengers argue with each other.
» Some of the passengers were weird
» I don't like it cause some of them get drunk and it gets crazy.
» Can be difficult dealing with multiple drunk passengers at once
» like anything else with the public, the more people you interact with the more of a chance of getting weird people or people that make you uncomfortable.
» Sometimes it can be very rowdy or incongruous to a harmonious atmosphere

More specific to Pool/Shared, drivers also note that the social dynamics are often unpleasant, with passengers not interacting. The word "awkward" comes up frequently.

> » *Everyone gets all quiet and awkward and*
> » *Makes for a very awkward situation most times*
> » *I hate it when people don't interact and only stare at their phone.*
> » *Many times the people did not interact and it became awkward.*
> » *Many times the vibe in the car is awkward because of personality differences.*
> » *I don't like when the people don't speak to each other*
> » *Passengers weren't friendly or talkative for the most part.*

When passengers *do* interact, it is sometimes not for the better. Passengers may become upset about the behavior or personality of other riders, which can cause stress for the drivers.

> » *Sometimes it's difficult when you have passengers that just care for each other and it's an uncomfortable situation.*
> » *A few times my passengers don't get along and it makes everything worst*
> » *Sometimes passengers do not get along which makes for an uncomfortable trip*
> » *The tension in the car is strong at times when you know that the passengers don't like each other.*
> » *When they start fighting over a stupid argument and I'm stuck in traffic so I can't kick them out of my car for safety reasons.*
> » *they complain if somebody else has a kid*
> » *People don't always get along at first sight & might not be a good idea*
> » *sometimes passengers are mean or rude. sometimes passengers argue with each other. 3 4 customers at the same time keep fighting with each another like who to be dropped off first.*

Some drivers noted that their vehicles sometimes become overcrowded, leading to passenger displeasure:

> » *The customers are not always comfortable with who they are sitting next too. I don't like drama and at times some people along the way lose their cool when they feel they need more personal space. People come in all shapes and sizes so if two smaller people sat next to someone whom they considered to be big, well their wouldn't be much I can do about that. Since I play the parent role of the car I encourage everyone to be respectful of the other. I do feel pay should be a few bucks more simply because we are a high demand service delivering exceptional service in all situations.*
> » *Again I dont like that everyone seems to be awkward with each other and it can get crowded.*
> » *They add too many passengers and nobody is comfortable because they are squished up next to somebody they don't know.*

While many drivers enjoy it when riders socialize harmoniously amongst themselves, drivers can bemoan the fact that the group social dynamic makes it more difficult to get to know their riders:

> » *Groups are harder to get to know. It's easier when it's you and one other person and they talk to you. The groups of people talk amongst themselves.*

The various manifestations of passenger dissatisfaction outlined above may not only annoy but also may work to the detriment of the driver's career, if it leads to low ratings by passengers:

> » *Too many stops. Sometime customer give a not good rating because longer drive and sometime out of there way.*
> » *Riders didnt like other riders being added and sometime lower your score because of it.*
> » *i feel like it takes up more time for less money and you are more likely to encounter a bad rating which will affect your ability to work for the service*

In a counterpoint to those who favor Pool/Shared because it brings more rides, one driver actually felt that the additional rides rendered him/her *too* busy:

> » *No breaks between rides.*

Finally, some quotes covered many of the themes outlined above:

> » *Some passengers didn't get along..some had zero class. Riders questioned the route plus charges..shared rides almost always more stressful . Some shared rides compensation good. Others not...especially when three routes combined on one trip..I would shut off more passengers..also Ride sharing passengers would lie about number of passengers then rate you low.*
> » *These trips are a complete waste of time and gas. You can drive the same time and distance as an UberX trip and will get paid a significantly less amount. Riders are automatically added on at times that are almost impossible and very unsafe to change direction and pick them up. Riders seem uncomfortable being squished in with other strangers. Riders are frustrated that we go out of their way to pick up & drop off someone else. Pool riders NEVER tip. You have to drop off riders in a certain order, even if someone wants to get out early, they can't. There is no editing of the destination, even if the rider accidentally put the wrong address. People request uberpool when they have too many riders and/or luggage all the time. With Express pool riders do not understand the concept of corner to corner at all and expect to be dropped off at their door.*
> » *More than one fare is a pain. Like riding on a train or city bus. People are rude in a "pool" setting and are generally cheapskates. Pain going to more than one location for drop-offs. Just not pleasant or worth it.*

3.2.4 Drivers' Bad Experiences

Drivers were also asked specifically about bad experiences they might have had. Some of their responses follow. Again, we limit these to comments specific to Pool/Shared and not to driving for Uber and/or Lyft in general. (The latter often involved passengers who

don't tip, people who mess up the vehicle (particularly due to bodily functions), and passengers who are drunk, rude, belligerent, or otherwise badly behaved.)

When asked to identify a bad experience, one driver offered:

> » *Every single one.*

In what is an ongoing theme, there were complaints about driver pay, particularly in view of the amount of driving required to serve shared trips:

> » *Just losing money*
> » *Compensation is poor*
> » *3.75 for driving around Atlanta for 45 minutes. Can't get any worse.*
> » *Nothing bad. Just not getting compensated enough.*
> » *Not worth the money*
> » *not bad experiences but is not cost or time efficient*
> » *My bad experiences of doing these trips is that they could be overly long and unprofitable.*
> » *Doing a carpool ride and getting less than $5 so wasteful I hate it rider pays 13$ and I get 3 and some change madness no wonder people don't tip its crazy*

One problem unique to Pool and Shared is that customers might select the services by accident, or at least not fully know the terms they have signed up for. When this happens, it can lead to frustration on the part of the customer.

> » *I had a rider get mad at me for picking up another UberPool rider although they chose to use UberPool.*
> » *Customers dont expect to pick up more customers during ride*
> » *Passengers often didn't realize they had to share rides*
> » *When passagers didn't realize tht they wasn't the first person to be dropped off*
> » *One time a passenger was very annoyed and angry that we were picking someone else up because they had a flight to get too but they didn't realize they chose pool. I offered to drop them off where we were but they were even more angry.*

Some drivers noted that passengers sometimes lie about knowing the rules of the system and demand that the rules then be broken for their benefit:

> » *I have seen passengers lie about having more than one person getting in the car.*
> » *people lying about how many passengers they have*
> » *someone who had too much stuff for me to pick up anyone else and complained and did not even tip. They lied and had 3 passengers.*
> » *Yes, Uber pool attracts a different type of rider. Usually those on a tight budget. However, many still ask for additional stops.*

Some complained about bad behavior on the part of passengers toward their co-riders:

> » *I had a lady who was upset about the traffic and was yelling. The other riders felt very uncomfortable.*
> » *yes, people don't respect each other being on the phone and talking over each other*
> » *There are costumers that are too boastful and doesn't know how to treat other people nicely*
> » *some passengers don't get along with each other and it gets awkward*

The most commonly reported bad experience was tension and even fights (sometimes physical) between passengers over issues such as routing, eating in the car, talking loudly on the phone etc.:

> » *it's the tension in the car that can make for an uncomfortable ride*
> » *Yes, demanding .and/or drunk passenger wanting extra stops while the new customer wants to stay on route*
> » *2 customers got in an argument because one was ioud on the phone*
> » *I have had my passengers fighting before and almost physically got fighting*
> » *Somebody smelling and yelling at another customer*
> » *If its to many customers i had an argument break out because another customer was eating next to the other customer.*
> » *I've had passengers with food thrwon at each other.*
> » *People fighting in my backseat.*
> » *A bad experience would be that two individuals did not like sitting with each other and kept arguing. I had no control over this situation except drive to the destination.*
> » *An unpleasant time was when two people started fighting because one was being dropped off before the other person.*
> » *yes one time 2 drunk women were arguing with a dude. they were going to jersey city nj. they argued the entire way. the drunk girl was kicking the front seat and the dude was yelling at her and cursing. i thought he was about to beat her up*
> » *One of my passengers kept talking too much and another one ounched him in the face.*
> » *Yes when pick up another passenger and other new each other when younger but know she was married. Her old boyfriend wanted her nunber again but husband got upset so a fught broke up*

This problem can be compounded when the driver is caught in the middle of customer tension:

> » *I've had people complain about the other person during shared trips*

Another source of driver complaint was the routing assigned by the TNC, which can be perceived to be sub-optimal:

> » *Nothing bad except for again the gps/ trip determination having been off to where I dropped off 1 rider then drove around the block to drop off the 2nd rider 1 house before*

> » *the first rider but on the opposite side of the street then went half way around the same block to drop off the 3rd rider.*
> » *one rider was stuck in the car for 45 minutes for a 5 mile trip*
> » *Yes. One time I had to make 8 stops to pick up and drop off on a single trip.*

As was noted above, sometimes when problems with pick-ups or routing happen passengers may take out their frustrations on the driver, which can result in bad ratings:

> » *Just that most people would complain about picking up others and made it seem like it was my fault.*
> » *not anything in particular but a few not so great ratings as a result of the mandatory routes i had to take*
> » *Yes some passengers thought that should be dropped off first and will give you a bad rating this happened many times you go by work with the app tells you but they think they know better*
> » *The app said drop the woman off and she said her drop off was on the west side. I had another passenger wait with me until the police removed her.*

Finally, there was some complaint about the information provided by Uber/Lyft, or with general driver confusion while serving shared rides:

> » *I didn't like not knowing who's going to get dropped off first, and not being able to speak to a live person through Lyft.*
> » *The app is confusing when you drop off one person and try to complete the trip for just that one passenger, and you end up completing the entire ride*
> » *I had a shared ride where the guests had the same name and they were dropped off at the wrong locations. I wound up having to drive them back to the right place and not getting paid for it*
> » *Yes on ride was confusing and my confusion upset my rider on the way to pick up the other rider they were going to share with*

3.2.5 Drivers' Suggestions for Improving the Services

We asked an open-ended question that allowed drivers to suggest how to improve the services. Drivers' suggestions for improving UberPool/Lyft Shared are shown in Table 4.

Table 4: Driver Suggestions for Improving UberPool/Lyft Shared

Driver Responses	Freq.	Percent
Good now: needs no improvement	18	5.8%
Eliminate it	15	4.9%
Compensation		
Improve pay	90	29.1%
Restructure compensation scheme	19	6.1%
Pay per pick-up	3	1.0%
Routing		
Improve routing efficiency	15	4.9%
No sharing for trips to airport	1	0.3%
Assign drivers more long trips	1	0.3%
Limit duration of passengers' trips	2	0.6%
Pick-ups		
Drop off 1st passenger picked up 1st	1	0.3%
Limit number of pick-ups	6	1.9%
Better facilitate process of meeting passengers for pick-up	8	2.6%
Allow drivers to opt out & only provide solo rides	5	1.6%
Driver/TNC interaction		
Improve information to drivers	23	7.4%
Improve the app	3	1.0%
Improve company driver support	1	0.3%
Fewer changes in the rules of the programs	1	0.3%
Dealing with passengers		
Allow drivers to refuse bad passengers	2	0.6%
Background check on passengers	1	0.3%
Passenger code of conduct	5	1.6%
Better inform passengers on rules of shared rides	7	2.3%
Not allow passengers to change their destinations en route	1	0.3%
Match passengers with each other based on characteristics or interests	3	1.0%
Match passengers with drivers based on interests	1	0.3%
Passengers driven by driver of same sex	1	0.3%
Allow passengers some choice of who they ride with	2	0.6%
Improve safety	7	2.3%

N = 309

As can be seen, 18 drivers offered no suggestions for improvement on the grounds that the services are functioning well as is. However, that number was nearly matched by the number of drivers who said that the services are hopeless and that the only way to

"improve" them from a driver's perspective would be to eliminate them entirely. Some drivers asked to be able to opt out of the system and accept only solo rides; however, the number requesting this (5) was actually smaller than we had expected based on the closed-ended question.

The main source of complaint centered on compensation, with almost 30% of drivers saying the system should be improved by increasing driver pay. In addition, some drivers recommended changing the way in which the compensation for the shared rides is structured. This included increasing the per pick-up compensation, a points system with perks for drivers like free food or car washes, charging for each member of a party, raising the minimum cost of a short shared ride, making tipping mandatory, raising the fee for cancelled rides, and, ultimately, paying the driver the full solo ride fare for all shared rides.

Some drivers expressed the wish that the routing instructions provided would be more efficient, with, for example, fewer long detours. Some requested that the number of pick-ups for Pool and Shared be limited, so that, for example, travelers do not have to endure more than one pick-up or drop-off during their ride. A couple of drivers suggested a maximum amount of delay that passengers should have to endure. Several drivers suggested that the pick-up process itself be improved, so that riders are not delayed when, for example, a person to be picked up is not ready and waiting at the designated pick-up site. One driver suggested that drivers be given pictures of the people being picked up to help identify them.

Some drivers noted that the pick-up information supplied to them is sometimes inaccurate and uninformative. Along those lines, a number of drivers suggested that the information provided them by the app and GPS system should be improved. Some specific suggestions included informing the drivers in advance of the number of passengers to be picked up at each stop, providing more detailed routing information before the trip begins, and allowing drivers to see all destinations before they accept a Pool/Shared ride.

There were several suggestions about improving passenger behavior, including that bad passengers should be banned. One driver suggested that passengers should be given background checks. Some drivers suggested a code of conduct to govern rider behavior in shared vehicles. Others noted that passengers should be more fully informed about the rules of taking shared rides in advance of their travel. Several drivers suggested that passengers be matched with each other based on shared characteristics such as interests, and two suggested that riders be given some level of control over whom they are matched with.

Finally, seven drivers expressed a wish for better safety, though they did not proffer more specific ideas as to how to make this happen.

3.3 Riders

The second portion of the survey covered travelers, including their experiences with shared service, their motivations for using and not using the services, and their ideas for

how the services might be improved. As we have noted, travelers are divided into three groups:

» Current, ongoing Pool/Shared customers
» Uber and Lyft customers who have tried Pool/Shared but plan to use them very rarely or never in the future
» Uber and Lyft customers who have never tried Pool/Shared

We first provide some basic data about the sample, and then proceed to presenting our results about travelers' attitudes about and experiences with the shared services.

3.3.1 The Sample

Figure 10 shows that almost 39% of sampled travelers use Uber only, 12% use Lyft only, and the remainder (49%) use both Uber and Lyft.

N = 1,110 riders
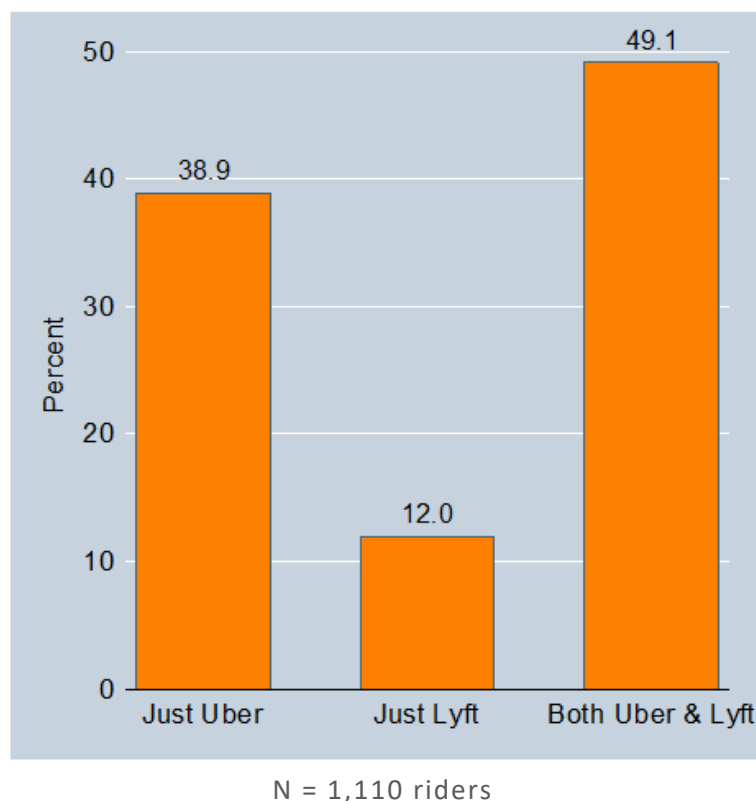
Figure 10: Which Services Do Our Travelers Use?

Travelers were drawn only from cities that offered both Pool and Shared service when the survey was designed. See Table 1 for a list of those cities.

3.3.2 Who Uses Pool and Shared?

We were particularly interested in determining what characteristics of riders contribute to the probability of their falling into one of our three groups of travelers, and thus if certain groups tend to use shared services more than others. To examine this question, we used a multinomial probit (MNP) regression model to identify which personal/demographic characteristics (we asked about a number of these, such as respondents' age, race/ethnicity, income, etc.) are associated with a person being more or less likely to be in one of the three rider groups. Since this is a regression model, all of the results show the impact of each variable independent of the others, so that, for example, by including the variables for "age" and "income," we examine the effect of age for hypothetical people who all have the same income, and the effect of income for hypothetical people who all have the same age. This deals with the problem that some characteristics tend to be correlated; for example, young people might tend to have low incomes, so if they are likely to use shared services it may be because they are young or because they have low incomes. MNP allows us to look at the contributions of age and income independent of each other.

Table 5 shows the model results indicating which characteristics make people more or less likely to be former users as opposed to non-users (in the left-hand columns), and current users compared to non-users (in the right-hand columns). Note that the coefficients in the table are very difficult to interpret intuitively. However, the significance stars, signs on the coefficients, and *t*-statistics show which variables significantly raise or lower the probability of being in in the former, or current, categories relative to the non-user category.

Table 5: Multinomial Probit Regression Predicting the Probability of Being a Former User, and a Current User, as Opposed to Being a Non-User

Base Category: Uber/Lyft User Who Has Never Used Pool/Shared	Former Pool/Shared User	Current Pool/Shared User
Demographic Characteristic	Effect on Probability (t-statistics)	Effect on Probability (t-statistics)
Age	-0.00953 (-0.34)	-0.0292 (-1.05)
Age Squared.	0.0000603 (-0.19)	0.000104 (-0.33)
Gender		
Male	Reference Category	Reference Category
Female	0.229 (-1.59)	-0.290* (-2.11)
Other/Declined to Answer	-0.13 (-0.18)	-0.6 (-0.87)
Marital Status		
Never Married	Reference Category	Reference Category
Married/Partner	-0.185 (-1.18)	-0.0608 (-0.39)
Divorced	-0.15 (-0.65)	-0.282 (-1.18)
Widowed	0.114 (-0.26)	-0.858 (-1.56)
Num. Children in Household	0.0131 (-0.19)	0.0441 (-0.65)
Race/Ethnicity		
White Non-Hispanic	Reference Category	Reference Category
Black Non-Hispanic	0.351 (-1.88)	0.0316 (-0.17)
Hispanic Any Race	0.384 (-1.88)	0.0927 (-0.45)
Mixed Race	0.226 (-0.76)	0.121 (-0.41)
Asian/Pacific Islander Non-Hispanic	0.12 (-0.53)	0.434* (-2.07)
Other	1.425*** (-3.51)	0.269 (-0.59)

Base Category: Uber/Lyft User Who Has Never Used Pool/Shared	Former Pool/Shared User	Current Pool/Shared User
Demographic Characteristic	Effect on Probability (t-statistics)	Effect on Probability (t-statistics)
Education		
No HS Deg.	Reference Category	Reference Category
HS Deg. Only	-0.184 (-0.28)	-0.217 (-0.33)
Some College	-0.204 (-0.32)	-0.0173 (-0.03)
2-Year Coll. Deg.	-0.38 (-0.57)	-0.112 (-0.17)
4-Year Coll. Deg.	-0.195 (-0.30)	-0.00681 (-0.01)
Postgrad Deg.	-0.157 (-0.24)	0.0481 (-0.07)
Disability Status		
No Disability	Reference Category	Reference Category
Disability	-0.0848 (-0.37)	0.0979 (-0.42)
Ln HH Income[1]	0.0613 (-0.79)	0.0949 (-1.24)
Num HH Vehicles	-0.165* (-2.31)	-0.395*** (-5.45)
Constant	-0.344 (-0.33)	0.588 (-0.57)

N = 1110

t statistics in parentheses

*p < 0.05, ** p < 0.01, *** p < 0.001

[1]Note the natural log of income is taken. This transformation is frequently applied in social science models, and allows changes at lower levels of income to have a bigger effect on behavior than changes at higher levels. For example, the difference in income between $0 and $20,000 is likely to have a bigger effect on behavior than the difference between $200,000 and $220,000.

The outcome suggests that most of our demographic variables fail to predict whether people have tried Pool and/or Shared, or whether—if they have tried Pool/Shared—they plan to continue using the services. (This is shown by the fact that those variables don't have significance stars.) For some of the demographic variables (such as marital status) we did not expect a significant association with Pool/Shared use. But, given findings from past research (Brown, 2018; Sarriera et al., 2017), we were surprised by the fact that Pool/Shared users do not tend to be younger and do not tend to have lower incomes. We had assumed that lower-income people would naturally be more likely to opt for a lower-cost option, and that younger people would be more apt to adopt a new technology (Czaja et al., 2006; Weinberg, 2004;). We should note, however, that our findings do not prove that those things *don't* matter, only that we fail to find strong evidence that they *do* matter. A bigger sample size might result in those variables becoming statistically significant, and the positive coefficients suggest that lower incomes may well be associated with a greater likelihood of using Pool/Shared.

The model reveals, however, that some individual factors are significantly associated with being a current or former Pool/Shared user. Uber and Lyft users who have fewer vehicles available in the household are more likely to have tried UberPool and Lyft Shared. To illustrate this finding in a more intuitive-to-interpret manner, we have generated predicted probabilities of an individual being in each of our three groups (non-user, former user, current user). Generating these predictions is not simple, because the effects of vehicle ownership on the probability of being in one of our three groups depends on the values of all the other variables in our model. So to predict probabilities, we have to make some assumptions about what those values are. We did this using the average marginal effects method: that is to say, for each member of the sample we plugged in zero, one, two, and three or more vehicles along with that person's scores on all the other independent variables, and generated predicted probabilities for each of these three hypothetical people. We repeated this using the data for each member of the sample, generating three predictions (for different levels of vehicle ownership) for each member of our sample, and then we averaged the predicted probabilities across the entire sample. Table 6 shows the predicted probabilities of being in the three groups for the different levels of vehicle ownership.

Table 6: Predicted Probabilities of Being in 3 User Groups by Vehicle Access

	Non- User	Former User	Current User
0 Vehicles	0.26	0.28	0.45
1 Vehicle	0.34	0.30	0.36
2 Vehicles	0.42	0.30	0.28
3 or More Vehicles	0.50	0.30	0.20

Having more vehicles available is associated with a much lower probability of trying Pool/Shared, and with being an ongoing user. This may be because those with more vehicles have higher incomes and thus are less likely to seek monetary savings, but since we do have income in our model our results suggest this is probably not the reason.

However, it might be possible that people are not reporting income correctly, either because they do not know it accurately or because they have deliberately given an incorrect answer, which is fairly common in survey research (Gonyea, 2005; Kim & Tamborini, 2014; Moore et al., 2000; Singleton & Straits, 2009). Another possibility may be that those with vehicles available are more accustomed to fast and convenient point-to-point travel, so they are less likely to accept a slower and more unreliable service when traveling by Uber and Lyft.

There may also be differences between user groups of different races/ethnicities. The results above for both blacks and Hispanics were borderline significant in the model predicting being a former user (p = 0.06 for both groups). Table 7 shows the predictions of the probabilities that white, black, and Hispanic travelers fall into the non-user, former user, and current user groups.

Table 7: Predicted Probabilities of Being in the 3 User Groups by Race/Ethnicity

	Non-User	*Former User*	*Current User*
White	0.40	0.27	0.33
Black	0.35	0.36	0.29
Hispanic	0.33	0.36	0.31

The results suggest that blacks and Hispanics are more likely to try shared services than whites, but are considerably more likely to cease using the services; as a result, black and Hispanic Uber/Lyft riders are about as likely as white riders to be current users. We are not clear about what the reasons for this might be. It is possible that non-white travelers may have social experiences that make them feel less comfortable sharing rides. We explore this further below.

Table 8 provides the predicted probabilities of being in the three user groups by gender. We find that females are as likely as males to try the shared services, but are considerably more likely to stop using them, so that males are more likely to be ongoing users than females.

Table 8: Predicted Probabilities of Being in the 3 User Groups by Gender

	Non-User	*Former User*	*Current User*
Male	0.36	0.23	0.41
Female	0.37	0.32	0.30

Again, we suspect that this may be due to being uncomfortable with the social encounters in Pool/Shared vehicles. In particular, it is possible that women may have experiences

that make them feel unsafe while sharing, such as being subject to romantic overtures from fellow passengers. In their survey, Sarriera et al. (2017) find a gender disparity in the perception of safety in shared rides. Women were more likely to feel "unsafe" or "intimidated" in a Pool or Shared ride. In addition, 16% of female survey respondents expressed the preference of sharing the ride with people of the same gender, while only 0.2% of their male counterparts expressed this preference. Middleton (2019) conducted an online survey on 1,113 Pool and Shared riders about their opinions regarding sharing rides with people of different demographic, social, racial and ethnic backgrounds in an (imaginary) autonomous vehicle. Survey results show the proportion of female respondents who expressed the preference of sharing the ride with other female riders increased in the driverless ridesharing setting, compared with the results shown in the survey conducted by Sarriera et al. (2017). Middleton thinks this increase is likely to be caused by women's safety concerns. We find this gender disparity troubling, and analyze it in greater depth below.

3.3.3 Are Customers Satisfied with Pool and Shared?

We asked travelers who use both shared and non-shared services like UberX and Lyft Classic how satisfied they are with each service. We limit our sample to those who have used both UberX and UberPool, and/or both Lyft Classic and Lyft Shared.

N = 576
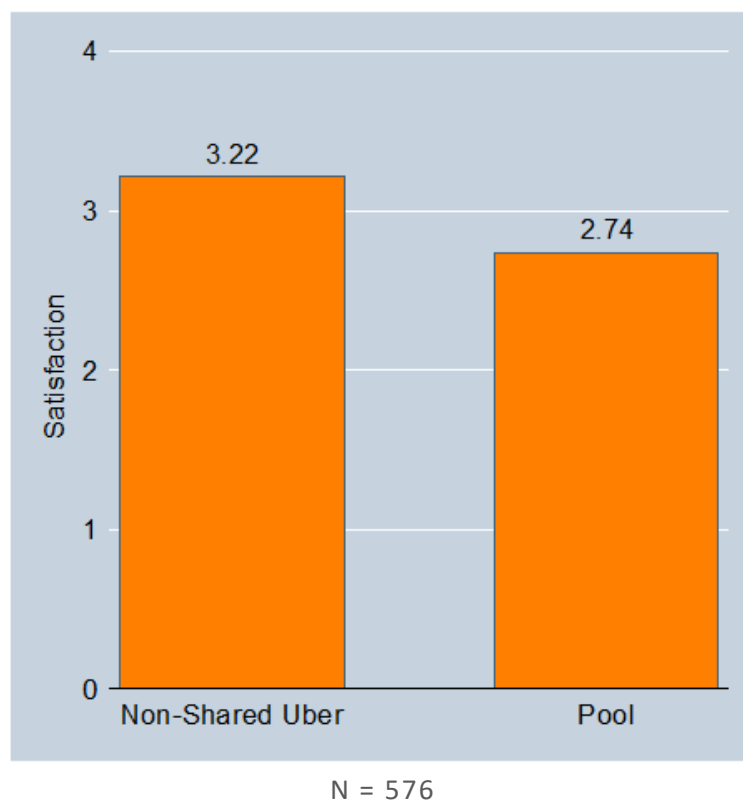
Figure 11: Are Customers Satisfied with UberPool?

Figure 11 shows that respondents are more satisfied with Uber's non-shared services than with Pool. The difference in a paired *t*-test of means is highly statistically significant ($p < 0.001$, $t = 11.70$).

Figure 12 shows that respondents are more satisfied with Lyft's non-shared services than with Lyft Shared.

N = 405
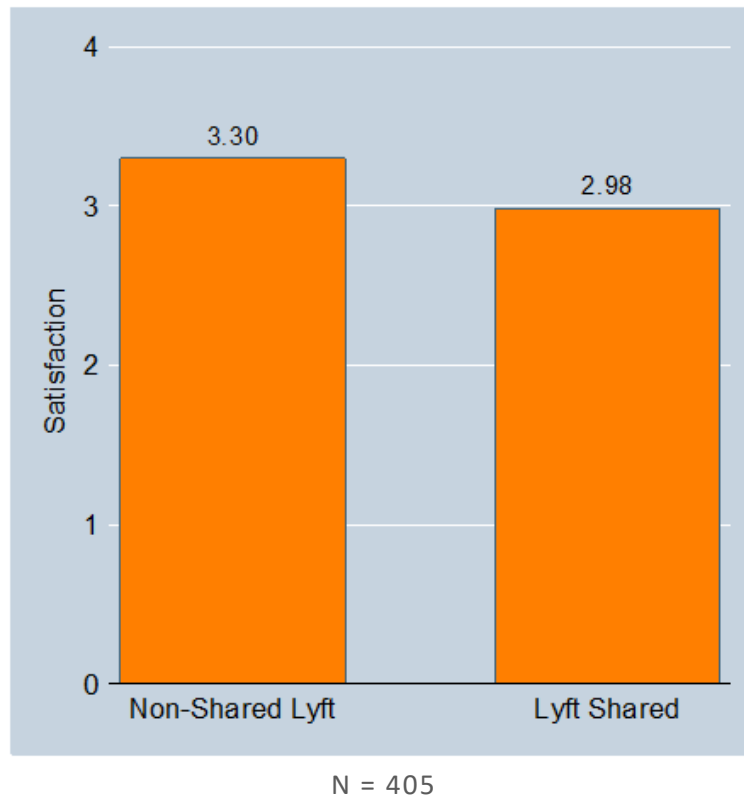
Figure 12: Are Customers Satisfied with Lyft Shared?

Result for Lyft are similar to those for UberX/Pool; Lyft Shared is generating considerably lower customer satisfaction in our sample than the solo services like Lyft Classic. The paired t-test test difference is highly statistically significant ($p < 0.001$; $t = 7.02$).

We caution that these results may not necessarily reflect the general population, because our sample is stratified, as discussed above, with an overrepresentation of former riders who may be expected to be particularly unhappy with the shared services. Thus we break satisfaction out by group, as shown in Figure 13.

N = 576
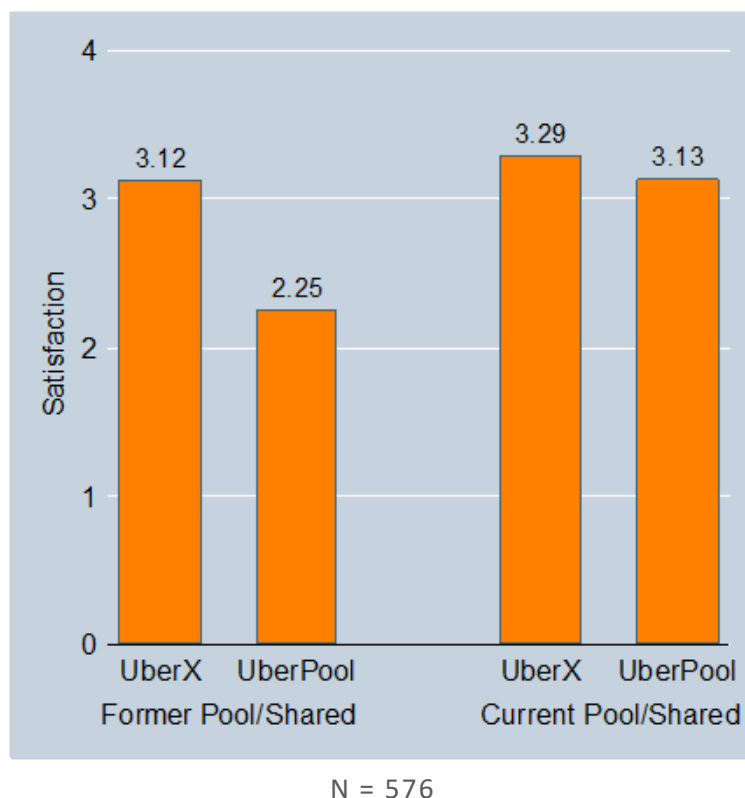
Figure 13: Are Customers Satisfied with UberPool, by Rider Group?

Clearly, former users are less satisfied with UberPool relative to solo services like UberX; this is as we expected, since they have given up using the services they are probably unsatisfied with them in some way. More noteworthy is the fact that even among ongoing customers, satisfaction with UberPool is measurably and significantly, if modestly, lower than satisfaction with non-shared services like UberX (the paired *t*-test results show $p <$ 0.001, t = 3.77, N = 319).

As with the Uber results, we also break out the Lyft results related to customer satisfaction by traveler group in Figure 14.

N = 405
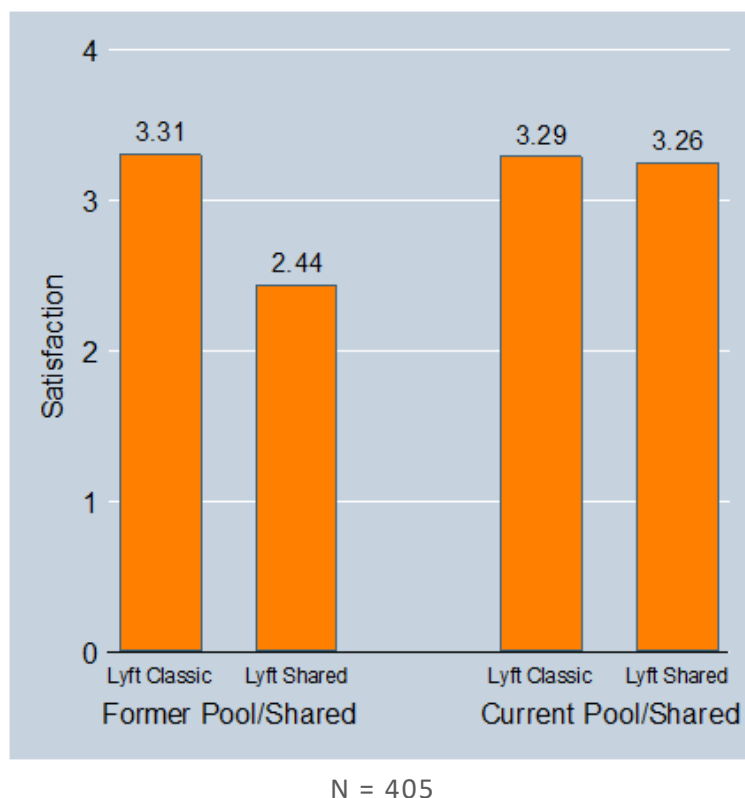
Figure 14: Are Customers Satisfied with Lyft Shared, by Rider Group?

Again, former users are far less satisfied with shared services compared to current users. Further, ongoing customers are less satisfied with Lyft Shared than with Lyft Classic; however, unlike the case with Uber, the difference is not statistically significant.

In sum, our results suggest there are lower levels of satisfaction with Pool and Shared. A substantial share of our total survey pool (about 10 percent) are former users who report that they will not use the shared services again. This group views the shared services quite negatively. Even ongoing users are fairly lukewarm about the shared services, scoring them slightly lower than the nonshared services, particularly for Uber.

3.3.4 Why Don't Some People Use Pool/Shared?

Another group in our sample use Uber and Lyft but have never tried Pool and/or Shared. We asked these non-users to rate how much they agreed with thirteen potential reasons that they haven't tried the services. Responses were assigned numerical scores with 0 being "strongly disagree" and 4 being "strongly agree."

N = 413
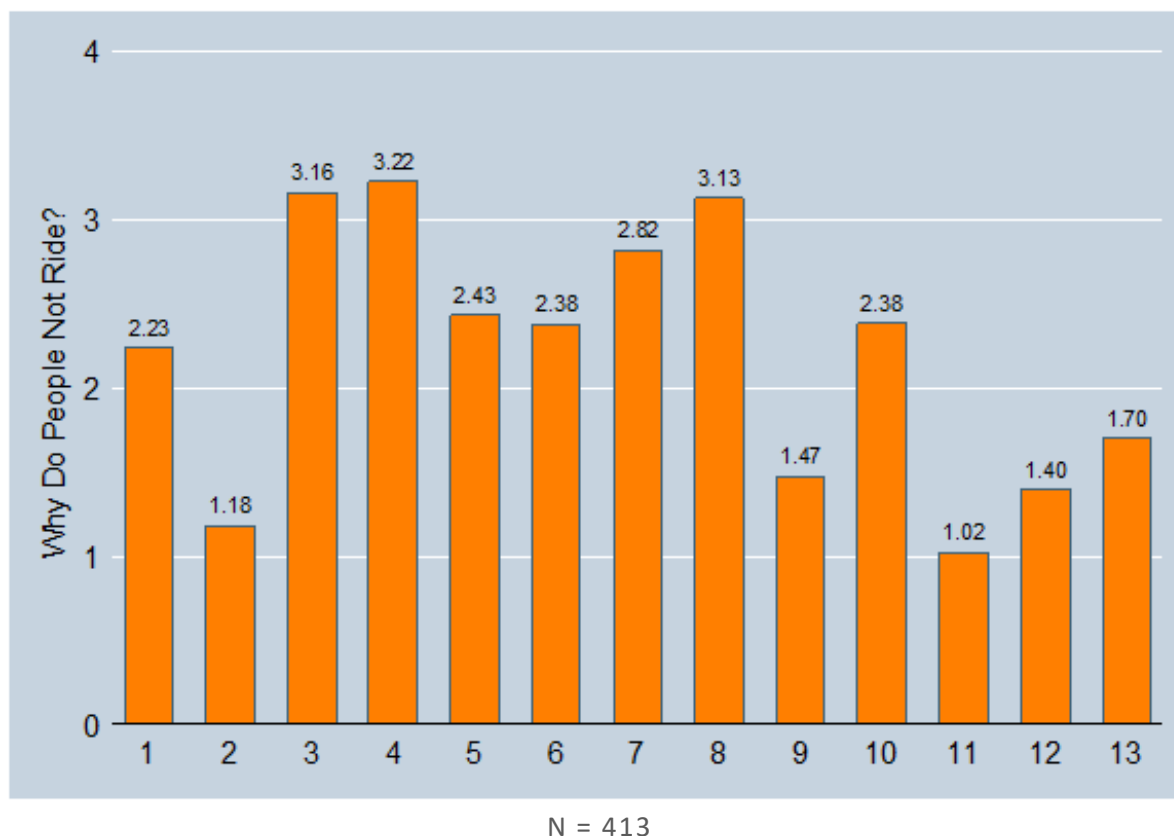
Figure 15: Why Don't Non-Riders Use Pool/Shared?

Key:
1.   They are not familiar with the services
2.   The services aren't available where they travel
3.   The services require extra travel time
4.   The services offer unreliable travel time (unexpected delays)
5.   The monetary savings are not large enough
6.   They are concerned about safety
7.   They would not enjoy traveling with others
8.   The shared vehicle would be too crowded
9.   The environmental benefits are not important to them
10.   They are often traveling in a group, so there would be no room for others
11.   They are often traveling for work, which pays for a more expensive service
12.   They are making multiple stops
13.   They are carrying things like luggage so there would be no room for others

Figure 15 shows that the most important factors in riders' choosing not to use shared services are concerns over travel time, reliability, and vehicle crowding, all of which receive high, and similar, scores. Not enjoying traveling with others is a close fourth. These results are largely as expected. Note that neither insufficient money savings nor unfamiliarity were major reasons cited for not using shared services.

Safety concerns ranked near the middle of the reasons for not riding. Given the difference in the use of Pool/Shared by gender discovered in the MNP regression above, we further investigated whether safety concerns were a larger deterrent to hailing a shared service for women than for men, since prior research has shown that women can have heightened fears about safety and crime when using public transportation (Loukaitou-Sideris & Fink, 2009; Gardner et al., 2017). We also hypothesized that women might feel more uncomfortable traveling with others for other reasons, for example due to unwanted overtures. Figure 16 shows the results on whether safety concerns and an aversion to the social experience of sharing are contributing reasons for why people do not share rides, broken down by sex.

N = 413 non-users
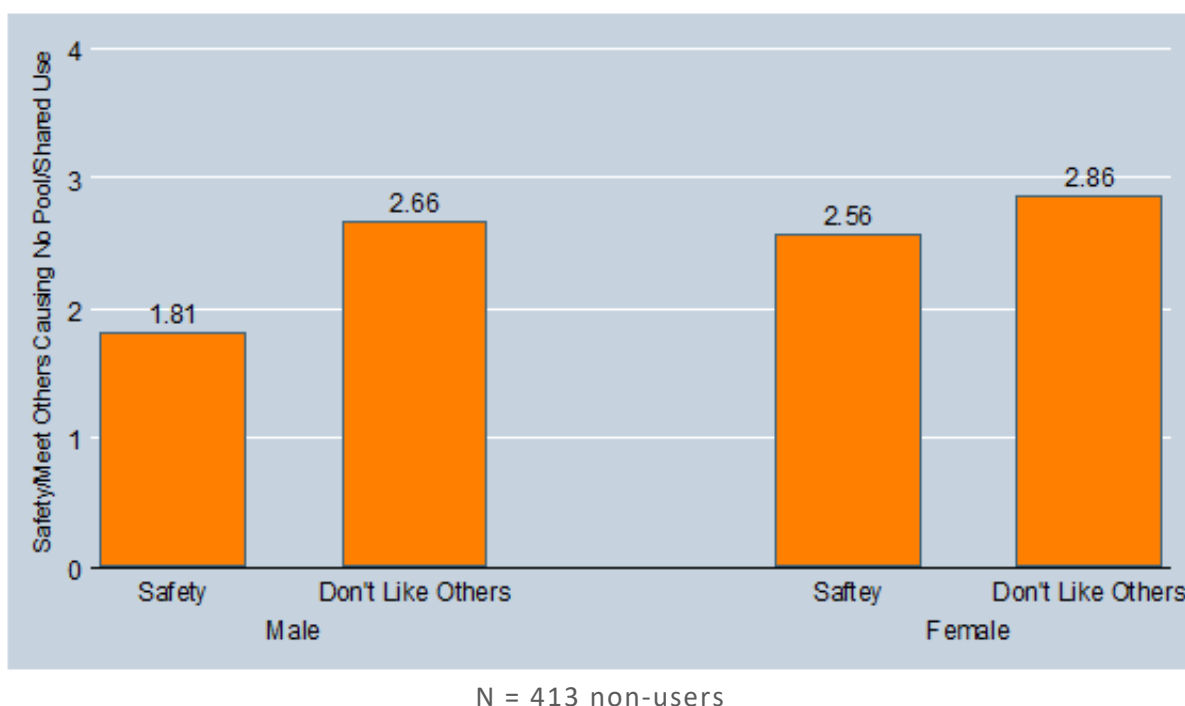
Figure 16: How Much Safety and Social Concerns Dissuade Non-Riders from Using Pool/Shared, by Sex?

Women are somewhat more likely than men to report not having tried shared services because they don't want to ride with others, but the difference is not statistically significant. However, a substantial gap separates safety concerns reported by men and women, with women rating safety concerns as much more of deterrent ($p < 0.001$, $t = 5.03$).

Because the results of our regression also suggested the vehicle ownership is an important factor in predicting whether Uber and Lyft users try Pool/Shared, we also explored whether vehicle ownership is related to the reasons non-users gave for not trying Pool/Shared. We did not find evidence that those with fewer vehicles weight travel time and reliability any higher, or lower, in their reasons for not trying the services. In fact, we find little evidence from any of our attitudinal questions as to why those with more vehicles are so much less likely to try Pool/Shared.

3.3.5 Why Do People Stop Using Pool and Shared?

We are also greatly interested in why some people who have tried Pool/Shared later stopped using them. Figure 17 shows that over one-third of riders (36.9%) gave up on shared rides after just one experience, the plurality (59.2%) rode shared services two to ten times, while very few (3.9%) had more than ten shared rides under their belt before ceasing to hail shared services. Together, these findings suggest that negative first experiences or impressions with these services can leave long-lasting impressions and reduce future willingness to share rides.

N = 330
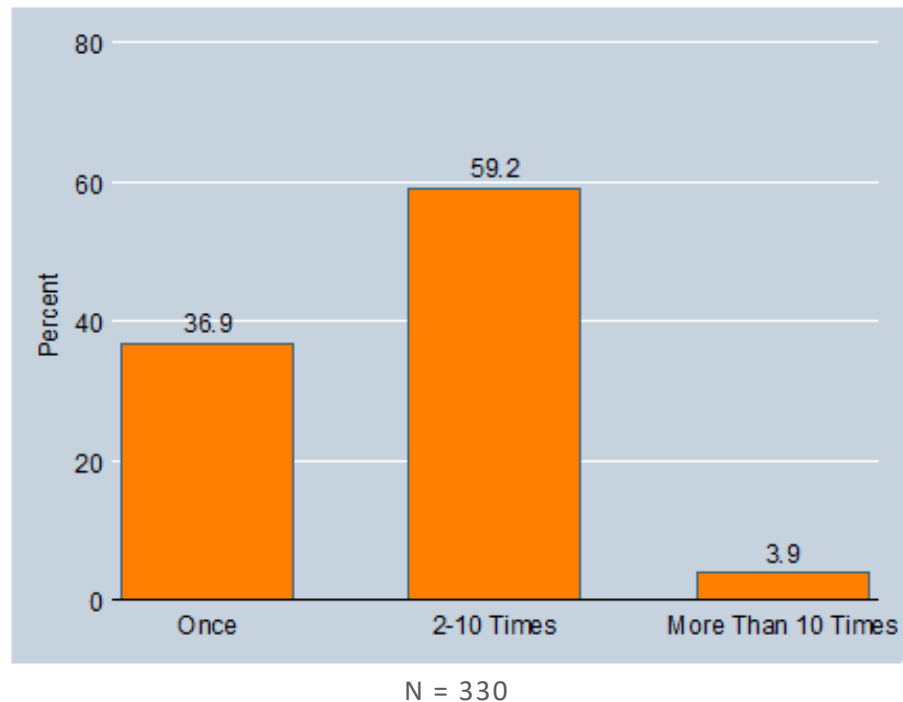
Figure 17: How Many Times Did People Use Pool/Shared Before Stopping?

Figure 18 shows reasons former users gave for why they stopped using Pool/Shared services.

N = 330
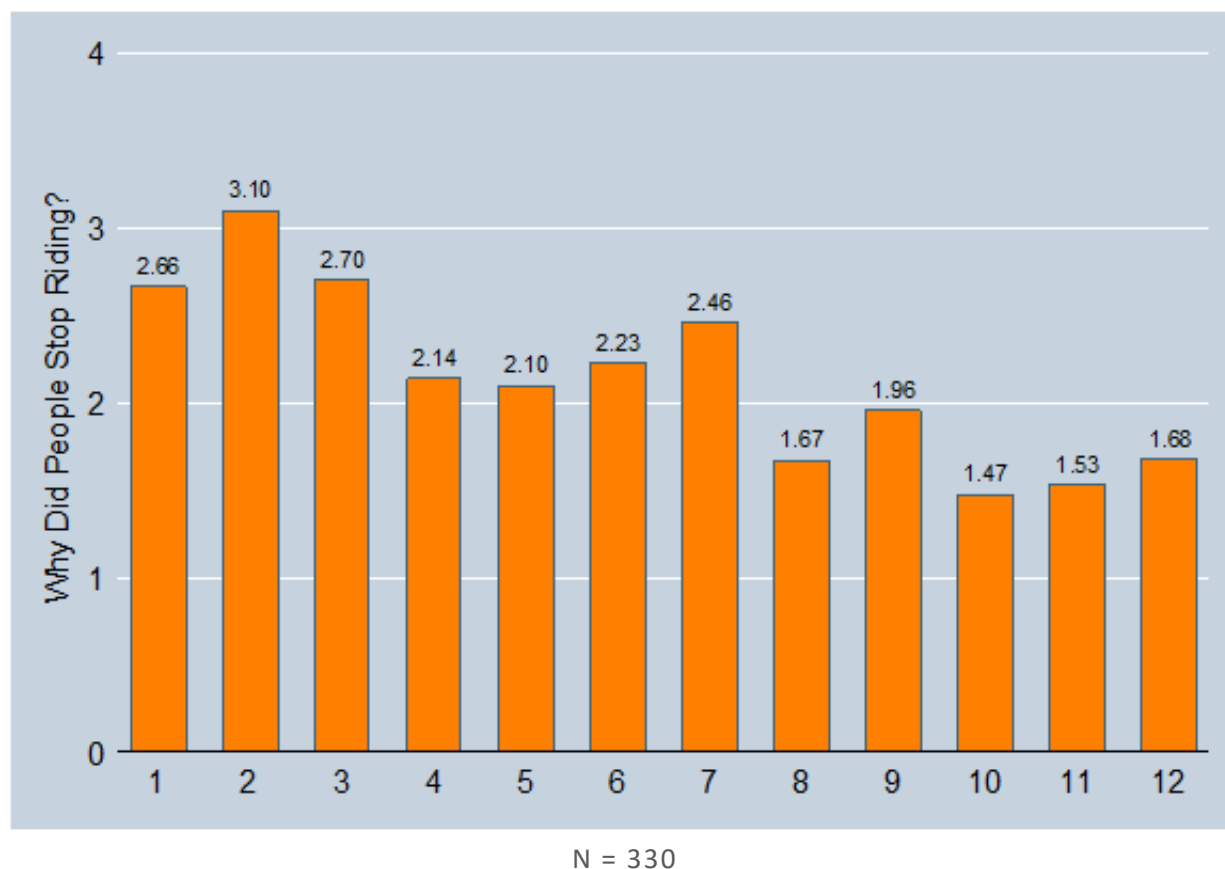
Figure 18: Why Do People Stop Using Pool and/or Shared?

Key:
1.   Travel times are longer
2.   Travel times are not reliable
3.   Don't like traveling with others
4.   Safety concerns
5.   Cost savings aren't large enough
6.   Had hoped others wouldn't be picked up, but they were
7.   Vehicles are too crowded
8.   Environmental benefits are not important
9.   Are often travel in a group so there is no room in the vehicle for others
10.   Work often pays for TNC travel
11.   Are often carrying things like luggage, so no extra room in the vehicle

Former users cite unreliable travel time as the most important reason to have stopped hailing shared rides. Longer travel times relative to non-shared services were another prominent reason. Other important factors include a dislike of traveling with others and vehicles being too crowded. These results are similar to those found as reasons people don't use the service at all, except for the fact that travel time unreliability stands out even more for the former users.

Again, we were interested in why women seem to be deterred from using the shared services more than men, hypothesizing this may be because of safety and social reasons. Figure 19 shows the importance of safety and social factors as reasons for stopping riding, broken down by sex.

N = 330
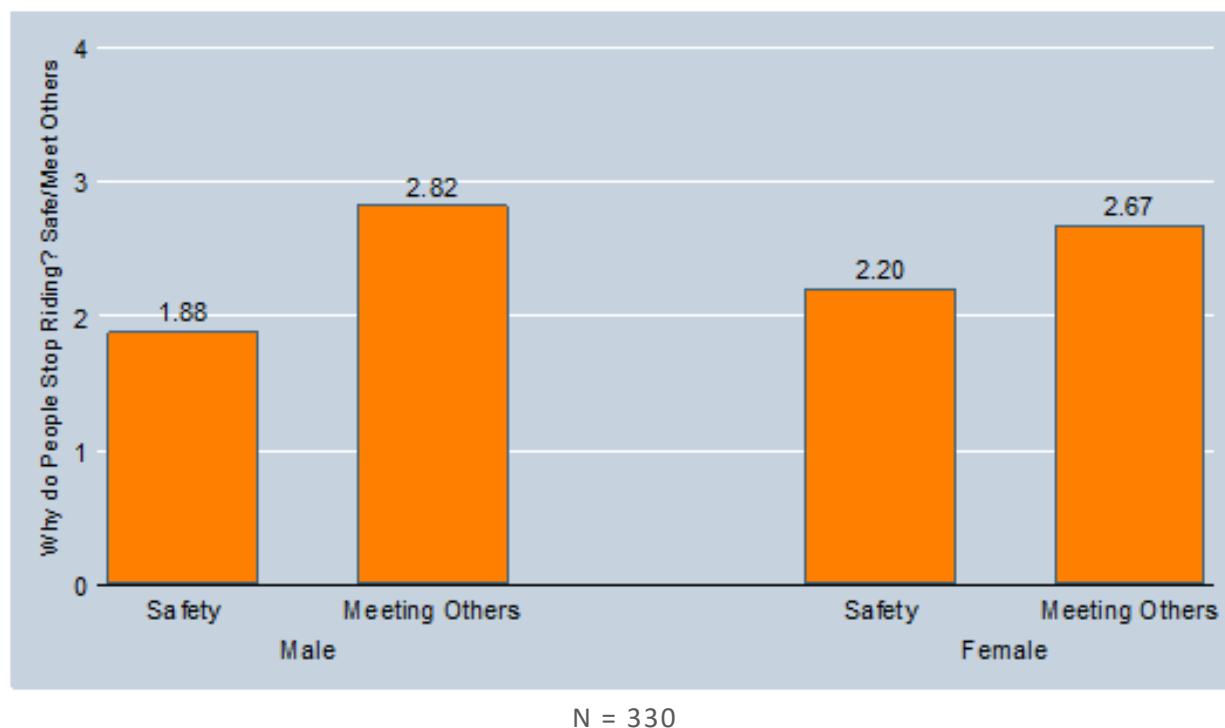
Figure 19: Safety and Meeting Others as Factors in Stopping Using Pool and/or Shared, by Sex

As with the non-riders, the difference in scores for meeting others as a deterrent to riding do not significantly differ by gender. However, as with the non-riders, there is a difference in safety concerns, which in this case is borderline statistically significant (p = 0.06, t = 1.88). This finding is troubling in that even women who have tried the services tend, as a a group, to feel more unsafe than men.

The other major difference between sexes is that women appear to be somewhat more sensitive to the cost savings than men: the average agreement score for "the cost savings aren't large enough" was 2.38 for men versus 2.04 for women, a difference which is borderline statistically significant (p < 0.05, t = 1.99). Thus it appears a significant reason some women may be more likely to give up on taking Pool or Shared is safety concerns, and that this cessation comes despite the fact that women may tend to appreciate the cost savings more than men do.

Since our evidence suggests that blacks and Hispanics are more likely to try Pool/Shared but stop using it than whites, we performed *t*-tests of means for all the former rider attitudinal questions to see if either of these ethnicities differ significantly from whites in terms of specific factors that caused them to give up the services. However, there were almost no significant differences in the mean scores, except Hispanics gave a significantly

higher score than whites for making multiple stops as a reason they gave up the shared services. This suggests there may be differences across ethnic groups in terms of the trip purposes for which travelers use the shared services, an issue which might be explored further in future study.

In sum, in concert with the findings on overall satisfaction above, Pool and Shared appear to be producing many unsatisfied former customers. The reasons for this are primarily the utilitarian characteristics of shared travel: reduced reliability and increased travel time. It is perhaps even more troubling that many rate the social experience as a negative, as the social experience is intrinsic to sharing rides. We consider these issues further in the conclusions, below.

3.3.6 Why Do Current Users Ride Pool and/or Shared?

Finally, we asked ongoing riders why they use Pool and/or Shared. The scores they gave, averaging the numerical values of their responses to the Likert scale questions, are shown in Figure 20.

N = 365
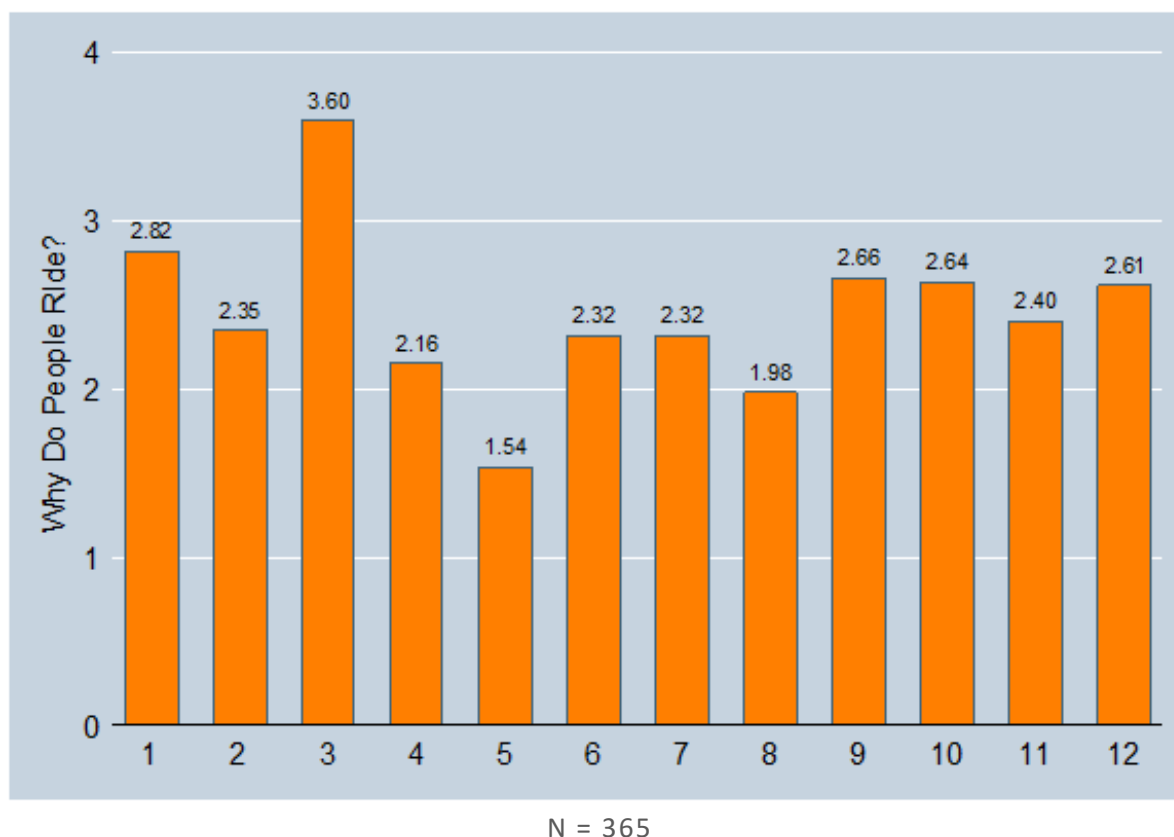
Figure 20: What Factors Cause People to Use Pool/Shared?

Key:
1.   Are usually not in a rush
2.   Are not bothered by travel time unreliability
3.   Want monetary savings
4.   Are not concerned about safety
5.   Want to meet others
6.   Vehicles are not too crowded
7.   Want to help the environment
8.   Ride hoping others will not be picked up
9.   Don't usually travel in a group
10.   Work doesn't pay for trips
11.   Are not usually making multiple stops
12.   Are not carrying items that would not fit in the shared vehicle

Monetary savings are the primary motivator for people to ride Pool/Shared services. People also opt to share a ride when they are not in a hurry, which is complementary to

the finding that uncertain and longer travel times are a deterrent to sharing. Few reported wanting to meet others as a strong motivator for sharing; in fact, the social experience of meeting others was the *least* important reason people gave for why they use the shared services. This suggests that social motivations are not likely drawing many people to the shared services, and could be deterring riders from using them. All other factors, such as not minding the extra time and reduced reliability, receive intermediate scores.

As above, in Figure 21 we examine the social and safety scores of males and females for using Pool and/or Shared.

N = 365
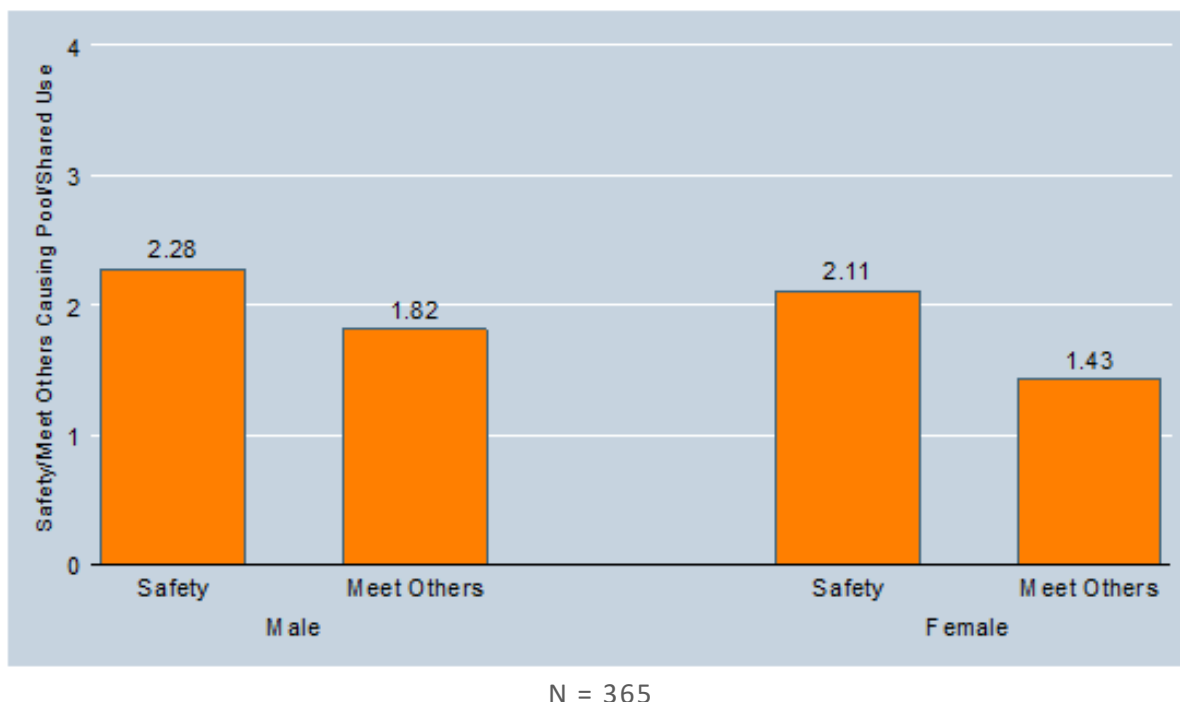
Figure 21: Safety and Meeting Others as Factor in Using Pool and/or Shared, by Sex

Men's and women's scores do not significantly differ on the variable that asks how much feeling safe contributes to their likelihood of using Pool/Shared, but men are significantly more likely to take the services because they enjoy meeting others ($p < .01$, $t = 2.62$), or at least because they do not dislike meeting them. The very low score that women give meeting others as an inducement to ride is further evidence that the social aspect of sharing may be problematic for attracting and retaining female customers.

3.3.7 How Would People Get Around Without Pool/Shared?

We wanted to determine what travel modes Pool and Shared trips are substituting for. If Pool and Shared are replacing solo TNC trips like UberX or Lyft Classic, or are replacing private vehicle trips, in the net they would be increasing sustainability by capitalizing on the fact that they are putting more passengers in each vehicle. On the other hand, if they are replacing transit, walking or bicycling, or are inducing new trips that otherwise would not have been made, they may be increasing VMT.

We had to be careful to phrase this question in a way respondents could answer reliably. It seemed too difficult for respondents to assign percentages to each alternate potential mode. So we listed five alternate ways of traveling, plus not making trips at all, and asked respondents to rank the top three ways they would travel without Pool/Shared. We scored these as three points for a respondent's first choice, two for her second choice, one for her third choice, and zero for choices four, five and six. (We did not ask respondents to rank choices four through six as we believed this would be too burdensome and ask for very speculative answers.)

N = 365
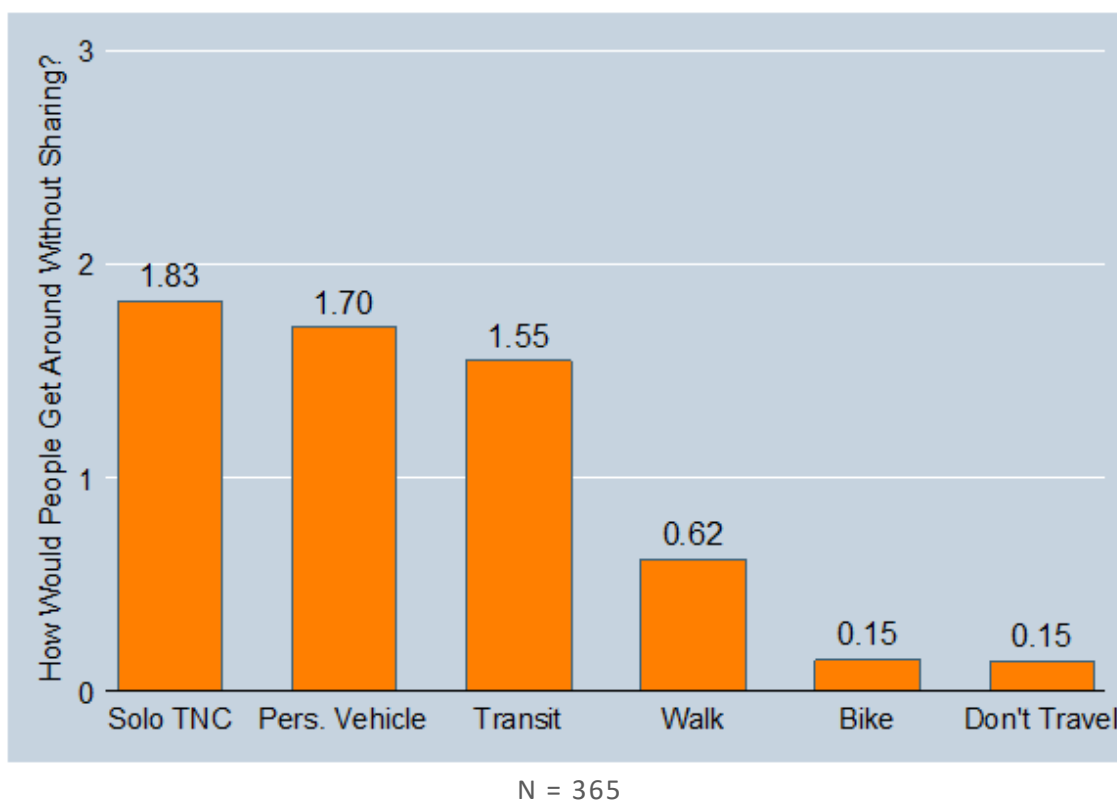
Figure 22: How Would People be Getting Around Without Pool/Shared?

Figure 22 shows that although it is impossible given the way we asked the question to calculate the actual number of substituted trips by mode, travelers believe they would primarily replace Pool and Shared trips with a combination of solo TNC trips, personal vehicle trips, and transit trips. We were surprised that shared services seems to compete almost as much with driving and transit as with solo TNC service. It appears people would not replace many shared trips with walking and biking trips, and that the shared services do not induce much additional travel (although this goes counter to prior research on TNC travel in general, which suggests that Uber and Lyft are inducing more trips (Rayle et al., 2014; Zhen, 2015)). Although this question calls for speculation on the part of respondents and does not consider specifics about where, when, and how trips would be replaced, these results do suggest that in the net the shared services are probably contributing to sustainability by reducing solo TNC trips and private vehicle trips, although the fact that transit trips are also being replaced may be somewhat worrisome.

3.3.8 How Much are People Willing to Pay for a Shared Ride?

As noted above, the top reason that people use Pool and Shared is the monetary savings. Further, basic microeconomic logic dictates that if the services were priced to be even more inexpensive than they are now, at least some former riders could be attracted back to Pool/Shared, and many non-users could be enticed to at least try them.

We thus explored each group's willingness to pay for shared service. Since we know that delay and unreliability are major drawbacks dissuading people from using the services, we asked respondents about hypothetical amounts they would be willing to pay to accept varying levels of potential delay. Respondents were asked to consider a trip that by a solo service such as UberX and Lyft Classic would last 20 minutes and cost $25. Since an integral part of the Pool/Shared business model is that matches can be made on the fly, we did not want to present riders with firm trip durations. So we asked about scenarios with different potential ranges of delay. Participants were asked how much they would pay for the same trip on Pool/Shared if the trip was guaranteed to take between:

- » *20 and 30 minutes*
- » *20 and 40 minutes*
- » *20 and 50 minutes*
- » *20 and 60 minutes*
- » *No guarantee about travel time*

The average scores given by each group are shown in Figure 23.

N=365 for current, 330 for former, 413 for non
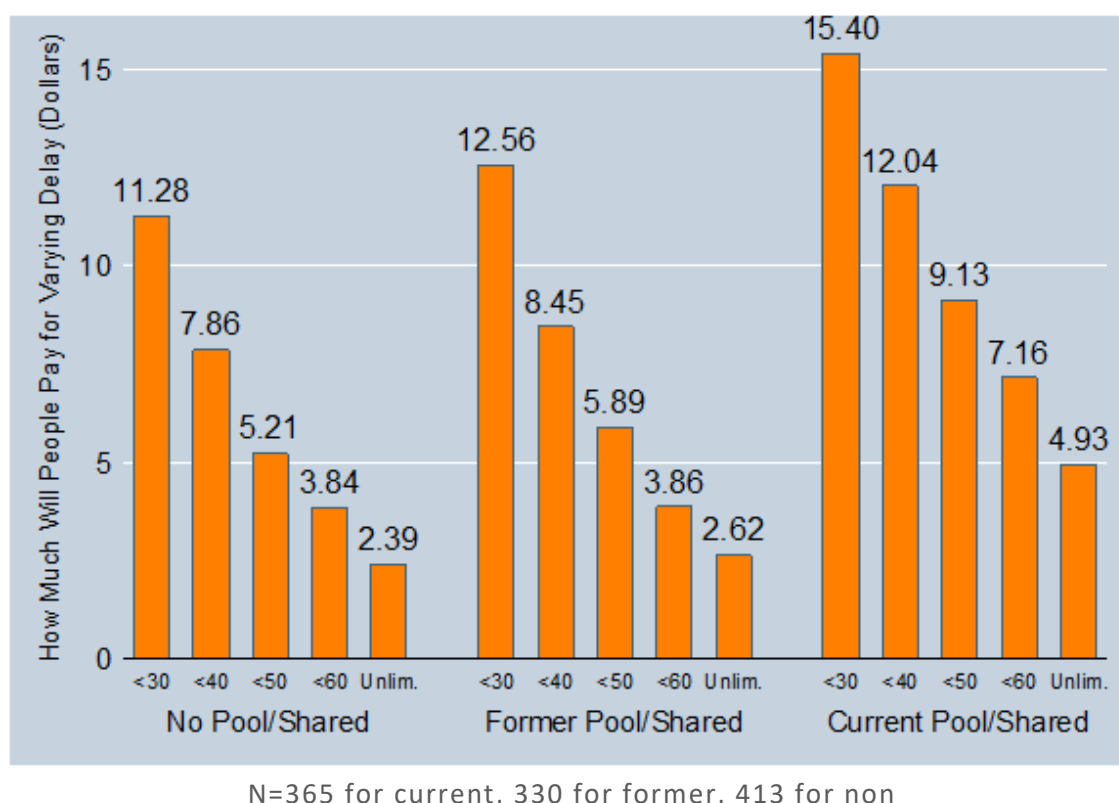
Figure 23: How Much Would People Pay for Pool/Shared with Varying Potential Amounts of Delay?

First, we find that even ongoing customers suggest they need steep price breaks to switch from unshared to shared services. On average, current users express a willingness to pay only 60% of the solo ride price for a potential delay of up to 10 minutes. This drops off fairly dramatically as potential delay increases. They state they are willing to pay only a very low amount ($4.93) for a ride with no travel time guarantee. This suggests that delay—and its associated travel time uncertainty—has a strong impact on willingness to pay, even among those who are repeat, ongoing customers. This price sensitivity fits with the data presented above, showing that the monetary discount is by far the most important reason people use the services. This suggests that Uber and Lyft might lose a substantial number of passengers were fares to be increased. On the other hand, it also suggests that price cuts have the potential to increase ridership.

Of even more interest are the price breaks that non-users and former users report they would need to make Pool/Shared a viable option, as these are the people who must be recruited as customers if shared service is to become a more widely used mode. This may be looked at in two ways. Viewed in a pessimistic light, the dollar amounts these groups say they are willing to pay are quite low. Even for a potential delay as small as up to 10 minutes, members of these groups stated an average willingness to pay of only half the solo ride rate. This suggests a value of time of at least $72, a very high figure. Further, these values drop fairly dramatically as potential delay increases, and these travelers state that on average they are willing to pay less than one tenth of the solo ride cost without a guarantee about the amount of delay. Further, 24% of non-users and 17% of

former users said they would not take a shared service for *any* level of discount, even with a potential delay of no more than 10 minutes.

On the positive side, willingness to pay by non-users and former users is not dramatically lower than current users, and most non-users and former users did name *a* price that could motivate them to share. In concert with the figures given by riders, this again suggests that price breaks do have the potential to lure more riders—even non-users and former users—into the system. On the other hand, these discounts would need to be fairly substantial, even if they come with some sort of guarantee that delays will not be excessive.

3.4 Open-Ended Questions for Travelers

We asked six questions of users, both former and current:

> » *In your own words, tell us what you LIKE about using shared services like UberPool, Express Pool, or Lyft Line/Lyft Shared. Please don't tell us things you like about Uber or Lyft in general.*
> » *In your own words, tell us what you DISLIKE about using shared services like UberPool, Express Pool, or Lyft Line/Lyft Shared. Please don't tell us things you dislike about Uber or Lyft in general.*
> » *Have you had any particularly GOOD experiences using the shared ride services that have made you more likely to use them? If so, please tell us about them.*
> » *Have you had any particularly BAD experiences using the shared ride services that have made you less likely to use them? If so, please tell us about them.*
> » *Are there any ways you would like to see UberPool, Express Pool, or Lyft Line/Lyft Shared improved?*
> » *Is there anything else you would like to tell us about your attitude toward shared services like UberPool, Express Pool, and/or Lyft Line/Lyft Shared?*

3.4.1 What People LIKE about UberPool/Lyft Shared

The themes that were expressed for why riders like the services are tabulated in Table 9. Note these are broken down by current users, former users, and total users.

Table 9: Open-Ended Rider Responses-What Do You LIKE about Pool/Shared?

	Former Users	Former %	Current Users	Current %	Total Users	Total %
Expressed *dislike*	41	12.4%	7	1.9%	48	6.9%
Benefits to self						
Cost	205	61.9%	279	76.4%	484	69.5%
Extra time not a problem	0	0.0%	26	7.1%	26	3.7%
Not in a rush	0	0.0%	12	3.3%	12	1.7%
Avoiding transit	3	0.9%	9	2.5%	12	1.7%
Don't have to find parking	0	0.0%	4	1.1%	4	0.6%
See new areas of the city	0	0.0%	3	0.8%	3	0.4%
Characteristics of service						
Convenient	27	8.2%	56	15.3%	83	11.9%
Arrives on time	7	2.1%	22	6.0%	29	4.2%
Sometimes no others get picked up	4	1.2%	17	4.7%	21	3.0%
Relations with other passengers						
Enjoy meeting others	47	14.2%	57	15.6%	104	14.9%
Feel safe	3	0.9%	10	2.7%	13	1.9%
Benefits to others						
Helping environment	19	5.7%	22	6.0%	41	5.9%
Getting cars off road	4	1.2%	7	1.9%	11	1.6%
Helping the driver	3	0.9%	2	0.5%	5	0.7%
Total respondents	*331*		*365*		*696*	

Note that respondents could mention they liked more than one thing.

Clearly, cost savings are the most prominent allure of the shared services, being cited as a positive by almost 70% of current and former users. Specific quotes (including responses for the general open-ended question) include:

» *It is much cheaper. As a college student, I don't have the funds to constantly take Uberx. Recently the prices of Uberx have been outrageous.*
» *Ibe always been very passionate about being able to eat, just food really. This let's me be able to svae money for the food.*
» *I like having the option of shared rides. I don't drive, so I am always looking for the best transportation options for my budget, and shared rides are pretty much perfect as far as convenience and cost.*
» *The prices are amazingly decent for the share rides.*

» *I LOVE to save money*

In terms of other benefits, a number of riders noted they like the shared services when they are not in a hurry:

» *I am usually not in a hurry so i might as well save a bit.*
» *I like it. I love ve the option because at times I'm not in a rush.*
» *I think they are great option to save money when timing is not really an object*
» *If I'm going somewhere that doesn't or isn't time sensitive. Then I would use it*
» *It's kinda cool, so unless I'm in a hurry where I absolutely can't chance waiting for other peoples pick ups/drop offs, I don't mind a little detour*

Some riders expressed the sentiment that the delays from pick-ups/drop-offs and indirect routing are not major.

» *I have never had a long delay and usually arrive as promised*
» *usually it works out that the time difference isn't too bad and there is a chance that you don't pick up any other passengers.*
» *Lyfts shared service is pretty fair, its never an exorbatant amount of time that you spend trying to locate and drop of the next passenger.*
» *I personally I have never had any issues with the trip taking too long with extra passengers.*
» *Even when there WAS another pick up, the detour wasn't long.*

A few passengers stated that Pool/Shared are superior to transit:

» *Not having to take a bus*
» *It's a good concept. It gives an alternative for those who may not be able to afford a single ride, and is much more convenient than public transportation.*

Some riders like the fact that selecting Pool/Shared sometimes means they are not paired with others, and thus they get a solo ride for a shared ride price:

» *Honestly, while using Lyft Shared, out of all the times I have used it, I've only shared with another passenger two times in total, so even though its the price of shared ride, its not really a shared ride which is good.*
» *It's cheaper and normally, or from what I've experienced in the past, they didn't even pick up anyone else, so it was just the same as me taking a regular Uber. Yes, it's a gamble, but 4 times out of 5 there was no one else, even in a busy city like Las Vegas, so it was just like taking a regular Uber.*
» *I personally enjoy taking shared rides later at night knowing I have a higher chance of not picking up passengers.*
» *Honestly, while using Lyft Shared, out of all the times I have used it, I've only shared with another passenger two times in total, so even though its the price of shared ride, its not*

really a shared ride which is good...My guess is that there are so many Uber vehicles out there, the chances are in the passengers' favor.

A few riders noted that traveling out of the way meant they could see new parts of the city:

» *I like that when I am not in a hurry to my destination I get to see different areas of places I wouldn't normally see.*

A few riders also feel that Pool/Shared contribute to safety:

» *Feels safer than calling a taxi and is better than relying on public transportation*
» *safety in numbers- I don't always feel safe with being the only passenger in a car, so having other people in the car, even though they are strangers, makes me feel safer.*
» *It's not safe to take public transportation all the time and i can't really afford rides but I do it for safety.*
» *The drivers are usually very protective and strict with their passengers 0% sexual harassment is tolerated.*

Meeting others came in a distant second among reasons people like the services, with about 15% of riders mentioning it.

» *I love to meet new people, it's all part of networking and that makes my business grow being a psychologist. Plus I just find people interesting to begin with*
» *Use when traveling as a cost effective means of getting around and a way to meet the locals*
» *I think it's a cool idea to bring strangers closer together. Never know who you might meet and what possibilities can come from sharing a ride.*
» *I like meeting new people. I'm a flaming extro.*
» *It's a very great way of getting affordable rides and meeting new people*
» *It's cheaper for me and I also get to meet a lot of different people on my way to work and on my way home from work and it's very interesting to see how well you get along with very different people and I have ended up with a few very very good friends from that ride are a ride*
» *I love that...often times I meet people in the pool that are interesting or are tourisists so I can offer them good advice on what to see while they're in town*
» *Chance to ride with hot girls*
» *I think shared rides can give one a sense of community. Especially here on the West Coast, people are very insulated. It is good to get out and actually be with other people, rather than clogging the freeways.*

In terms of broader benefits to others and society, some passengers like that sharing may help the environment and get cars off the road, although it may be considered surprising that only a small number of passengers (7.5 percent) mentioned these as "likes":

> » *i like that its better for the environment and for carbon emissions..*
> » *I like saving money, while also knowing that it is better for the environment , keeping cars off the road.*
> » *It's a nice way to be environmentally friendly but still not have to take the bus of you have luggage*
> » *It also good for the environment. Theoretically it would mean less cars on the road so less emissions in the air, so less air pollution.*
> » *I think ride shares and carpooling in general are great things. Both for the environment, and traffic*

Some passengers state they are happy to be helping the driver by allowing him/her to make more money, though they may be under the erroneous impression the drivers collect the full fare from each passenger:

> » *I also like the idea of being able to help the driver save gas and make more money in less time by picking up rides that are shareable.*
> » *The service allows us to save money, and the driver to make money, so is a win win*

3.4.2 Riders' Good Experiences

We also asked riders to tell us about any good experiences they might have had while sharing.

> » *I had all good experiences. All my drivers were great and the passengers I shared with were pretty friendly*

Some passengers praised rides where the matching algorithm seemed to function well:

> » *In general, Lyftpool does a good job of maki g the shared route fairly time effiecient*
> » *my last lyft shared ride went ok, it was only 1 other passenger and we were both going to the airport and it made it an easy cost effective trip*
> » *All of the people on the ride were going close to the same placr*

Other passengers reported on positive social experiences:

> » *One time I met a very nice elderly couple. They were so sweet and enjoyable to be around.*
> » *Met some really interesting people once, still exchange email*
> » *I once met a really good person that I'm now friends with*
> » *Sharing a ride with someone I knew from my area.*
> » *Meeting some really cool people*
> » *I mean it's nice to meet new people when they are nice.*
> » *Once was picked up and dropped off quickly with an engaging passenger.*
> » *I made a great connection with someone*
> » *Met cool locals*

» *I meet some very nice people.*
» *i made a new friend*
» *Had a person who was cracking jokes. Made the ride fun.*
» *Meet some cool passengers*
» *I remember taking a Lyft shared home and I learned that I had many interests with the passengers I was in the lyft with. It was a lot of fun*
» *The good experience was the people being friendly and nice felt much safer in the vehicle.*
» *When my friend and I went to California and the Uber drivers and other customers were extremely nice and engaging*
» *Yes. Met some nice people along the way on some of the trips.*
» *I rode with a nice girl who I liked and we had a friendly chat*
» *Yes I had a shared Lyft with a cool couple and we talked and laughed all the way to the destination it was a really cool experience.*
» *the passengers were very pleasant to talk with. Also, there was still plenty of room to relax.*
» *a new passenger was picked up, everyone was nice and I got to my destination still on time*

Some positive experiences involved somehow "beating the system," particularly when no match is made and the trip turns into a solo trip for a shared price:

» *Some drivers will turn off availability when cars start getting full to avoid overcrowding*
» *A few times I booked an uberpool and no one else booked it and I got to my destination both faster and in less money*
» *The one time I tried it I was happy to be the first one to be dropped off.*
» *Yes when I didn't have to share the ride*
» *The only pleasant experiences I had with UberPool was when no other passengers were picked up and I got to ride alone for a cheaper rate.*
» *The first time I took Uber share I was the only one in the car, it was a very smooth ride,*
» *There have been times I used pool and was the only person, and other times it has saved me a lot of money and was not inconvenient at all.*
» *Once or twice I got the car to myself. That was nice.*
» *Most of the time I used Uber pool we did not pick up another Rider,*
» *I once took a shared ride but didn't have to share.*
» *The time I was the only passenger in the car it was quick and inexpensive*
» *Once nobody else was in the car and that was great.*
» *I once used UberPool and was the only passenger for the entire ride*

3.4.3 What People DISLIKE about UberPool/Shared

However, even when specifically asked for good experiences, some riders had little good to say about Pool/Shared:

> » *Once I got picked up, got to my destination, and nobody died*
> » *The pricing is the only good experience*
> » *I wish I did.*
> » *No particular good experience as of yet*
> » *wouldn't go as far to say good-- would just say neutral*
> » *Not really.. besides it being cheaper nothing beyond that.*

We also asked people what they *dislike* about Pool/Shared; the subjects of their responses are presented in Table 10.

Table 10: Open-Ended Rider Responses-What Do You DISLIKE about Pool/Shared?

	Former Users	Former %	Current Users	Current %	Total Users	Total %
Nothing	112	33.8%	38	10.4%	150	21.6%
Cost						
Cost	22	6.6%	20	5.5%	42	6.0%
Characteristics of trip						
Excessive travel time	120	36.3%	121	33.2%	241	34.6%
Unreliable travel time	5	1.5%	61	16.7%	66	9.5%
Too many stops	3	0.9%	36	9.9%	39	5.6%
Indirect routing	7	2.1%	30	8.2%	37	5.3%
Time uncertain	30	9.1%	2	0.5%	32	4.6%
Inaccurate arrival time given	39	11.8%	13	3.6%	52	7.5%
Relating to Others						
Behavior of others	8	2.4%	39	10.7%	47	6.8%
General dislike of strangers	37	11.2%	103	28.2%	140	20.1%
Conversation of others	1	0.3%	8	2.2%	9	1.3%
Others drunk	1	0.3%	4	1.1%	5	0.7%
Others on phone	13	3.9%	2	0.5%	15	2.2%
Smell of others	16	4.8%	15	4.1%	31	4.5%
Others rude	0	0.0%	27	7.4%	27	3.9%
Others making out	2	0.6%	1	0.3%	3	0.4%
Others not ready for pick-up	24	7.3%	8	2.2%	32	4.6%
Others sick	0	0.0%	1	0.3%	1	0.1%
Others too talkative	59	17.8%	9	2.5%	68	9.8%
Crowding	23	6.9%	31	8.5%	54	7.8%
Race/size of others	2	0.6%	1	0.3%	3	0.4%
No privacy	1	0.3%	0	0.0%	1	0.1%
Unsafe	3	0.9%	11	3.0%	14	2.0%
Other						
Carrying things	2	0.6%	2	0.5%	4	0.6%
Total Respondents	*331*		*365*		*696*	

Sources of complaint about Pool/Shared were more dispersed than causes of approval, which generally revolved around price. Complaints broadly broke down into two categories: complaints about the mechanics of the travel (issues surrounding travel time/unreliability/excessive stops/poor routing/being given inaccurate arrival times) and issues with other passengers. We illustrate each in turn.

Some riders complained about the cost of the service, or that the discount is not large enough:

» *pool offers less than a $2 discount on average vs the private ride for me (on average $40 private ride). Cost savings are too low compared to the additional time added.*
» *The price definitely needs to be way lower.*
» *I dislike the rate of shared rides. I may as well take public transportation*
» *The price ISN'T lower ENOUGH and the difference in time.*
» *Price still often doesn't make financial sense for the trips I need to take most often*
» *Sometimes they are not worth the saved cost, such as when it's only a few dollars cheaper, or when the shared ride is much more time, or when you pick up a lot of people and take so many detours.*
» *Sometimes it is barely cheaper so it's pointless.*
» *They need to market themselves as significantly cheaper or otherwise more appealing cause they really aren't worth the reduced price at the moment. Lyft shared is usually only 1-2$ cheaper than the private Lyft.*
» *I would like to utilize it more, however the cost doesn't seem low enough to me, and most of the time I am on a tight time frame so I will pay more for less awkwardness and a faster ride.*

Some complained about long travel times:

» *It takes WAY too long*
» *when i took a pool ride, some passengers requested to stop for pizza and it took FOREVER to get it and therefore I didn't get home until an hour after I thought I should*
» *I dislike that it will sometimes take considerably longer to get where I'm going.*
» *It takes so much longer. It could take up to an hour for me to go 8 miles in Boston*
» *Sometimes it can take way too long to get to your destination.*
» *I don't like that sometimes it feels like it takes forever to get to my destination*
» *There are times I don't have extra time and need to get from A-B without any interruptions.*
» *I think it is ok but not worth the price differential based on taking a longer time using a shared service.*

Excessive delay may be caused by too many stops:

» *Too many stops. I like to be on time to where I have to be.*
» *Potentially too many stops if my Destination is fartherest away*
» *On longer trips its not worth the saving withnso many stops and going off the route*
» *Don't like when they pick up too many people and take you way out of your way*
» *Drivers go out of way to pick up other customers and there is no max on the amount of detours they take. A driver picked up 3 shared passengers on one of my trips and it took me over an hour to get home.*
» *It can easily turn into a really long trip if other pick ups aren't ready and if the drop offs are far apart*
» *Every once in a while you get royally screwed when the driver picks up 2 other passengers and the total trip took over an hour (normally under 30 minutes)*

Others complained about reliability and unpredictable travel times:

» *You never know how many people they might pick up and drop off in between where you needed to go and so you could wind up getting to your destination very late.*
» *The unpredictability of where another passenger is being picked up or dropped off; the cost is usually not much less than a single ride.*
» *not knowing how many people, stops or how long it might take to get where you're going*
» *You don't always know how long it will take or how many additional people are being picked up.*

Related to this, passengers complained about not knowing their travel time in advance:

» *we will not know when we will reach the destination, so can't be used when we don't have much time especially during travel for business purpose*
» *I don't like the unknown the of the extra time as I am always tight on my schedule*
» *I don't like how the drop off time can fluctuate with new passengers picked up.*
» *Theres no telling how long the rides may take.*
» *I dont like not knowing how much longer its going to make my trip when i choose the pool option....*
» *The shared service is unpredictable, and increases the time for me to get to a location. I don't want to have to stop multiple place before getting to my end point*
» *I don't like not knowing what time I will arrive at my destination.*
» *I do not like the fact that arrival time to my destination is unknown.*

Some complained that the predicted arrival times given by the services are too vague or inaccurate:

» *Trip times were rarely accurate*
» *the estimate of arrival is so wide, you have to not be on a time limit, or leave extremely early to make it somewhere on time.*
» *The original estimated arrival time always seems to get later and later*
» *Unexpected addition guests that significantly lengthen arrival time. Way past what originally showed up on the app*
» *I don't like the significant increase in timing that it takes to reach the desination and the vague destination ETA. I use Uber a lot for work travel so the majority of my trips are time sensitive .*

On the other hand, one rider praised the accuracy of the ETAs:

» *I like that even though I used shared lines, I always get to where I need to go on time because the estimates are accurate.*

The routing instructions given to drivers frequently frustrate passengers. There is often a sense of injustice when others are dropped off before the passenger, particularly if it seems they live farther away:

»   *The rides take too long, the drivers are always confused and don't necessarily pick up and drop off in a logical order.*
»   *Sometimes the driver goes out of the way to pick up and drop off the other passengers with no rhyme or reason to the route.*
»   *Can drive past destination and driver won't drop off if someone else is scheduled to be dropped first*
»   *My only dislike is that at times, the driver can by pass your stop because of picking up another passenger or if your drop off is closer to their next pick up even if you was in the car first you might be last to get dropped off*
»   *It always seems as if the driver drops off the other person first, no matter if it is farther away than my destination.*
»   *The driver goes the long way around to get to the destination, if it is a shared ride.*
»   *Annoying out of the way pickups.*
»   *Sometimes the driver goes way out of the way to pick up new passengers and makes the trip very long, doesn't make much logical sense to me from a logistical standpoint.*
»   *sometimes in rare instances the diver will be detoured and be closer to my drop off vs the other passenger's drop off and the app doesn't have them drop me first instead it goes all the way to their destination several miles away from where they were detoured to which was maybe half a mile from my destination....very annoying especially if that adds 40 mins to the trip*

Some believe that the first rider picked up should be the first dropped off:

»   *I do not like that drivers do not drop people off in the order of proximity to destination vs. whoever gets picked up first*
»   *I don't like how sometimes the uber pool with have the driver go far out of the way of my route to my destination and then I don't even get dropped off first if the next persons destination is closer.*
»   *Sometimes they drop someone off who was picked up after me, or they take longer than I think is reasonable*
»   *On occasion it seems like the drivers accept rides that are slightly out of the way and it seems like every time that happens when I'm the first rider, the new rider gets dropped off first. Even when the drop off location is also slightly out of the way. I feel like if the new riders are requesting to be picked up on the same path that the driver was going initially with the first rider, then that is when the second rider should be picked up. But when the driver has to drive 2 or more streets off track to pick the new rider up or deviate off of the original destination more than 3 blocks to drop the second rider up, then either dont pick up the second rider or drop the first rider off first. I think the first person in the car should get priority when it comes to who gets dropped off first unless*

the drop off for the second person is on the way to the first persons drop off location with out deviating more than 2 streets off track.

However, another rider complained about the opposite:

» *Sometimes other passengers who were picked up first get dropped off first even if my destination is much closer than their's.*

There was one complaint that drivers have trouble with the navigation instructions they get when serving shared trips:

» *the drivers get confused and mess up the routes when picking up multiple people*

The other main source of complaint was other passengers. There were frequent comments about not liking the general principle of sharing with strangers.

» *I don't like sharing that much of my personal space and time with a stranger.*
» *It's a tense vibe*
» *I love the idea but in practice it's really awkward to share a ride with a stranger.*
» *I don't really like riding with other people I don't know. Riding alone makes me feel special somehow.*
» *I hate sharing a car because you never know who will be in the car.*
» *It is already weird to have a stranger pick you up and drive around and now you are asking that to happen with even more strangers.*
» *It's like flying on a plane, can't pick the people you travel with. It's a crapshoot*
» *I prefer my privacy and don't care to hold conversations with strangers*
» *Don't like other passengers in the car. I feel obligated to make small talk*
» *I dislike using UberPool because it pairs me with potentially unfriendly and/or dangerous passengers*
» *I'm not comfortable riding with additional people in a vehicle that I don't know.*
» *I'm a shy and anxious person, so the mental turmoil I face when in shared cars does not make up for the lower prices.*
» *I just don't like sharing a car with strangers. I like to have a nice quiet ride by myself/with my partner/family. I just find it awkward to travel in such close quarters with strangers.*
» *Uncomfortable sharing a long ride with people I don't know, especially a pair of friends when Iam alone*
» *I dislike riding with strangers. It feels unsafe, it feels uncomfortable. It's just not a pleasant thing*
» *The uncertainty of the character and hygiene of other passengers.*
» *I dislike having to interact with people and really dislike being to close to them in the car*
» *Overall, it isn't too bad but I still prefer traveling in my own space and privacy. At times you have to deal with rude passengers...I do like my quiet time while traveling and that is rarely possible when traveling with strangers.*

There were numerous more specific complaints about passenger behavior. The word "creepy" came up multiple times describing other passengers:

> » *Creepy other people you don't know if you want to be next to*
> » *Sometimes the other passengers can be rude and or creepy*

More specific complaints include general rudeness:

> » *Sharing a ride with strangers you can't control how other people act or smell or talk or anything and I've met rude people I've shared with before that ruined my experience with pool.*
> » *May have rude, discourteous passengers riding with you. Long route before destination.*
> » *I thought everyone would be polite, but I was wrong, some people think they are the only ones in the car using language I do not like to hear.*
> » *I dislike it when you get a noisy or obnoxious person sharing the ride.*
> » *There should be standards. Like convenient stores. No shirt, no shoes, no service.*

This occasionally goes as far as hostility on the part of other passengers:

> » *I was the second passenger and the first passenger seemed annoyed at me personally when they picked me up because he was late to work. And, it was too close for comfort in the backseat of the car for me. I didn't like it at all.*

Riders also expressed frustration with other passengers who complain too much, for example about crowding or routing:

> » *Other passengers complain that it's getting too crowded and that makes me feel self conscious.*
> » *The other passengers tend to complain as the car gets more crowded.*
> » *The customers can be some of the rudest people I have ever met. The customers are not very understanding about not only what is legal for the driver to do or what the app permits.*

One source of complaint was other riders not being ready or requesting detours:

> » *You are dependent on others to be timely and organized, in order to make your trip shorter.*
> » *If in a tight schedule, the stops in between delays the trip. Especially when other riders aren't ready.*
> » *waiting on the other passenger. sometimes they take long to get in the car.*
> » *Some passengers are inconsiderate and don't understand the purpose and concept of SHARING the ride - they show up with a bunch of bags/luggage, are not on time, or have requests to change dropoff and pickup locations. They simply choose pool (selfishly) t save themselves a couple bucks, but don't think about the people they are riding with. If*

> *they want to do those things, stop being cheap and pay for your own ride!!! More drivers should be calling them out for these actions, but they seem to be afraid to lose money.*

> » *I have been in rides with people that are inconsiderate of my time which is extremely frustrating, e.g. one person asked to stop by their house and run up but was there for 10 minutes.*

People complained about others talking on the phone:

> » *Often times, in shared rides, people are taking on the phone which is annoying.*
> » *sometimes the people you ride with can be incredibly rude...aka...talking on their phone...trying to direct the driver...*

A source of relatively frequent complaint was other passengers' hygiene and/or smell:

> » *Sometimes people are inconsiderate with hygiene and communication.*
> » *The perfume of the lady in the car was overpowering and penetrated my suit so I smelled unprofessional at my next business meeting. Also the large man she was with made me feel very unsafe.*
> » *I just don't feel safe with other people in "this world these days" and the perfume situation with my allergies and professional presence is important, I don't want to smell like a "call girl" because of sharing a Ubershare with a lady that has taken a bath in cheap perfume that gets all over everywhere.*
> » *Some people are rude and or arent hygienic.*
> » *There is never a guarantee that you may share a ride with someone you find annoying or irritating or smells funny (too much perfume, cologne, etc).*
> » *Don't like...smelling their perfume/cologne/body odor.*
> » *people with too much perfume or smokers*

One passenger complained about others playing music:

> » *Don't like...listening to other people's radio*

There was even a complaint about amorous activity on the part of other passengers:

> » *if the other passengers make me feel uncomfortable (ie. Making out right next to me).*

Others complained about passengers who are drunk:

> » *Sometimes the other passengers can be drunk or otherwise bothersome.*
> » *I have ridden with unpleasant passengers before (drunk, rude, etc.) and sometimes it adds significant amount of time to the ride duration.*
> » *sometimes the other passengers can be loud or on the phone...or drunk, or weird.*
> » *I don't like the idea of getting into a personal vehicle...[and] the people in the car with me are angry drunks*

Passengers may be sick, raising the fear that they will pass this on to others in the vehicle:

> » *safety...sick other passenger*
> » *I don't like it when I have to share a small place with someone who is sick*

Some people complained about others bringing unwanted things with them, such as pets:

> » *People having baggage or taking too long*
> » *people sometimes have smelly animals with them like cats or dog.*

A major source of complaint is that other passengers can be too talkative, when the rider dislikes having to make conversation:

> » *Some passengers want to be social and I only ever take it after work and at that point I don't want to be social*
> » *Sometimes other passengers like to talk to me but I'm not always up for conversation*
> » *I don't like talking to the passengers all the time.*
> » *sometimes feel obligated to talk to people.*
> » *I also don't like conversing with people and i think some drivers even rate you if you don't like small talk*
> » *i am usually quiet and do not want to talk to a stranger*
> » *Sometimes the people are weird and talk to you even if you dont want them to.*

However, in contrast, others complained that other passengers are sometimes not sociable *enough*:

> » *Most of the time the passenger does not even greet/acknowledge you (I'm always polite enough to at least acknowledge them). I find this quite rude and it sometimes can put a damper on your mood.*
> » *sometimes you miss out on a ride because they get full. Also, less time to get to know each other since the more people the less people are willing to talk to each other*

Of note, there were a couple of offensive sentiments expressed regarding other passengers:

> » *I don't like the type of people I end up sharing with. They're kind of ghetto.*
> » *There are time that the rate was way too high for the level of discomfort spaces wise. Sometimes the system lets a number of people to be picked up without taking in account their weight which sometimes made the trip kind of uncomfortable.*
> » *Sharing with smelly people or larger people.*

We suspect that in addition to these comments, others may harbor similar attitudes but did not express them in a survey where their response could conceivably be tracked back to them.

Crowding was another source of complaint:

- » *If I'm squished in a car with smelly people*
- » *I've had a car arrive where I would have had to sit As a third person of a small back seat. I refused the ride.*
- » *Too many people being crammed into too small of a space. Just because there are 3 seat belts back there doesn't mean i want to be sotting that close to a guy who reaks of cigarette smoke or weed.*
- » *That the car may not have enough space and the ride is uncomfortable for me as well as the other passenger/passengers.*
- » *DO NOT CRAM US IN LIKE A BUNCH IF SARDINES!*
- » *Sometimes it takes ridiculously long and drivers try to stuff 6 people into the back of their car.*
- » *sometimes a person enters the car and they don't respect other peoples personal space*

Two users noted that it is difficult to carry things in a Pool/Shared ride:

- » *Not useful when getting food for family.*
- » *sometimes it's crowded and not enough trunk space if I'm bringing or carrying items*

Finally, there were some negative comments about the perceived lack of safety when sharing, including that other riders may learn where you live:

- » *less safe- it's uncomfortable enough getting into a car with a stranger, but at least I know the drivers been somewhat vetted - having any stranger (next to me!) feels less safe*
- » *not knowing who else is going to be in the car with you is kind of scary.*
- » *Even though you know who your driver is going to be , safety is always a concern.*
- » *No. I am simply too afraid, because of my own past experiences, to use them.*
- » *I feel like it's unsafe to use shared rides, especially during the night time. You never know what type of person is getting in, all you have is basic information about them.*
- » *Essentially if you're someone like me who is traveling from work to home, you don't want these shared riders to know where you are going. Overall its very uncomfortable.*
- » *It not safe to let others see where you live.*
- » *They are awkward and makes me really uncomfortable as a woman travelling.*
- » *I honestly wouldnt use them by myself only with a group of friends to feel more comfortable.*
- » *The weirdos that get in, or people that dont seem trustworthy. They now know where I live/work*
- » *It takes longer and potential risk of dangerous passengers*
- » *I like using shared rides on certain occasions, but not at night.*
- » *it doesn't feel so safe with some strangers (depend on how they look like and act like).*
- » *I'd really rather not use them at all. I don't want people knowing where I am going. My "agreement" is with the driver and Uber - not with this stranger in the car as well.*

3.4.4 Passengers' Bad Experiences

As with good experiences, we asked passengers to share bad experiences they may have had while sharing. In many cases these evoked similar themes to the complaints outlined above. These include long trips:

» *Yes. The shared rides took longer than they were supposed to, and I was late to my appointments.*
» *Yes because one time my ride took over an hour for literally a 15 minute drive.*
» *Other than excessive time spent in a packed car no*
» *yes one time a 20 minute ride took over an hour*
» *Trip took twice as long for minimal savings*
» *Yes, a trip that too double as long as i expected it too…*
» *It took so much longer to get where going.*
» *Trip took longer than expected. I was arrived to my destination 20 minutes later than usual.*
» *One time I had to go to school and I left really early and used a pool, and it took me about an hour to get there (direct would have been 15 min TOPS) There were also 3 other passengers besides me and no one was together. It was very awkward and uncomfortable.*

Along those lines, some reported times they felt victimized by excessively indirect routing:

» *Yes I had a bad experience where I was close to my destination but because another person was going my way the driver literally made a U turn and had to go back the way we just came from.*
» *Yes-the driver went out of the way to drop people off (I thought it was supposed to be en route).*
» *I once took an Uberpool the took me over double my 20 minute estimated time because it kept telling him to pick up people that weren't anywhere near my route*
» *Yes i was 35 min late because the driver kept picking people up that were not on the way to my destination*
» *i was almost at my destination then another pick up happened last minute and we had to make a u turn over a mile farther to go back wasting so much time*

Others made similar complaints about what they perceive to have been excessive stops:

» *I took a shared ride from an airport. The trip to the airport should have taken no more than 30 minutes. I was in the car for 1 1/2 hours as it made extra stops. This was unacceptable*
» *I entered a share pool and the driver made an additional two stops to pick up users and one of the passenger needed to make a stop and took to long.*
» *Made multiple stops and ended up being late to a meeting*
» *Yes many.. the reason why I stopped taking shared rides. Having drivers pick up over 5 other passengers and needing to sit in the car for over an hour when the ride should've*

    been less then 20 minutes. Uber pool/ lyft line are time consuming and are to risky to take. Not worth the cheaper price

» *Nothing particularly bad except one time when the app originally said approx 50 minutes to destination and then it turned into an hour and a half because two of the gusts were going in the opposite way from the airport - almost missed the flight and had to carry on a bag I would normally check*

» *Overcrowding, not having defined drop offs where one can be in a car four an hour perpetually picking up passengers delaying your drop off*

Again, there were complaints about other passengers' general level of "creepiness":

» *Just a creepy feeling from the other passenger*

» *The only bad experience was a passenger that was very strange and creepy*

There were numerous complaints about having been paired with other passengers who had poor hygiene:

» *Smelly smelly passengers*

» *Sometimes other passengers have a smell about them and it's completely unpredictable...*

» *They smelled bad and sat really close to me*

» *Other persons odor!*

» *besides a person stinking and their baby throwing up on me nope.*

» *Some other passengers smelled bad*

» *Yes..stranger was picked up ..He smelled awful and wasnt very friendly.made me feel uncomfortable*

» *Other passengers had strong smells- body odor and perfume*

» *One of the passengers I rode with worked at a fast food restaurant and smelled like grease and pot. The smell made me want to gag*

Some even complained about pets' hygiene:

» *Only When Someone brought a dog into the car and the whole car smelled .*

» *Yes, I shared and UberPool with someone taking their cat to the vet which was unpleasant.*

Some have experienced sharing with sick passengers:

» *People coughing on me.*

» *Once coming home after a night our my pool picked up a male passenger who passed out in the back seat immediately. I just don't want to feel uncomfortable like that anymore*

» *Around the holidays I was in shared ride with somebody who sneezed, coughed, and blew their nose constantly. I didn't want to get his cold.*

» *I ended up riding with a customer that comes to my job often though he didn't recognize me at the moment. It was uncomfortable as he breathed heavy the whole time and kept coughing into the air.*

Riders complained about times the other passengers were not ready for the pick-up:

» *Just multiple ride that took way too long because of other people not being able to find the car or in the wrong location. Also I've been in packed cars, squeezed multiple people with a bunch of stuff.*
» *Yes, rude passengers.Passengers who are not ready to be picked up:*
» *Other rider wasn't ready, we had to wait longer.*
» *Passenger we were picking up took too long and delayed me unnecessarily!*

Other complaints focused on bad experiences with rude fellow passengers:

» *The other passenger was being difficult and annoying*
» *Yes very rude people that I ended up sharing the pool with.*
» *There has been times where I've gotten into an UberPool where the original passenger was upset that I was added on, because they just wanted to use the service for a cheaper ride.*
» *the other rider was loud and on his phone*
» *I think shared services are an ingenious invention and have made people lives better. I'm not too positively inclined towards my fellow passengers who are often so rude as to not even acknowledge me (the emotional cost of trying to acknowledge them only to be ignored sometimes influence my deliberation as to whether to use shared vs. non-shared)*

Some have had bad experiences with fellow passengers who were inebriated:

» *Yes, I once shared a ride, at 3pm, and ended up with 3 drunk college age boys. It was an extremely uncomfortable experience for me.*
» *I had a rideshare with someone who smelled of marijuana.*
» *drunk females and LA traffic*
» *Drunk girl I had to help out of the car*
» *I have shared a ride with people who have been extremely rude, annoying, or under the influence of drugs or alcohol.*
» *I have not experienced anything negative other than an intoxicated person in thr vehicle while using the service midday*

Some have traveled with fellow passengers whose conversation they found offensive:

» *yes, just a few days ago, a drunk latina woman kept referring to me as a nigga and bitch, in an effort to show she was culturally in tuned. eventually, i had to ask her not to use either of those words while speaking to me.*

- » *Another passenger who kept talking and talking --and most of that was swearing.*
- » *Got in an argument with a passenger for being in my business and assuming things about me*
- » *I did, A group of 3 people came in the car and they were talking in a very uncomfortable language.*

In one case, a traveler reported fellow passengers getting into a fight:

- » *I had two people get in a fight in the car while I was waiting for my drop-off...Also, women always are talking on the phone and I don't want to hear their conversations*

Some riders complained about the behavior of children in the vehicle:

- » *I once used Uber Pool and the other passenger had two kids with her. The kids were screaming and yelling the whole time and it was a very unpleasant experience.*
- » *A baby pooped in the car and it was not pleasant*

One passenger expressed offensive sentiments about other riders:

- » *Both times I used it, I ended up in a car with ghetto type people*

Respondents also mentioned times they felt unsafe while sharing:

- » *the last time I used you Uber pool one of the people that was picked up and dropped off while I was in the car requested to be dropped off in a very unsafe very unsavoury area of Atlanta*
- » *No. I was just uncomfortable with some of the drop off locations.*
- » *It's just uncomfortable being with complete strangers*
- » *Another incident was 2 male passangers came along and the driver was male, it freaked me out being the only female in a full car and I had anxiety up until I got dropped off at work, not that it's anyone's fault or that they did anything to make me uncomfortable. My mind just goes 278339 different directions and I like to be cautious.*
- » *Did not feel comfortable or safe*

Some passengers reported experiencing unwanted advances:

- » *There was a man that was picked up from a liquor store as I was coming home from work around 2 am or 3 am, he proceeded to sit in the back seat with me and hit on me. He even tried to go as far as to follow me into my apartment building instead of continuing on his route. I can tell the driver was very flustered and didn't know what to do in this situation*
- » *The worst was when the driver picked up another passenger (a man) who was crudely and persistently hitting on me despite my clear expression of not being interested. I had to drive next to this guy doing this for 30 minutes (after the driver got lost picking up a 3rd passenger). It was extremely uncomfortable.*

Finally, there were stories about excessive crowding:

- » *I'm a big human. I don't fit well with others.*
- » *Personal space is an issue for me, especially when I'm paying for the experience*
- » *I refused a ride because of space. Had to request another car.*
- » *Toooo many people in the car*
- » *I had my double oxygen tank holder with me and I was placed in the front seat. In order to fit I had to move the seat back some. The rear passenger had plenty of room but decided to continue to ram his knees into the seat whenever possible. The driver did nothing after I told him. I asked the other passenger to please stop and told me well if you weren't so selfish and a bitch I'd consider it. Needless to say I left no tip*
- » *Yes, the vehicle was small and three cranned in back seat, one in front. Not much room for groceries.*

3.4.5 Non-User Comments about Pool/Shared

We requested that non-users tell us anything else they wished to about the shared services. Among these responses were numerous reasons explaining why people do not use the services. Non-user comments, grouped by theme, are tabulated in Table 11.

Table 11: Non-Rider Reasons They Do Not Ride

Non-Rider Responses	Freq	Percent
General positive statements	22	5.3%
General negative statements	21	5.1%
Cost		
Fares too high	13	3.1%
Fares not structured properly	1	0.2%
Travel time/unreliability		
Don't want longer/more unpredictable travel time	7	1.7%
Routing too indirect	1	0.2%
Too many stops	1	0.2%
Are too much in a hurry	3	0.7%
Issues with other passengers		
Would LIKE to travel with strangers	1	0.2%
Would DISLIKE traveling with strangers	20	4.8%
Vehicles too small/crowded	3	0.7%
Don't use service due to traveling with others	1	0.2%
Should be able to select co-riders by gender	1	0.2%
Should be a no-talking option	1	0.2%
Services feel unsafe	18	4.4%
Should not identify rider interests using Facebook	6	1.5%
Other		
Unfamiliar with the service	4	1.0%
Service area should be expanded	2	0.5%
Service should be more like a regular carpooling service	3	0.7%

N = 413

Specific quotes included general positivity:

» *Its a great idea for carpooling*
» *I do feel that in the city, like new York, the shared rides would benefit the people more. It is very expensive to get around the city. Anything saved is fantastic. Also, the distance people need to travel in the city is usually shorter. Even if you are not 100 percent comfortable with sharing, your ride shpuldnt be too long.*
» *I really appreciate the options and the desire to improve customer satisfaction.*

- » *It's very convenient and much cheaper than taxis*
- » *It seems like a great idea and I should use it more*
- » *Sounds like a great idea for people who frequently travel thru uber or lyft*
- » *It's great and maybe I'll try it sometime*
- » *I'd use it, based on the other's customer's destination*
- » *I think it's good for others. It's a great way to save money if you need to Uber/Lyft often.*
- » *I think they have a place and are a valuable alternative.*
- » *I think it's an excellent tool for people who usually carpool.*
- » *A great idea for a service especially with gas prices so high*
- » *I know my grandchildren use Huber Pool and for them as students and young working people is great for them at the times they travel*
- » *I think it's a good idea and it's just like a personal bus ride.*
- » *I'm just glad it's available when I need to use it. I hated calling cabs.*
- » *no...its a good idea for those who don't mind the time and the whatever a stranger might do or cause while sharing your trip*

However, others expressed general disdain:

- » *I think it is a terrible idea*
- » *No just that people should buy there own car*
- » *Makes me feel awkward*
- » *Overall it's not worth the hassle.*
- » *I think it's a good concept environmentally but I personally wouldn't want to carpool like that*
- » *I wouldn't consider them in any circumstances.*
- » *I don't see enough benefits in it.*
- » *It's good for others, not me*
- » *i only keep the app for urgencies. if you want to share a ride , use mass transit.*
- » *I don't like shared rides*
- » *it's an interesting idea but I don't trust it.*
- » *Not really a fan*
- » *I'm not really very interested in shared services*
- » *Not really. I'd rather take public transit than shared Uber/Lyft in most cases*
- » *Use uber not uberpool*
- » *nothing. Just not interested in sharing rides.*

Numerous non-users stated that the cost savings from sharing were simply not high enough to persuade them to use the services:

- » *I am in a position in my life that I really don't have to utilize this service unless there is a significant savings. Saving $5.00 or $10.00 is not worth the hassle for me and quite frankly most people that are over 40 years old.*
- » *It would need to be significantly cheaper*

» *Not interested unless it's dirt cheap.*
» *I don't have the experience using it to make a real comparison, but normally the price isn't that much higher to know that I have the car to myself and will arrive at my destination in a reasonable time.*
» *Expense is also a big factor; price differential needs to be worth it for a shared ride.*
» *I think it's economical enough that you don't have to share a ride.*
» *The lack of savings is a major issue for me*
» *There has to be a balance between cost and time. The increased time has to be worth the savings*
» *great concept but should be less expensive!*

There were two suggestions about how to restructure fares:

» *The cost should be weighted so people whose shared distance is the longest relative to their total travel distance should pay the highest rate. This compensates passengers who have the longest travel distance for the inconvenience of sharing the ride.*
» *Give us a rewards program or more coupons and not just first time customers.*

Non-riders also expressed an aversion to longer/more unpredictable travel times:

» *not a big fan. don't want to get delayed based on someone else's timeframe*
» *Do not like extended travel time. Want reasonable pickup time and drop off time.*
» *Maybe if we were both at the same location (ie concert or other event) I would be more likely but I dont want to get picked up and travel to get someone else before starting the journey.*
» *I don't mind using it,I just don't want to take forever to get to where I want to be.*
» *The longer trip time in a shared Uber doesn't interest me at all*
» *Love that this is offered, but I want to get to my destination as quickly as possible*
» *if I had the time I might use it more often*
» *Usually am time crunched if taking Lyft so cant afford any delays*

More direct routing was requested:

» *If they limited their drive radius, it would help*

There was also a suggestion that stops should be limited:

» *limit number of stops during trip to 2 max*

Larger vehicles were also requested:

» *Just need to make sure the car is big enough for everyone and their belongings*

Turning to the social experience, many non-riders expressed that they simply don't want to share with strangers:

» *I feel a little odd about sharing rides with strangers*
» *I have no problem paying extra for a private ride and if I don't have the money I'll walk before being stuck in a small enclosed space with strangers*
» *Nope. The less people I have to interact with the happier I am.*
» *The idea of sharing a car with people I do t know gives me anxiety.*
» *I'm a little skeptic about shared service since I dont like people*
» *No I just like to travel alone*
» *I'm just a very private person so this is not appealing to me at all*
» *Not comfortable with shared rides with people I don't know*
» *No. If other people don't mind sharing rides with stranger's. Then I think it's a good idea for them not me.*
» *I just like the alone time too much to share the ride*
» *I'm shy so I would be uncomfortable engaging in conversation with another passenger.*
» *Getting into a car with a stranger is enough of an anxiety-tester for me, so getting into a car with even MORE is a test of my patience!*
» *I am not a social being.*
» *the Uber driver is a stranger and it freaks me out, I would hate to have two people in a car that I didn't know*
» *I wouldn't share a taxi unless I was familiar with that person or persons. Why use ride share unless I was commuting to the same place as the other passengers or knew them? It just does not make me feel comfortable to do so.*
» *I like routine and structure. It would be my luck to get into a vehicle with talkative individuals and that is not comfort for me.*

One non-rider asked for a no-talking option:

» *It sounds dumb and very millenial-generational, but it would great if there was an option to check when you ordered your car to let your driver know if you wanted to talk or not. It can be so awkward sometimes.*

On the other hand, one person opined that sharing with strangers may actually be a positive for society:

» *I think it's a wonderful concept, and that having to ride with strangers is a good way for humanity to reintroduce themselves to one another*

Returning to more negative sentiments, there were frequently expressed concerns about a perceived lack of safety on the shared services. Several commenters were females worried about the prospect of sharing with male riders:

» *As a female, I am more hesitant to use services where I might be faced with unwanted attention or feel unsafe.*

- *I usually don't use any type of shared rides because I'm worried about my safety. I would be uncomfortable if I was going home and a passenger saw where I lived.*
- *I would do this going to somewhere public like the airport or mall because if I end up with a crazy passenger, I do not have to be concerned that they know where I live or where someone close to me lives.*
- *increases personal safety risk - don't like it at all - really bad idea since Uber cannot guarantee my safety. Cab companies don't guaranteed safety with drivers either but I do not perceive a risk as high as Uber ride pooling*
- *I really like the idea, but am a bit wary of riding with people I don't know.*
- *I just worry about safety of these services from stories I hear from friends, family and news about bad trips.*
- *I would also be much less likely to use a shared ride later in the night*
- *It sounds like a good idea since it helps save the environment, but people still scare me.*
- *Being a woman, I am still nervous using this service.*
- *It seems a bit scary for a single woman*
- *I'd be afraid of dealing with an intoxicated individual*
- *I would only like to say that I believe services such as UberPool, Express Pool, Lyft Line, and Lyft Shared are less safe than taking an Uber or Lyft on your own.*
- *I would be concerned when being dropped off at my home ~~ other passengers would then know where I lived which is a bit unsettling*
- *I feel really uncomfortable sharing small spaces with complete strangers. I feel unsafe especially when they are male.*

Along these lines, some do not use the shared vehicles due to concerns about crowding:

- *I would feel uncomfortable in a shared car and it's too crowded*
- *i don't like sharing a small space due to allergies*

One of the questions on the survey asked about the program Uber is researching to match riders based on common things in their Facebook profiles, which we discuss further below. A number of non-users found this objectionable:

- *Allowing people to refuse shared rides based on Facebook data could enter dangerous territory of discrimination based on race/sexuality/other similar issues. Not recommended.*
- *Using facebook to look up potential riders will fuel racism and discrimination*
- *Facebook is not protecting privacy as it should, I hope Uber or Lyft will not apply that the customer must share FB content to use the service.*
- *I would consider using it, but not if there is talk of sharing data through Facebook.*
- *The Facebook connection sounds creepy, not helpful. I dont want strangers knowing things about me.*

Some suggested Pool/Shared be more of a regular carpooling service:

> » *Carpool concept is good if everyone in the car is going to work at the same building or same place. Somewhat makes you feel safer and less time consuming going to different places. It's better when everyone actually going to the same mall/company/specific destination.*
> » *Maybe you should advertise it to companies so people working at the same place could carpool together*

One person reported they don't use the service because they are usually riding with others:

> » *I order an Uber and prefer to ride alone because I can pay for it and am usually accompanied by multiple people*

A few non-users expressed unfamiliarity with the system:

> » *Not being familiar with this, I would be willing to share ride if the prices were cheaper and the time it took to get to my destination wouldn't take to long*
> » *I think it's a good idea should advertise more*
> » *Very unfamiliar with the service.*

Finally, there were requests that the service area should be expanded:

> » *Have in more rural areas.*
> » *I would like it if these services were available in more areas.*

3.4.6 Suggestions for Improving Pool/Shared

We asked riders for suggestions on how Pool/Shared might be improved. A tally of their responses is shown in Table 12.

Table 12: Rider Suggestions for Improving Pool/Shared

	Former Users	Former %	Current Users	Current %	Total Users	Total %
Change payment						
Reduce cost	14	4.2%	49	13.4%	63	9.1%
Make cost more consistent	0	0.0%	1	0.3%	1	0.1%
Discount for each pick-up	0	0.0%	6	1.6%	6	0.9%
Discount if trip is longer than ETA	0	0.0%	4	1.1%	4	0.6%
Rewards system for frequent riders	8	2.4%	2	0.5%	10	1.4%
Improve travel time/reliability						
Reduce travel time (general)	8	2.4%	11	3.0%	19	2.7%
Shorter waits for vehicles	2	0.6%	3	0.8%	5	0.7%
More vehicles on road	0	0.0%	2	0.5%	2	0.3%
Less walking/closer pick-ups/drop-offs	5	1.5%	3	0.8%	8	1.2%
Optimize routing better (less detours)	13	3.9%	27	7.4%	40	5.8%
Limit number of pick-ups	10	3.0%	9	2.5%	19	2.7%
No new pick-ups if over ETA	0	0.0%	1	0.3%	1	0.1%
Person picked up first dropped off first	0	0.0%	3	0.8%	3	0.4%
Make estimated arrival time more accurate	25	7.6%	21	5.8%	46	6.6%
Guarantee arrival time	3	0.9%	1	0.3%	4	0.6%
Provide riders advance notice of route	10	3.0%	2	0.5%	12	1.7%
Improve quality of riders						
Make safer	4	1.2%	6	1.6%	10	1.4%
Background checks of passengers	2	0.6%	2	0.5%	4	0.6%
Passenger profiles available to other riders	10	3.0%	9	2.5%	19	2.7%
Allow passengers to rate each other	2	0.6%	1	0.3%	3	0.4%
Ban bad riders	1	0.3%	0	0.0%	1	0.1%
Allow some choice of fellow riders	9	2.7%	1	0.3%	10	1.4%
Allow co-rider selection based on gender	3	0.9%	0	0.0%	3	0.4%
Allow co-rider selection based on employment	1	0.3%	0	0.0%	1	0.1%
Allow co-rider selection based on smoking	0	0.0%	1	0.3%	1	0.1%
Allow co-rider selection based on children	0	0.0%	1	0.3%	1	0.1%
Allow co-rider selection based on age	2	0.6%	0	0.0%	2	0.3%
Allow co-rider selection based on "ghetto"	1	0.3%	0	0.0%	1	0.1%
Crowding						
Reduce crowding	5	1.5%	7	1.9%	12	1.7%
Use larger vehicles	5	1.5%	3	0.8%	8	1.2%
Serve wider area (other cities)	2	0.6%	7	1.9%	9	1.3%
Improve customer service	3	0.9%	0	0.0%	3	0.4%
Better accommodate disabled	1	0.3%	0	0.0%	1	0.1%
Improve passenger behavior						
Code of conduct for passengers	2	0.6%	13	3.6%	15	2.2%
Code: no talking if not desired	2	0.6%	3	0.8%	5	0.7%
Code: no animals	0	0.0%	1	0.3%	1	0.1%
Code: no playing radio	0	0.0%	1	0.3%	1	0.1%
Code: must be waiting on time for pick-up	1	0.3%	1	0.3%	2	0.3%
Code: must not smell	0	0.0%	1	0.3%	1	0.1%
Code: no loud phone talking	0	0.0%	1	0.3%	1	0.1%
Code: no eating	0	0.0%	1	0.3%	1	0.1%
Code: no baggage	0	0.0%	1	0.3%	1	0.1%
Code: no foul language	0	0.0%	1	0.3%	1	0.1%
Accommodate regular carpools	1	0.3%	1	0.3%	2	0.3%
N	*330*		*365*		*695*	

Note: We exclude suggestions that apply to Uber and Lyft more generally, such as improving the quality of the driving.

Rider suggestions run a wide gamut, but there are several major themes. The single most popular suggestion was reducing the price of Pool/Shared. Aside from a blanket fare cut, there were other interesting suggestions for targeted price breaks in specific situations, such as when the estimated time of arrival (ETA) is violated. A related idea would be a discount to riders for each additional pick-up of another rider during their trip. There were also suggestions that the price of Pool/Shared trips be made more consistent across trips.

Reducing travel time through various means was also frequently requested. In addition to general sentiments that travel time should be shortened, riders proposed a number of more specific policies. First, as was made clear above, many travelers are unsatisfied with the routing algorithm and the sometimes-frustrating, out-of-the-way routes it generates. However, given that the algorithms are proprietary and riders are not privy to the number and location of potential matches, it is unsurprising that most riders can offer no more specific policy improvements.

There were, however, some more concrete suggestions. Some riders suggested pick-up limits, such as a promise that only one other passenger would be picked up and dropped off en route. One rider made the interesting suggestion that no new pick-ups should be made when a rider will be going over the ETA she was promised at the start of the trip.

Some riders suggested reducing travel times by putting more cars on the road and reducing wait times for pick-ups.

Another set of proposed improvements focused on the uncertainty and reliability issues. Many riders lobbied for greater accuracy for the projected arrival window that riders are given when they first hail the Pool/Shared trip. However, most of these suggestions were vague requests for better service as opposed to concrete ideas for improvements. One rider did suggest allowing drivers to use their judgment to refuse requests if they see the new trip would involve too dramatic a diversion.

Some riders suggested that the arrival time should be "guaranteed." Others made the related suggestion that they be shown the route in advance of the trip so that they can refuse the ride if the trip will be too circuitous.

Another set of suggestions centered around the experience with other riders. There were some suggestions to improve safety. Specifically, there were a couple of suggestions for background checks for riders. There were also some suggestions that riders be allowed to rate each other to incentivize good behavior. One respondent suggested banning "bad" passengers, presumably those with low ratings from drivers.

Some riders felt it would be beneficial to give Pool/Shared customers some information about whom they will be riding with. Note that as we have noted Uber has looked into sharing information gleaned from Facebook profiles to alert prospective riders when they have common interests. Some respondents felt this is an interesting idea, but others see it as an invasion of privacy. Several riders expressed an interest in being able to screen potential co-riders; presumably, this could be done by sharing some sort of personal

information and giving riders a chance to reject a ride with that person, or by allowing a blanket opt-out for certain types of co-rider. Respondents expressed an interest in being able to filter out potential co-riders based various characteristics including age, smoking, sex, employment, and having children present for the trip. One of our responses suggested passengers be able to reject rides with those who are too "ghetto."

There were general suggestions that Uber/Lyft reduce crowding. Specific policies recommended include reducing the number of new pick-ups when riders are in the car so that a maximum of two passengers would be present in the backseat (three are currently allowed). Another potential policy might be setting a minimum on the size of vehicles that are dedicated to Pool/Shared service.

Some riders asked for service in a wider area. (As we note above, currently Pool and Shared are only offered in a limited number of cities.)

Finally, there is the subject of passenger behavior. A number of riders, both current and former, suggested that there be some sort of code of conduct, whether informal or formal, for people who share. One specific request was promulgation of a policy allowing riders to indicate whether they are interested in talking or not during the ride. Others asked for policies banning animals and children. Further suggestions include bans on the playing of radios or other music devices, a policy that customers must not smell offensively, a policy of no loud phone conversations, a policy of no eating, a policy of no excessive baggage, and a policy of no offensive language. It was also suggested that Uber and Lyft crack down on riders who are not at the pick-up point and ready.

We offer our thoughts on the efficacy and feasibility of these suggested changes in the conclusion of this report.

3.4.7 Non-Rider Suggestions

We asked non-riders (those who use Uber and Lyft but have never tried Pool/Shared) if there were any improvements that could be made to the services that might persuade them to ride. Results are provided in Table 13.

Table 13: Non-Rider Suggestions for Improvements that Might Persuade Them to Use Pool/Shared

Non-Rider Suggestions	Freq	Percent
Nothing/would not ever ride	245	59.3%
Change Payment		
Reduce cost	39	9.4%
Discount for longer travel time	2	0.5%
Late passenger compensates riders	1	0.2%
Rewards system for frequent riders	1	0.2%
Improve travel time/reliability		
Reduce travel time (general)	13	3.1%
Make more reliable	25	6.1%
Better estimated travel time	26	6.3%
Guarantee arrival time	11	2.7%
Guarantee route in advance	7	1.7%
More efficient routing	16	3.9%
Information in advance about route	9	2.2%
Drop off 1st passenger 1st	1	0.2%
Limit stops (one)	10	2.4%
Faster response time on pick-ups	3	0.7%
Improve quality of riders		
Allow rating of passengers	2	0.5%
Better info about other passengers	11	2.7%
Allow rides with no talking	1	0.2%
Have option for sharing only with women	4	1.0%
Safety		
Make safer	11	2.7%
Panic button	1	0.2%
Crowding		
Reduce crowding	9	2.2%
Bigger vehicles	6	1.5%
Other		
Advertise services better	4	1.0%
Serve wider area	1	0.2%
Serve regular carpools	11	2.7%
Autonomous vehicles	2	0.5%

N = 413

As can be seen, the majority of non-riders stated they would probably not use the shared services under any circumstances. However, many did suggest potential areas for improvement that might persuade them to at least consider trying Pool/Shared. In general, these mirrored suggestions made by current and former users outlined above, but there are some novel ideas not already mentioned.

In terms of safety, one non-rider suggested some sort of "panic button" inside the vehicle. Another non-rider suggested that when a passenger is not ready for the pick-up she should have to compensate the riders already in the vehicle for their time. Finally, several non-users expressed unfamiliarity with the service and suggested better advertising on the part of Uber and Lyft.

We return to all of the themes raised above in the conclusions and policy recommendations section of this report.

CHAPTER 4

What Do People Tweet About The People That They Meet?

4.1 Online Commentary About UberPool and Lyft Shared

We aren't just interested in what people *think* about Pool and Shared; we are interested in what people *say* about them. This is because we presume that services' success will be based in part on the kind of "buzz" they generate in the popular culture.[1]

4.1.1 The Power of Twitter and Social Media

It's no secret that we are now living in the age of social media. According to the Pew Research Center, as shown in Figure 24, just five percent of Americans used social media in 2005; in 2018, almost 70% did.
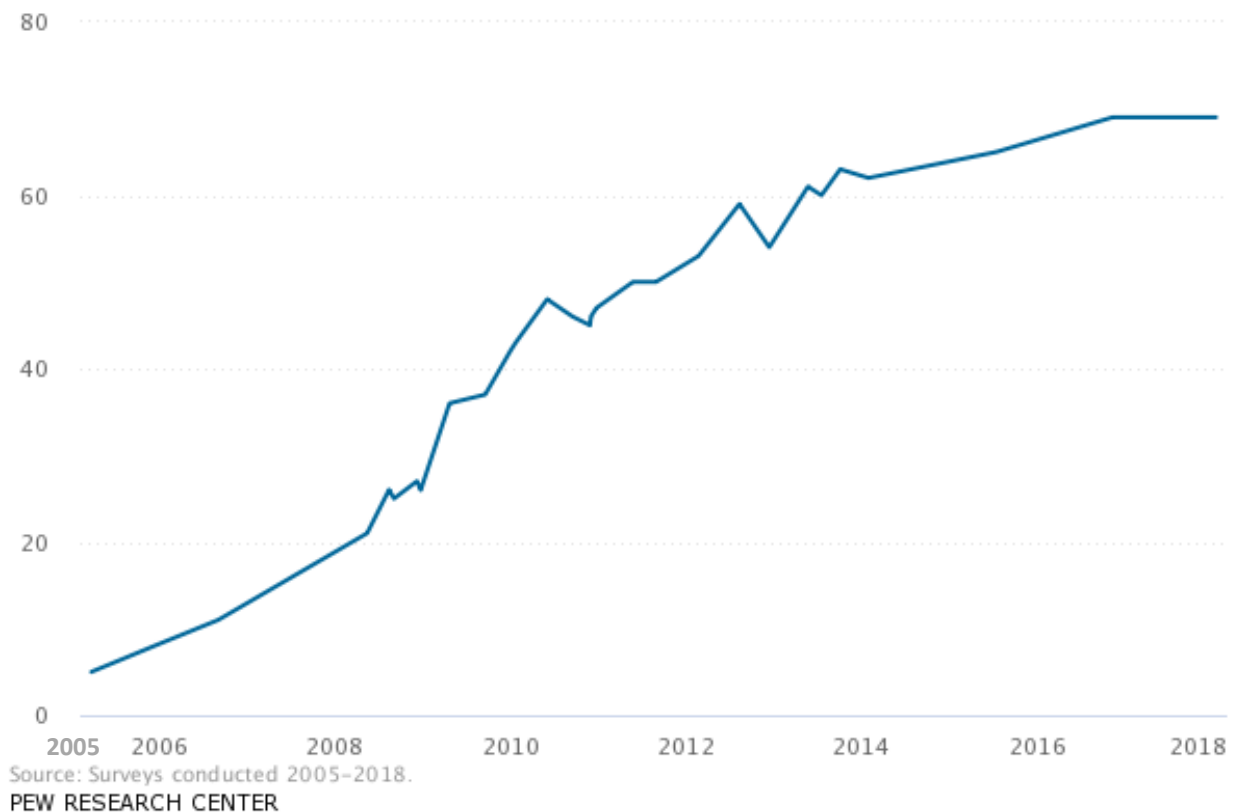
Figure 24: Percent of US Adults Who Use At least One Social Media Site

Even from this lofty level, participation in social media seems set to continue to rise in the future. Only about 30% of those over 65 use social media, while over 75% of those between 18 and 29 do (Pew Research Center, 2018).

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[1] Note that the substantial content of this chapter has been published in journal format in *Transportation Research Part F: Traffic Psychology and Behaviour* (Pratt et al., 2019).

Given social media's power, it may be one of the best ways to attract new customers to use the shared ride services. To gauge whether the "buzz" surrounding Pool and Shared is positive, we have looked at how the services are portrayed on the popular micro-blogging site Twitter, a platform on which users post short (280 characters or less) messages, called "tweets." Tweets can be accessed online and via mobile devices. Further, they are automatically sent to those who have subscribed to the tweeter's feed ("followers").

Although perhaps not as influential as Facebook, Twitter is certainly a major player in the social media landscape. About 25% of Americans use Twitter, including 40% of those ages 18-29 (Pew Research Center, 2018). Furthermore, Twitter inspires devotion among its users. Over 40% of Twitter users access it at least once a day (Pew Research Center, 2018). Since Twitter is easily accessible, is free, and disseminates tweets almost instantaneously, huge numbers of tweets are produced, transmitted, and read. As of the beginning of 2017, 500 million tweets were being generated per day by 300 million active monthly users (Aslam, 2018).

Opinions expressed on Twitter have a tremendous potential to propagate through the system. Some tweeters, particularly celebrities, have amassed huge numbers of followers. Singer Katy Perry currently has the biggest following, with 107 million followers (Wikipedia, 2018). Twitter has even become a major conduit through which the president communicates with the nation; Donald Trump has 53 million followers, not to mention legions more who read his tweets when they are reproduced by journalists and other disseminators of opinion and information.

The power of tweets becomes even greater when those that strike a chord with readers are "retweeted" to others, with or without additional commentary added by the retweeter. Retweeting means a single expression of sentiment can attain tremendous exposure.

All of this means that Twitter has a considerable capacity to both reflect, and shape, public opinion. Twelve percent of Pew survey respondents even report getting news from Twitter, with the share being much higher among young people: one-third of Twitter news consumers are 18-29 years old compared to only seven percent who are over 65 (Matsa & Shearer, 2018).

4.2 Our Methods

4.2.1 Gathering the Data

Given Twitter's vast reach and influence, we have analyzed how people talk about UberPool and Lyft Shared on the platform. We hope to understand the "culture" surrounding shared rides, and are particularly interested in this topic because we presume that what people say about the services could influence others' decisions about whether to try, and stick with, them. This assumption is based on previous research which shows that customers' buying decisions are influenced by word-of-mouth (Cheung &

Thadani, 2012), which can be dramatically amplified by social media platforms (Erkan & Evans, 2016).

We "mined" Twitter data for a three-month period between December 1, 2017, and March 1, 2018. We did this using a social media listening platform called Salesforce Social Studio (formerly Radian6) (Salesforce, 2018). Social Studio allows users to specify keywords in tweets, and pulls tweets containing those keywords for analysis. We used the keywords "UberPool" and "Lyft Line." We searched for "Lyft Line" because this was the name of Lyft's shared service when we collected the data; Lyft rebranded its shared service "Lyft Shared" in the summer of 2018, after our data collection was complete. Throughout this section we will refer to this service as "Lyft Shared" as we have done throughout this report, but when we quote tweets we will reproduce the original tweets, which refer to the service as Lyft Line.

Due to the sheer volume of Twitter posts, we selected a subsample of tweets for study. Our three-month data collection period produced too large a sample of Tweets about Pool and Shared to analyze (4,244 for Lyft Shared and 11,486 for UberPool). We therefore extracted a random subsample of 1,061 Lyft Shared tweets and 1,000 UberPool tweets for in-depth analysis, though we also did machine-coding analysis of the full dataset (see below).

We excluded tweets with terms that were not appropriate, such as hashtags and handles that referred to Lyft and Uber generally. Also, we used keywords to filter the data based on language and country (Metzgar & Maruggi, 2009; Sanderson & Gramlich, 2016; Weathers et al., 2016), limiting our data to tweets in English and originating in the U.S.

One issue that must be addressed when analyzing Twitter content is how to treat retweets. Retweeted content is not original sentiment, so a case could be made for excluding them. However, they may create just as much impact on behavior as an original tweet, and potentially far more when they are propagated widely. Further, sometimes tweeters retweet content but enhance it by adding a bit of original commentary. Finally, those who retweet a tweet are in some sense endorsing its sentiment although they did not create it. Thus we retained retweets in our analysis as they are an important part of the online conversation; we did, however, independently analyze "original" tweets, which were about 60% of our sample, to see if they meaningfully differed in any way from the sample with retweets included.

4.2.2 Analyzing the Tweets: Hand Coding

We used two methods to analyze the content of the tweets: hand coding and machine coding. To hand code, we used the qualitative constant comparative methodology (Glaser & Strauss, 1967). Three members of the research team read through the tweets and came up with initial thoughts on the ideas, themes, and patterns in a random sample of 50 tweets. The group then compared their initial findings and generated a set of initial emergent categories into which the content of the tweets seemed to fall (Strauss & Corbin, 1998). The team used these categories to independently code a second random

subsample set of 500 tweets. Next, they compared their results, including determining how well these tweets fit into the categories they had initially devised. After refining the categories further, they created a codebook in which they named and defined the most salient content categories into which the tweets seemed to fit. The researchers then repeated this process, this time on a sample of 1,000 tweets, checking how well these tweets fit the categories in the codebook. After making final adjustments to the codebook, the researchers independently recoded the entire sample of 1,061 Lyft Shared tweets and 1,000 UberPool tweets.

We categorized the tweets based on three characteristics: the "speaker" of the tweet (the type of person who composed it), the "sentiment" of the tweet (the tweet's general emotional tone), and the subject of the tweet (what specific aspect of Pool/Shared the tweet was about). Each coder determined these for each of the tweets. Once the coders had individually coded the tweets, the team compared results and reconciled discrepancies. In particular, at this stage the researchers collapsed codes that were too similar (e.g., happy and positive). They also accepted the majority opinion (i.e., 2 out of 3 coders agree) when there was disagreement about how a tweet should be categorized. For the Lyft Shared tweets, there was majority agreement 99% of the time for who was the speaker, 93% of the time for what the sentiment of the tweet was, and 88% percent of the time for what the subject of the tweet was. For the UberPool tweets these figures were 98%, 96%, and 86%, respectively. At least 2 out of 3 coders agreed on speaker, subject, and sentiment together for 87% of the Shared tweets (N = 866), and 78% of the Pool tweets (N = 823). Tweets which lacked a majority opinion are excluded from the analysis below.

The researchers also identified examples of tweets that illustrate each code that we could quote in this report.

4.2.3 Analyzing the Tweets: Machine Coding

The major limitation of coding tweets by hand is that, as the process described above shows, it is quite labor-intensive. As a result, as we have noted we hand coded only a subsample of about 2,000 tweets. However, it is also possible to automate the process through machine text mining. We explored this as an alternate analysis method. We did this to 1) examine a larger set of tweets (all 15,000-plus that referred to Pool or Shared during our study period) and 2) to test whether our hand-coding results are robust.

We used two different text mining applications. These cannot check the speaker or subject of tweets, but can check for sentiment. The first method we tried was Salesforce Social Studio's "sentiment analysis." This uses a coding algorithm to calculate the ratio of positive, negative, and neutral tweets. However, when we manually inspected the tweets and how they were coded by Social Studio, we felt that the algorithm was unacceptably inaccurate; many tweets were, in our estimation, miscoded. The second problem is that Salesforce Social Studio's algorithm is proprietary and we have no information about how the tweets are coded. We thus rejected this method.

Next, we tried a text analysis program called Aylien. We chose Aylien because of its widespread use by researchers (Aylien, 2018a), and because Aylien discloses the methods it uses to assign sentiments to the text it analyzes (see Aylien (2018b) for information on how it does this). We used Aylien to test for sentiment on our entire sample of over 15,000 tweets.

4.3 Our Findings

4.3.1 Speaker: Who Composed the Tweets?

We categorized "speakers" as Pool or Shared riders, Pool or Shared drivers, the TNC companies themselves (Lyft or Uber), corporations other than Lyft or Uber, government agencies, foreign accounts, "commenters" who don't clearly fit any of the above categories, and spam (any speaker account that clearly exists for malicious purposes only, such as political harassment or financial scams).

Table 14 shows the breakdown of speakers, as determined when two of the three coders agreed on the speaker's identity (this happened 99% of the time for Lyft and 98% for Uber).

Table 14: Who Tweets about UberPool and Lyft Shared?

Speaker	Frequency	Percent
UberPool		
Riders	725	74.0%
Commenters	228	23.3%
Corporate	14	1.4%
Uber	1	0.1%
Government	1	0.1%
Drivers	5	0.5%
Spam	6	0.6%
Total	980	
Lyft Shared		
Riders	769	73.2%
Commenters	233	22.2%
Corporate	18	1.7%
Lyft	16	1.5%
Government	0	0.0%
Drivers	14	1.3%
Spam	0	0.0%
Total	1050	
Total of Lyft and Uber		
Riders	1494	73.6%
Commenters	461	22.7%
Corporate	32	1.6%
Uber/Lyft	17	0.8%
Drivers	19	0.9%
Government	1	0.0%
Spam	6	0.3%
Total	2030	

The large majority of tweets (74%) were generated by riders. We only attributed tweets to riders when the tweet clearly mentioned specific experiences related to traveling by Pool or Shared, but we are confident that most "commenter" tweets also came from people who travel using the services. There are very few tweets that we identify as coming from drivers. There were some tweets from Lyft and Uber themselves, but these were relatively rare, particularly from Uber. For the most part, the distribution of speakers is similar for both Shared and Pool tweets. The distribution of speakers was also quite similar to the results above when we limited the sample to only original tweets (not including retweets).

4.3.2 Sentiment—What Emotions Did the Tweets Express?

4.3.2.1 Hand Coding

We identified four categories of sentiment: happy/positive, humor, angry/negative, and neutral/unclear. Table 15 shows the breakdown by sentiment for the hand-coded tweets where two of three coders agreed on sentiment (this was the case for 93% of tweets about Shared and 96% of the tweets about Pool). We break out riders separately as we are

particularly interested in analyzing the rider experience, and these constituted the majority of the tweets.

Table 15: Sentiment of Tweets from Hand Coding

Sentiment	All Tweets			Riders Only		
	Lyft	Uber	Both	Lyft Riders	Uber Riders	Both
Happy/positive	116	44	160	84	23	107
	-11.8%	-4.6%	-8.2%	-12.9%	-3.9%	-8.6%
Humor	250	707	957	210	477	687
	-25.4%	-73.3%	-49.1%	-32.3%	-80.3%	-55.2%
Angry/negative	384	118	502	299	76	375
	-38.9%	-12.2%	-25.7%	-46.0%	-12.8%	-30.1%
Neutral/unclear	235	95	330	57	18	75
	-23.9%	-9.9%	-16.9%	-8.8%	-3.0%	-6.0%
Total	985	964	1949	650	594	1244
	-100%	-100%	-100%	-100%	-100%	-100%

There were some positive comments about the services. (Again, note that since Lyft Shared was called "Lyft Line" at the time we collected our data, the posts below will refer to "Lyft Line.")

> » *Uberpool is such a fun adventure*

However, there were relatively few positive tweets about either service. Further, there was a substantial number of negative tweets, which outnumbered positive tweets by a ratio of roughly 3 to 1. Both positive and negative tweets, however, were outnumbered by tweets featuring humor. These comprised roughly 50% of the tweets.

There is a difference in the content of the tweets when we compare the two services; there are proportionately more humor tweets from Uber riders and more negative/angry tweets from Lyft riders. However, this has to do with the fact that a substantial portion of the UberPool humorous tweets were retweets of memes. When we limit the sample to original tweets, there are higher proportions of positive posts (12%) and negative posts (38%) and a much lower proportion of humor posts (only 25%). So it seems that complaints or praise about the service are less likely to capture people's imagination and get passed from tweeter to tweeter compared with humor posts. Hence it is possible that humor posts may more powerfully shape discourse about the services.

4.3.2.2 Machine Coding

We had Aylien machine code the entire sample of over 15,000 tweets. Table 16 shows the tallies based on the sentiment of tweets as calculated by machine coding.

Table 16: Sentiment of Tweets Calculated by Machine Coding

All Tweets	Lyft	Uber	Both
Happy/positive	575	444	1019
	-13.5%	-3.9%	-6.5%
Angry/negative	1387	1945	3332
	-32.7%	-16.9%	-21.2%
Neutral/unclear	2282	9097	11379
	-53.8%	-79.2%	72.3%)
Total	4244	11486	15730
	-37%	-73%	-100%

The percentages of positive and negative tweets are very similar to our scores from the hand coded subsample. However, Aylien coded a much higher share of tweets as "neutral." This is because machine coding cannot easily code for humor. If we recoded all hand-coded "humor" tweets as "neutral," the percentages in the neutral category would match up with the Aylien total in this category. The lack of a way to machine code for humor clearly shows the weakness of machine coding: without doubt humor is qualitatively different than an expression of "neutral" sentiment. Our results were similar when we ran Aylien's algorithm on only our subsample of 2,000 tweets.

In addition to being unable to recognize humor, we found that the machine coding using Aylien often simply gets it wrong. Here are some examples:

> » *Proud to say I've managed to go my entire #UberPool life without having a loud conversation on the phone with other passengers and a driver who could not care less about my day to day.*

Aylien coded this tweet as negative; we coded it as happy/positive because the speaker is talking about negative behaviors but is actually reporting that she is happy she has never experienced them.

> » *I like how 90% of childhood "stranger danger" is "never get into a car with a stranger" and I just got out of an UberPool with three dudes. (humor emojis)*

Aylien coded this tweet as negative; we coded this tweet as humor because the speaker is using UberPool to poke fun at the irony of their adult behavior versus what they were told in childhood. The presence of the humorous emojis, which Aylien does not interpret, further underlines that the tweet is meant to be humorous.

> » *I ordered an UberPool because it was $2 as opposed to a $10 Uber-X. And it didn't stop to pick up anyone. Best ride evaaaa*

Aylien coded this as negative; we coded it as happy/positive because the speaker is pleased with getting an unexpected solo ride at the UberPool price.

> » *I wish you could rate fellow passengers in your uber pool/lyft line. Definitely ridden with some inconsiderate people...*

Aylien coded this tweet as positive; we coded this tweet as angry/negative, because this speaker reports unhappiness with behavior of past co-riders.

In sum, our comparison of coding methods suggests that hand-coding is far superior to machine-coding, at least for the Social Studio and Aylien systems we explored. For these systems, it is simply too difficult for computer algorithms to pick up nuances in thought and meaning. This is particularly problematic for an analysis of the content of posts about Pool and Shared, which our hand coding reveals contain a high proportion of humor, which is clearly not a straightforward expression of positive or negative sentiment. Finally, hand coding allowed us to click on links and view emojis within tweets that automated systems like Social Studio and Aylien cannot read; this provides additional information regarding the sentiment of the tweet, such as shared memes and gifs.

In short, although we thoroughly explored machine-coding techniques, our overall conclusion is that they are a poor substitute for manually gauging the tone and tenor of content, at least on this subject.

4.3.2.3 Sentiment by Subject

As discussed above, we also coded tweets based on the subject. Further, we classified subject tweets by sentiment. Table 17 shows the breakdown of subjects in the left-hand column, and the columns to the right disaggregate the number of tweets on each subject by sentiment. The tweets tabulated in Table 17 are limited to tweets by riders, because we are particularly interested in analyzing the rider experience and also because rider tweets comprised a large majority of our sample.

Table 17: Sentiment and Subject of Rider Tweets—Both Services

	Happy/ Positive Tweets	Humor Tweets	Angry/ Negative Tweets	Neutral/ Unclear Tweets	Total for Subject
Other passengers	37	410	179	41	667 59.3%
Getting a solo ride	33	19	0	0	52 4.60%
Overall service	14	55	35	11	115 10.2%
Drivers	8	57	28	2	95 8.4%
Cost	10	29	24	5	68 6.0%
Travel time	0	8	41	1	50 4.4%
Routing	2	8	57	0	67 6.0%
Incentives	0	9	0	0	9 0.8%
Customer service	0	1	0	0	1 0.1%
Safety	0	1	0	0	1 0.1%
Total for Sentiment	104 9.2%	597 53.1%	364 32.4%	60 5.3%	1125 100.0%

	% of Tweets Happy/ Positive	% of Tweets Humor	% of Tweets Angry/ Negative	% of Tweets Neutral/ Unclear	Total
Other passengers	5.5	61.5	26.8	6.1	100
Getting a solo ride	63.5	36.5	0.0	0.0	100
Overall service	12.2	47.8	30.4	9.6	100
Drivers	8.4	60.0	29.5	2.1	100
Cost	14.7	42.6	35.3	7.4	100
Travel time	0.0	16.0	82.0	2.0	100
Routing	3.0	11.9	85.1	0.0	100
Incentives	0.0	100.0	0.0	0.0	100
Customer service	0.0	100.0	0.0	0.0	100
Safety	0.0	100.0	0.0	0.0	100
Total percentages for sentiment	9.2	53.1	32.4	5.3	100

Some "neutral" tweets provided useful information about the services:

> » *New: Uber is launching Express Pool, which promises to be up to 50 percent cheaper than UberPOOL, in the D.C. region on Thursday. It works..well...kinda like a bus*

Ultimately, the use of Twitter to disseminate information about the services and how to use them may ultimately contribute to higher ridership.

Passengers may also send tweets to Uber and Lyft in order to get questions answered.

> » *@AskLyft I want to send you feedback about Lyft Line routing, but there isn't an appropriate selection for 'What can we help you with?' in the drop down menu on your help page and I can't bypass it. Do you have a support e-mail address instead?*

This is also a promising application for Twitter in cases where normal customer service channels (such as the app) are limited or do not function properly. The use of Twitter in this way may provide for a better customer experience and encourage users to patronize the services, assuming Uber and Lyft respond to such tweets.

Unsurprisingly given the evidence from the survey outlined above, we found positive commentary about the cost savings Pool and Shared provide:

> » *I just saved $2.67 by riding uberPOOL in Miami. Ride uberPOOL, share your ride, split the cost*

More frequent, though, was positive commentary from riders who "won the lottery" and took a Pool or Shared trip without being matched with another customer. Passengers post in creative ways about their elation when this happens:

> » *Every time I take a lyft line and it ends up being just me the entire ride I feel like a genius*
> » *I don't necessarily believe in luck, bu but if I did I would define it as 'taking a Lyft Line from Lakeview to River North without picking up any additional passengers.' YEP. THIS HAPPENED TO ME JUST NOW. #winning*
> » *#1 turn on - when I order a Lyft Line and it picks up nobody else on my way home*
> » *I saw Bernadette Peters as Dolly Gallagher Levi and then took a Lyft line home with no additional passengers. I may never feel pain again*
> » *Whenever I order an UberPOOL I feel poor but if nobody joins during my ride, I feel trés riche*
> » *Guys. I took an UberPool from Williamsburg all the way to Hamilton Heights by myself! Which means I pretty much won the UberPool jackpot*
> » *In an UberPool going home and I'm pretty sure my driver is just straight up ignoring the addition of another passenger. The living really is easy*

One important thing to note is that we classed these tweets as "positive," in that they clearly express that the rider had a happy experience with Pool or Shared. However,

these sentiments are not necessarily positive about the ridesharing experience in general; what they are actually praising is solo service (such as would be provided by UberX or Lyft Classic) at Pool/Shared prices. In a sense, they are actually negative, in that they show displeasure about being matched with others. Were we to reclass these tweets as neutral or even negative, the ratio of positive to negative tweets, which is already low, would be even more lopsided.

Some negative tweets included:

> » *Accidentally got in my first Lyft line, I regret it instantly.*
> » *#LyftLine confuses me, like wtf?? am i the only one??*

As expected, there were numerous negative tweets about Pool's and Shared's longer travel times. One cause of complaint was perceived indirect routing:

> » *I'm realizing Lyft Line's algorithm for picking up people sucks. Saved $2 from Uber Pool for this bullshit of driving nowhere and everywhere but my destination*

Another source of displeasure was a perception of too many pick-ups and drop-offs:

> » *@lyft line added 4 new passengers before dropping me off! Really bad experience*

These seem to particularly grate on riders when the routing seems irrational: that is to say, the traveler perceives that shorter, more direct, and more fair routing could have been assigned by the system. Sometimes the system seems unjust, particularly when others are both picked up and dropped off before the tweeter.

> » *The fact that I'm the closer location and the person sharing this @lyft line is getting dropped first is ridiculous*
> » *the ride back was a waking nightmare. we got halfway to my place (highland park from los feliz) and the driver announced he had to double all the way back, sometimes lyft line does this ha ha but yes we're going back to literally the exact bar we just left*

Interestingly, we found more complaints about Lyft Shared (327) than UberPool (95):

> » *Pro tip: if you're in the Bay Area, use Uber Pool instead of Lyft Line. Consistently better experience. Lyft is too crowded*

In all, however, negative tweets about travel times, routing, and excessive pick-ups and drop-offs comprise only 8.7% of all tweets, a relatively small number and fewer than we expected.

Most tweets were about other passengers rather than routing or trip time. As we discovered above, attitudes about the social experience were quite bifurcated. Some tweets were quite positive, reflecting a satisfying social experience in meeting other travelers:

» *The fun thing about being a writer is you never know where your next idea will come from! For example last night a realtor in my Lyft Line told me that what I really needed to do if I wanted to sell something is write a thing with magic in it*

» *Made a new friend in an uberpool and we are getting brunch*

However, there was considerably more negative commentary about other passengers (about 27% of tweets about other passengers were negative) than positive commentary (less than 6% of tweets about other passengers). Echoing the results from the survey, numerous travelers complained about inconsiderate behavior:

» *Uber should let you rate the people you share an UberPool with because they're worse than the drivers most of the time*

Such behavior included by-now-familiar themes, such as other passengers talking too loudly or too much, including talking on the phone:

» *Omg I hate when I get a Lyft line and the other passengers be so damn loud on their phone*

Tweeters also complained when other passengers appeared to pose a health risk:

» *Protip: If you have consumption or some shit, please don't take Lyft Line, where you might infect other passengers*

Having poor hygiene, being drunk, or both were a source of complaint:

» *In an uberpool and the guy we picked up smells like he bathed in a bath of beer*

Also, passengers were criticized for playing a music device too loudly:

» *This guy in the @Uber pool ride has his SPEAKER ON WITH THE DIRECTION ON FULL BLAST #UBER #UBERPOOL".*

Other complaints we found revolved around fellow riders being unfriendly, violating the tweeter's personal space, or annoying the tweeter in other ways:

» *when you order uberpool and the other passenger opens your side of the door [image shown of woman giving an incoming passenger an incredulous look)]*

But despite the amount of negative commentary about other passengers, the most common sentiment about them is humorous. Posts about other passengers were 62% humorous, and 36% of all tweets generated by riders were humorous commentary about other passengers.

Many of these tweets poked fun at conversation with, or other interactions between, the tweeter and the fellow riders:

> » *my favorite place to dole out relationship advice i have no right to give is in the back of a lyft line*

Or humor consisted of tweets about the behavior the fellow rider:

> » *Two guys in an Uberpool fighting over who should get dropped first becos he has a higher salary #museumfolk*
> » *This kid in my Lyft line: 'am I next to get dropped off? I need to get home or I'll be late and my mom is going to kick my ass!*
> » *Sharing a Lyft line with a girl named Dimple and feeling pissed that my name is so boring. #dimplewolf".*
> » *Homegurl in my uberpool has been drawing in her eyebrows perfectly on our v bumpy ride. Props. I would've drawn in zigzags by now*

What are riders saying about their drivers? Some such tweets were negative, questioning driver decisions and competency:

> » *Every time I try to save some $ using Lyft Line I immediately regret it. Why are the drivers who choose to do line the most confused?*
> » *Purgatory is a Lyft line with a driver who doesn't know how to use a gps or the Lyft app*

Other negative tweets focused on driver personality and conversation:

> » *When you requested an UberPOOL and it arrives but you see 2 people in the back seat so you're left with no choice but to sit in the front passenger seat knowing the driver is going to hold a conversation with you [image showing discomfort]*
> » *when my lyft line/uberpool drivers get mad at the other riders and expect me to be on their side....sis if you dont focus on the damn ROAD*

However, as with passengers, much commentary about drivers was humorous. Most of this stemmed from driver comments or personality, such as:

> » *I was in a lyft line with a woman who was going on and on about how she hates the Eagles and our driver turns to her and says 'you know i get to rate you too right'*
> » *Wife and I get into an UberPool last night. DRIVER: before I take you guys home, we gotta pick up Ashley. ME: c'mon man, no one wants to pick up Ashley. DRIVER: yea, you're right. He cancels Ashley's pickup and takes us home.*

4.3.2.4 Other Speakers: Commenters

After riders, tweeters we label "commenters" were the next largest group in both the Lyft Line (n = 199) and UberPool (n = 210) samples. As noted above, we are confident that

most of these are riders, but as we cannot be sure (they did not tweet about specific rides) we classified them as being a distinct group.

In contrast to the rider tweets, the largest share of commenters' tweets expressed neutral, unclear or unrelated sentiment (n = 183, or 39.7%). A large number of tweets featured information about using Pool and Shared, particularly incentives to ride the services (n = 66, or 14.3%):

> » *Lyft Line's pre-tax commuter perks are available in 18 cities' Lyft Line was built from the start to make daily ridesharing more affordable, but it really comes into its own if you can use a commuter benefits card*
> » *Uber Express Pool Offers 50 Percent Lower Fares than UberPool But Requires You To Walk*

By definition, commenter tweets did not give us evidence that the tweeter used the service, so it is unsurprising that the commenter tweets were less likely to focus on things like trip characteristics or other passengers. But even despite the fact that these tweets did not include specific anecdotes about riding, the behavior of passengers still elicited the most commentary (n = 137, or 29.7%).

Again, many commenter posts featured humor (n = 163, or 35.4%). As with riders, the largest single sentiment/subject combination was humor about passengers (n = 115, or 25% of all commenter posts).

> » *Uberpool really be a gamble*
> » *Imagine an Uberpool in a coupe*
> » *imagine if ur uberpool picked up a frenemy... would you say hi?*

Others used Pool or Shared as a prop in a joke or statement, for example:

> » *Last one......Ur in a Uberpool ride for 20 mins. Seated next to you is your 17yr old self. When the ride is over, you vanish and life restarts What 3 things will you tell yourself?*
> » *i wish to have the confidence of someone who throws a birthday party at a warehouse in pilsen: "hi friends please take a $14 lyft line down here on your saturday night. could you spot $5 for the pizza tim ordered in, also all that is here are three beers. no gifts please luv u*

Such tweets indicate shared understandings of UberPool and Lyft Shared among Twitter audiences, suggesting the characteristics of the Pool/Shared experience are known broadly enough that the meaning and the experiences they connote will be understood in unrelated contexts.

Angry/negative sentiment was displayed in 43 commenter tweets (9.3%), and happy/positive sentiment in 20 (4.3%). So the pattern among commenter tweets is very similar to the rider tweets: more negative than positive sentiment, but more humor than either.

4.3.2.5 Other Speakers: Drivers

We find that drivers seldom tweet about Pool and Shared. This may be because they prefer other forums, such as UberPeople.net and UberForum.com, which are sites more exclusively devoted to communication with other drivers.

However, as expected given our literature review and the evidence above, there were some expressions of frustration from drivers about their compensation:

» *@AskLyft Please, I can not afford to drive regular lyft, let alone lyft line. I have car that seats 7 I'm paying more gas. Please just lyft plus*
» *Evidence how much #uberPool #sucks for #drivers. Notice almost same distance (off by .something) the difference in time was about 8mins, difference in pay $4*
» *The difference for the driver UberX you get paid!UberPOOL you get scammed any questions!"*

4.3.2.6 Other Speakers: Corporate Accounts

There was a small number of tweets from businesses other than Lyft or Uber. All of these were related to advertisements or promotions, for example:

» *Unlock your ride credits. Get $1 off 4 rides on Lyft Line, with the code: CSLA2018. Use #LYFT*
» *One More Chance For Penn Students To Take Advantage of Free UberPool To @PennBasketball Games!*

4.3.2.7 Other Speakers: Uber and Lyft Themselves

We did have several tweets posted directly by Uber and Lyft. There were far more tweets from Lyft (16) than from Uber (only one). These posts were about customer service.

We discuss lessons learned from our Twitter analysis in the conclusions section which follows.

CHAPTER 5

Summing It All Up

5.1 What Did We Find That We Expected to Find?

Many of the conclusions we reached given our data and analysis were very much what we expected based on our review of the literature and online opinion.

5.1.1 On the whole, drivers are less satisfied with shared than non-shared services.

A number of fairly dramatic results stand out from the quantitative part of our driver survey.

> » The average driver satisfaction score was 2.37 for Pool vs. 2.81 for Uber in general and 2.66 for UberX.
> » The average driver satisfaction scores for Lyft were quite similar: 2.47 for Shared vs. 2.79 for Lyft in general and 2.86 for Lyft Classic.
> » Almost 2/3 of former drivers said having to provide shared trips was at least part of the reason they quit driving.
> » 60 percent of drivers said they would refuse shared trips if there were no penalty for doing so.

The troubling nature of these findings is compounded by the fact that driver dissatisfaction does not seem to relate to a single issue. As we expected based on our review of existing evidence, drivers reported displeasure with their compensation for shared trips, and that on average they would need to receive several more dollars per pick-up to alleviate their frustration with the shared services. But compensation was not the only issue they raised; they also reported that providing shared service is difficult and stressful work, and that they believe their passengers are less happy than when traveling by solo service, which in turn may harm the quality of driver/passenger interactions. This suggests that there may be no one simple "magic bullet" that can fix the problem of driver demoralization.

The fact that reforming the service to increase driver satisfaction may prove difficult was further underlined by the open-ended comments. Although the issue of pay was by far the most common complaint by drivers, they also expressed dismay about many aspects of shared service, even when asked to list the positives. This included utilitarian factors like perceived irrationality and confusion surrounding routing and pick-ups, as well the fact that some find serving shared rides to be tiring and stressful. Also, some drivers complained about the social consequences of sharing, such as awkward and even hostile relations between passengers, and passengers being angry about routing, pick-ups, and each other, sometimes taking it out on the driver. In sum, there is considerable work to do to make sharing more attractive for drivers.

5.1.2 Passengers have mixed feelings about the shared services

Overall, riders rated shared services as less satisfying than non-shared services, but this in part reflects very low satisfaction among former users. But current, ongoing riders also

rate shared services slightly below solo service. Still, in all, Pool and Shared seem to be serving those riders who choose to use them reasonably well; the trick is convincing riders to remain on these services once they have tried them.

5.1.3 Positive commentary on Twitter about the services is pretty rare, and is outnumbered by negative commentary.

The previous point notwithstanding, the picture on social media is worse for the shared services. Only 8.7% of rider tweets were directly positive, and this includes when the positive comment was about hailing Pool or Shared but getting a solo ride, which isn't necessarily a positive comment about Pool or Shared so much as a positive comment about getting an UberX or regular Lyft ride at Pool or Shared prices. Such posts comprised 33 of the 107 (31%) positive tweets from riders where topic and sentiment could be identified. Further, this finding is reinforced by the prevalence of negative commentary. Among riders, there were almost four times more negative tweets than positive ones. The paucity of positive comments may simply reflect the fact that WOM has negativity bias. It is possible that those with bad things to share about Pool and Shared are simply more likely to speak up. Also, it is possible that transportation is a topic about which people like to complain. When we get to our destination on time we may simply take it for granted. But when transportation goes wrong, and we don't arrive as planned, it is often extremely annoying. Schweitzer (2014) studied Twitter commentary about transit and discovered the discourse on Twitter is also quite negative about that mode, so it is possible that travel has a strong potential to generate customer complaints. Alternatively, however, the predominance of negative commentary over positive may be because the services are not leaving as many happy customers as might be desired.

One thing that is worth mentioning is that there were more Twitter complaints about Lyft's routing than Uber's. This may simply be because of random chance in the selection of our sample. It is also possible, however, that Lyft's routing and pick-ups and drop-offs are inferior to Uber's, as one tweeter suggested. This may be because Lyft's algorithm is inferior, which we have no way of confirming. It may also result from the fact that Lyft has fewer passengers, and thus more detours are necessary to generate rider matches on this service. In any event, Lyft should be sensitive to the fact that people are complaining about its routing in social media, and attempt to address the problems that may be causing this.

5.1.4 Cost is the major reason people use the services.

Cost savings were by far the most heavily cited reason why people use shared services. Former- and non-users said they would require quite steep discounts to consider using the services, on average demanding a half-price fare for a potential delay of up to 50 percent extra travel time. This suggests that those who do not use, or have stopped using, the services place a very high value on their time and/or have a fairly strong aversion to using the shared services for other reasons. Some riders, former riders, and non-riders complained that the price of the shared services is currently too high, the discounts riders currently receive notwithstanding.

However, our results could conversely be read as a positive for the potential of the shared services; most former and non-riders did not fill in "0" for the price they would be willing to pay for shared trips of varying durations, suggesting that attracting them to use the services is possible if the price is right.

5.1.5 Passengers have mixed feelings about the shared services

According to our attitudinal scale questions, these are the top two reasons non-users refuse to try the services and the first and third top reasons former riders left the services. Our open-ended response sections confirm that these are major factors deterring use. Given that most Americans have become accustomed to uninterrupted point-to-point travel via automobile, we do not find it surprising that delay and unreliability are major strikes against the shared services in the eyes of many.

5.1.6 Passengers have mixed feelings about the shared services

Whether fair or not, passengers often feel that there is limited rhyme or reason to the routes shared rides take. Further, some believe that there is an excessive number of pick-ups. We find this unsurprising, as prior research (Koebler, 2016) suggests that the "lottery" nature of taking shared rides—where trips might range from a direct, solo ride for a shared ride price (which our social media analysis suggests is quite prized) all the way to a ride with unexpectedly long detours and multiple additional pick-ups—seems bound to produce strong emotions, both positive and negative, among customers. Our reading of our evidence is that the uncertain nature of Pool/Shared trips is a negative for the customer experience; it seems as if most Americans may not wish to "gamble" every time they want to take a trip. This argument is supported by previous research, which shows that uncertainty (i.e., unpredictable variation) in travel time is considered very undesirable due to the possible consequences (or "penalties") brought by late or early arrivals (Carrion & Levinson, 2012; Iseki & Taylor, 2010). In order to avoid the penalties, travelers will have to set up a large "safety margin" (Ettema & Timmermans, 2006), which adds to cost on the travelers' side (Nolan & Polak, 2002; Diab et al., 2015). Such a phenomenon undoubtedly is present for Pool/Shared travelers. This is a difficult problem to address because some uncertainty is an inalienable part of a shared ride service.

5.1.7 Passengers have mixed feelings about the shared services

Issues with riders not being ready or being in the wrong place are very difficult with any TNC travel, but the problem is compounded when there are other travelers in the vehicle waiting, as commentary from our drivers and riders attests to.

5.2 What Did We Find that We Didn't Expect to Find?

In addition to findings we suspected, we also uncovered a number of things that surprised us and shed new light on the shared ride phenomenon.

5.2.1 There are some sources of driver satisfaction with Pool/Shared.

The literature and commentary we investigated suggested strong driver dissatisfaction with the shared services. However, although overall our data make clear that drivers are less happy with shared services compared to non-shared services, there are also significant sources of satisfaction with shared. Three stand out: first, although many drivers report relations between passengers can be problematic, many others report enjoying when there are positive social interactions between passengers. Second, opinion about the profitability of the services is bifurcated. Although as noted above a large share of drivers are unhappy with their compensation for shared rides, many think the shared services are more profitable due to more pick-ups, more rides, and less "deadheading" between trips. Third, at least some drivers take satisfaction in the fact that they are saving riders money and helping those with low incomes.

5.2.2 Age and income do not predict Pool/Shared use.

Since the major incentive for using the shared service is the price discount, we expected that low incomes would naturally be associated with a higher probability of using the shared services. We also assumed that, based on prior literature, young people might be more likely to use Pool/Shared because they are more likely to adopt new technology (Czaja et al., 2006; Weinberg, 2004). We found no evidence of this in a statistical model that controls for various demographic characteristics. We do, however, find that vehicle ownership is associated with a lower probability of sharing, and since the young and poor are less likely to have vehicles available (Renne & Bennett, 2014), it seems likely they are somewhat more likely to share.

5.2.3 There were more former riders than we expected.

We stratified our sample to include a large group of former riders because we were particularly interested in capturing the full spectrum of opinions about shared services, including from those who may have stopped using them; former rider opinions, in particular, may be helpful in generating ideas about how to improve the services to retain and increase ridership. It is difficult to precisely quantify the share of such people in our sample, which in any case is not truly random. However, former riders were considerably more numerous than we had initially assumed. We thought it would be quite difficult to collect a sample 300 former riders, but in the end we filled this quota group reasonably quickly. Thus it is somewhat unsettling that it appears there is a substantial number of people who have given up on Pool/Shared, underscoring the importance of listening to and attempting to address their concerns and complaints.

5.2.4 A fairly substantial number of non-users are not familiar with the services.

Unfamiliarity with the services was not the largest reason people reported not having tried Pool or Shared, but it was not a trivial one either. Despite the fact that the Pool/Shared option appears in the app, and despite the fact that Uber and Lyft have made efforts to promote the services, unfamiliarity with Pool/Shared services remains a deterrent for trying them.

5.2.5 Some demographic groups are more likely to stick with sharing rides than others.

Our regression models showed that several demographic characteristics are likely to help get people to try, and subsequently stick with, sharing. First, those with more household vehicles are much less likely to share as opposed to taking solo services like UberX or Lyft Classic. This may be because they tend to have more money and do not need the discounted price as much as others who own fewer vehicles. Although our models do control for income, it is possible that they are doing so imperfectly, for example because people are not reporting their income correctly. Prior research (Gonyea, 2005; Kim & Tamborini, 2014; Moore et al., 2000; Singleton & Straits, 2009) has shown that some people do not report income as accurately in surveys as might be desired, due to being sometimes unable and sometimes unwilling to accurately share this information. An unwillingness to share rides on the part of those with vehicles may also be because those with vehicles have another option for non-shared, point-to-point travel, and are thus more used to, and expecting of, a trip that takes less time, is more reliable, and is more private.

Secondly, we find that black and Hispanic ride-hail users are more likely to try shared services than white riders. One might expect that minorities would be more likely to try the shared services due to more constrained income and vehicle ownership, but it might be considered surprising that minority status is a significant predictor of the propensity to try sharing even in a statistical model that holds income and vehicle availability constant. We are unable to fully explain why minorities are more likely to try sharing given our data, but one possibility might be that minorities may be more likely to live in denser and more central areas where matches might be more frequent, which would mean lower prices for selecting a shared option. For example, Brown (2018) found that in Los Angeles, 33 percent of Lyft trips in high-density neighborhoods were shared compared to about 21 percent in low-density neighborhoods, and that people living in low-income neighborhoods took far higher shares of their trips on Lyft Shared compared to riders living in high-income neighborhoods (27% vs. 16%). Another possible explanation is that discrimination among riders is different across racial groups, resulting in the difference in the willingness to hail a shared ride in which the respondent would be likely to be paired with riders from other race or social class. In their survey, Sarriera et al. (2017) find that 18% of white respondents expressed discriminatory attitudes against co-riders of different racial or socioeconomic backgrounds in a Pool or Shared ride, while 11% of non-white respondents expressed similar attitudes.

Further, we were quite surprised that being black or Hispanic is associated with being more likely to stop using the shared services, so that, overall, being black and Hispanic is associated with a slightly lower probability of being a regular, ongoing user of Pool/Shared. This finding is perhaps troubling, and is one for which our data unfortunately provides few explanations. One possible explanation might be that the social aspect of sharing rides might potentially be more unpleasant for those in minority groups due to discrimination, as it was found by Sarriera et al. (2017) that the percentage of survey respondents expressing discrimination against co-riders of different racial groups was higher among whites than among non-whites. However, our quantitative data do not show that minorities rate the social aspects of sharing any more or less positively than whites do. Additional research is needed to better understand these trends.

Finally, we also find that being female is associated with a much higher probability of trying the services but giving up use of them. This leads to the next point.

5.2.6 For some, particularly some women, sharing rides raises safety concerns.

Anecdotal evidence suggests that some view safety as a problem inherent in ride sharing (Hess, 2015; Gil, 2017). Safety concerns may seem irrational to some, since a driver is present during the trip; in fact, a few of our respondents argued they feel safer with other passengers in the vehicle than they do being with the driver alone. However, we were surprised by the degree of concerns about safety that came through in our survey responses. This is certainly not true for all riders, and safety concerns were not one of the top reasons people cited for not using, or trying but giving up on, shared services. But nevertheless safety did come up more frequently in the open-ended responses for former and non-users than we had expected it would. In fact, safety concerns and not wanting to share a vehicle with strangers were mentioned more frequently than issues of delay or cost when non-riders were asked about why they don't use the services.

Delving deeper, our data clearly show that safety is more of a concern for women than men. Our quantitative analysis shows women former- and non-users rated safety concerns as being much more important in terms of why they do not use the shared services than men did. Obviously not all women feel this way, but for some women the idea of sharing with others, particularly men, who might harass them in some way during the trip and may then find out where they live or work when their trip ends is troubling (Loukaitou-Sideris & Fink, 2009; Gardner et al., 2017). In short, dynamic ridesharing might have a gender/safety problem it will need to overcome.

5.2.7 The social aspect of sharing rides is viewed as a very mixed bag. In the net it is probably seen as more of a negative than a positive

One of the most interesting things about shared rides is the novel social dynamic at play. Certainly transit and air travel involve sharing a common space with strangers while traveling. But sharing such a confined space with others for such a potentially long period of time is quite uncommon, not only in transportation but in general in our society. The way people respond to this will go a long way toward determining whether widespread sharing of rides is feasible.

We had expected that the social aspect of sharing would have both its positive and negative aspects and would be perceived differently by different people. We were somewhat surprised, however, at how strong the feelings in both directions are.

When asked what they like about the services, almost 15 percent of users mentioned meeting other people. Numerous passengers reported making new friends while using Pool/Shared. This may be viewed as an extremely positive phenomenon. Rarely in our society do we meet and interact with "random" people; Pool/Shared means stepping out of our "echo chambers" where we interact only with those who have backgrounds similar to our own. It seems as if ridesharing, were it to become truly widespread, has the

potential to enrich our social lives and contribute to greater social and cultural diversity across our society.

Building on this point, perhaps the most surprising finding we unearthed in the Twitter analysis is the amount of online humor Pool and Shared are generating. More than half of the posts for which subject and sentiment could be identified were humorous, as tweeters related lighthearted observations about their Pool or Shared experiences. The large majority of these tweets were about other passengers: their behavior, speech, interactions with the driver or the tweeter, etc. It is of considerable interest that Pool and Shared interactions with other passengers are becoming something of a new cultural meme, generating mirth not only for the rider but for others when such stories propagate online. The fact that social interactions on Pool and Shared generate such lighthearted commentary, and the fact that humorous tweets are more likely to be retweeted than more straightforward commentary about the services, suggests that sharing can be a socially and culturally vibrant activity. As a result, the serendipitous encounters with others that Pool and Shared engender may be enriching the lives of travelers and even those they communicate with online.

However, unfortunately from the perspective of those supporting ridesharing, the social aspect of ridesharing was also the subject of considerable negative commentary in our study. The social aspect, and the related issue of vehicle crowding, came in a strong second and third in terms of factors preventing non-users from trying sharing, and a strong second and fourth in terms of the most important factors cited by those who have tried and rejected the services. The most dramatic result is that when we asked ongoing riders why they use the services, the desire to meet others was scored as dead last among the 12 reasons we offered.

Riders and former riders noted many types of behavior on the part of other riders that they have found offensive--general rudeness, drunkenness, foul smells, excessive talkativeness (or, much more rarely, non-talkativeness), loud phone talking, physical illness (which may possibly be contagious), bringing pets and children into the vehicle, and even amorous activity (both advances toward the respondent and sexual activity between other co-riders). Unfortunately, a few respondents expressed racist or size-related criticism of other customers, and based on prior research we suspect many more harbor such feelings but did not express them in our survey due to social acceptability bias.
On balance, we conclude that the social aspect of sharing is a net negative that acts more powerfully to dissuade ridership than it does to attract it. Apparently, many Americans highly value their privacy while traveling and feel uncomfortable meeting strangers. We offer suggestions on how the negatives of the social experience might be reduced below.

5.2.8 Pool/Shared are replacing a lot of personal vehicle and transit trips.

We had expected that Pool and Shared primarily compete with solo TNC travel like UberX or Lyft Classic. However, our analysis suggests that it may compete nearly as much with private vehicle travel and transit travel. Our results suggest that shared service probably

does have environmental benefits since our respondents report that shared trips replace both solo TNC trips and private vehicle trips about as much as they do transit trips. Further, they appear to substitute for quite few walking trips.

5.2.9 Environmental consciousness does not play a very large role in shared TNC use.

There is some evidence that concern for the environment prompts people to share (Sarriera et al., 2017). Still, according to our evidence it does not seem to be a major factor. Helping the environment was not rated very highly as a reason for riding, and if anything we would expect people to rate it more highly when taking a survey than they actually view it, since people often give responses to surveys which they feel make them "look good" (Singleton & Straits, 2009). Only about 6% of respondents mentioned helping the environment as a reason they like shared service in the open-ended comments. It would seem as if an appeal to riders based on the argument they are helping the environment certainly may be worth making, but may have only limited effectiveness if the social and operational issues preventing people from sharing more are not addressed.

5.2.10 We learned many new ideas for improving Pool/Shared.

On our survey we asked about a couple of specific ideas for improving Pool/Shared, but we were surprised by the large number of suggestions for improving the services from both drivers and passengers that we hadn't considered. We discuss these, as well as ideas we had already generated, now.

5.3 Possible Improvements for Shared Service

How might shared TNC service work better? Not only would improving the functioning of services like Pool/Shared improve the lives of current riders, but it may also attract new customers and help to retain existing ones. Given that our findings show that shared service is substituting heavily for solo TNC and personal vehicle travel, it is definitely worth thinking about how to attract more people to the shared modes. This would benefit society as a whole, including even those who will never take a TNC trip, by reducing, or at least slowing the growth of, congestion, emissions, energy use, crashes, etc.

From the perspective of drivers and the TNCs that employ them, improving shared TNC services is also quite desirable. Uber and Lyft currently have high driver turnover, and our evidence suggests that in cities where shared service is available part of this is due to dissatisfaction with having to provide the shared options. Clearly, all of the mobility benefits TNCs are currently bringing us will be under threat if quality drivers cannot be attracted and retained. In addition, there is a basic fairness issue, in that driving for the TNCs is not an easy job and those who do it should be treated well.

At the start of this project we had some ideas for ways in which shared service might be improved, but we learned a lot more through our survey. Below we outline many of these ideas. Essentially, there are three major issues that might be addressed. The first concerns the monetary aspects of the services: primarily, driver compensation and passenger fares. The second concerns the operational aspects of the services, such as

routing and scheduling. The third concerns the social aspects of the services. We address each in turn below.

Note that we see some possible improvements as potentially much more fruitful than others. However, without access to all of Uber and Lyft's proprietary data we are not in the best position to fully gauge the feasibility and potential effectiveness of all of the possible reforms. Therefore we list many potential ideas for improvements, even those we do not consider to be promising, as a way of furthering the discussion and because it is possible that some of these ideas might be more feasible than we suspect. However, we do outline our thinking about which ideas may be better than others.

One of the most difficult issues is that many ideas for improvement would be costly for the TNC services. We do not have access to data on the finances of Pool and Shared, including how much money the companies are making—or possibly losing—as a result of offering the shared services. Some of the suggestions below might simply not be financially feasible for Uber and Lyft. Clearly these are for-profit companies and if they cannot make a fair return on their investment of time and money we cannot expect them to pursue certain ideas, even if it would be in the public interest.

On the other hand, policies or programs that raise the cost to the companies for individual shared trips might ultimately benefit the TNCs in the aggregate if they result in attracting more riders. Shared services are subject to what economists call increasing returns to scale; this means that the more riders there are, the easier and cheaper it is to serve each rider. More riders means more potential matches, which in turn would result in fewer trips where no feasible match can be made at all and travelers are enjoying a solo ride for a discounted price. More riders would also mean that matches can be made with less potential deviation from riders' routes, which would make the service much more attractive to travelers. Thus policies that increase the number of riders may result in less profitability for the TNCs at the front end, but may ultimately lead to a virtuous circle in which better service results in more riders, which leads to even better service, which in turn leads to more riders. The ideas follow.

5.3.1 Changes to the Monetary Structure of the Services

5.3.1.1 Increase driver compensation.

As we have noted, our survey suggests that drivers are currently less satisfied with shared services than non-shared services; in fact, 60 percent said they would refuse shared trips if they could. Not all of this stems from perceived poor compensation (although 26 percent did raise this as a complaint); serving shared trips brings stress in other ways as well. But there is certainly a price at which drivers would consider themselves fairly compensated for providing shared service. Our survey suggests that around $4 per pick-up would make the average driver feel he/she was being fairly compensated, which is considerably higher than the roughly $1.00 they are currently receiving from Uber (they currently receive nothing from Lyft). In addition to a straightforward increase in monetary compensation, such as a higher per-pick-up fee, Uber and Lyft might consider other types of incentives, such as making Pool/Shared trips more valuable in their rewards programs. Note that this

could conceivably have an outsized effect on driver psychology in relation to how much it costs the TNCs.

Clearly, there are limits to what drivers can be paid; the most basic premise of the shared services is that riders receive a discount, so driver can never be paid the full amount they would make if each passenger was traveling on a solo trip. But still it might be worth examining some increase in driver compensation, if for no other reason than to stem driver turnover.

5.3.1.2 Publicize that drivers receive financial benefits from shared service.

More drivers complained about their compensation than praised it, but there were some drivers who feel they are receiving economic benefits from shared services, for example because they involve less deadheading in which their vehicle is traveling empty between rides. As we noted above in the literature review, Uber has calculated that UberPool generates enough extra trips that ultimately it is more profitable to drivers to have the service offered (Uber, 2017), and some outside observers have calculated that shared service is more profitable due to less deadheading (Gurley, 2015; Preston, 2016) or because shared trips tend to be longer (SherpaShare Blog, 2015).

If it is indeed the case that shared service is more profitable for drivers than it might appear, it does not seem like Uber and Lyft are fully getting this message out. We encourage the companies to publicize and disseminate evidence that Pool and Shared are earning drivers more money in ways that are harder to see than just the per pick-up fee they are receiving (or not receiving at all in the case of Lyft). We return to the issue of better advertising the services below.

5.3.1.3 Reduce the amount charged for shared rides.

As we discussed above, our data showed, unsurprisingly, that the main reason people share rides is the cost savings. Clearly, charging even less may eat into the TNCs' profitability, and shared service might simply be infeasible at a lower price point. We strongly suspect that Uber and Lyft have experimented extensively with how to price the services to maximize matches and revenue, so across-the-board price cuts may not be practical.

However, one of the most basic laws of economics is that people will consume more of a good if it costs less. Further, our results show that non-users and even former users could be enticed to use the services if the discount were steep enough. We are not in a strong position to gauge what economists would call the "elasticity of demand" for the services—i.e., how much ridership would increase if the price were lower. Given that Uber and Lyft are sophisticated companies with access to excellent data about the pricing and use of their services, we suspect that they have good reason for charging what they do and are maximizing net income. Still, it may be worth considering price cuts if these are heavily publicized within and outside of the app and are treated as a "loss leader" in an effort to expose new users to the shared services. Once new customers have been attracted and

acclimated to the services, price increases might be considered in the future if they are necessary in order to guarantee the financial feasibility of the services.

5.3.1.4 Restructuring the pricing system.

There is no way around the fact that sharing rides involves uncertainty. In order to successfully match riders, the TNCs need to have the flexibility to change routing on the fly and pick up passengers as new ride requests appear. However, as our results clearly show, this is one of the key problems for the passenger experience; many simply do not like taking a trip where there is a lot of uncertainty about how long it will take.

However, right now passengers are quoted a discounted fee at the beginning of the trip but are not compensated if the trip takes longer than expected. The TNCs might consider reforming this system so that passengers receive some discount when their trip takes longer than they initially thought. The most straightforward way of doing this might be an additional discount per passenger picked up. Obviously too big of a discount would harm the financial feasibility of the system, but perhaps even a small discount (maybe one dollar off the fare for each additional pick-up) could provide outsized psychological satisfaction among riders who would feel they are being directly compensated for their inconvenience. Another option would be to offer an additional discount when the trip takes considerably longer than the estimated time projected at the start of the trip.

It is true that this would harm the overall financial feasibility of the shared service. However, as with other ideas, it is possible that the cost of this compensation might be offset by increased ridership. Further, the TNCs might couple this incentive with a small increase in the base fare. In any event, we think some sort of compensation for riders when they have to endure excessive stops and route deviations would be a promising avenue for the TNCs to explore as it would bring considerable psychological satisfaction to riders.

Further, as we mentioned above with respect to drivers, it might be worth considering some form of alternate compensation for riders. Given how much success the airlines and others have had with programs to reward frequent customers, it might be worth considering some sort of points system where frequent shared users might be rewarded with perks such as occasional free rides or upgrades to a solo service. As with drivers, this may have an outsized psychological effect on riders that would attract customers more than straightforward price reductions would, at a more limited cost to the TNCs.

Some riders proffered the wish that the pricing of shared trips, which can vary at different times even for the same trip, be made more consistent. This is difficult since it is in the TNCs' interest to vary the pricing depending on the probability of making matches, which helps to balance supply and demand. Charging the same price every time without varying it based on the potential matches may not be economically feasible for the companies and may result in providing too many solo rides at a discounted price when there are few possible matches to be made.

5.3.1.5 Charge more for undesirable behavior.

The suggestions above all involve the TNCs charging less for their shared services, but in some cases it may make sense to charge more. One example is when the companies want to discourage bad behavior on the part of travelers. We have identified many ways in which passengers behave in an unpleasant manner, but in most cases it really isn't feasible to charge more for such things as passengers who smell or talk on the phone loudly. However, one complaint from drivers and passengers is when people are not ready and waiting at the pick-up point. This is a problem with all TNC service, but it is especially a problem with shared service where it is not just the driver but the other passengers who are being inconvenienced. Thus it may be worth exploring increasing the penalties for shared ride users who are not ready or not in the right place. In addition to discouraging bad behavior and thus reducing travel time and uncertainty, this would raise revenue for the companies. The fee for cancelled rides might also be increased.

5.3.1.6 Raise the price of solo travel.

There is one option for promoting shared services which may actually raise revenue for the TNCs: increase the price of solo services like UberX or Lyft Classic in the markets where shared options exist. This would obviously serve as a deterrent for solo travel and would make sharing more appealing. It is difficult to know what would mean in the net because what economists would call the "cross-elasticity" of demand for shared service— that is to say, how much changes in the price of solo service would affect demand for shared service—is unknown to us. Moreover, such an option has its drawbacks. Patrons dissuaded from using solo services may switch not to shared options but to non-TNC modes, or may forego travel entirely. For this reason, and because the TNCs would be getting less revenue from those who switch to shared options, in the net such a policy might prove costly to the TNCs. Still, it may be worth considering raising fares for solo service, at least as a trial, particularly because it may actually increase revenue due to the solo riders who are now paying higher fares. Such an increase might even be paired with price reductions for shared service.

5.3.2 Changes to the Operation of the Services

The next potential area for reforms involves changes to the functional characteristics of the shared services, including travel time, reliability, etc. Note we exclude from these policy ideas improvements that involve changes in pricing, which we discussed above.

5.3.2.1 Improve the information given to drivers.

A number of drivers complained that currently they are not given full information about trips when they are assigned them by the system. We see no reason that drivers cannot be informed up front about all of their trips' characteristics, such as rider destinations. Other suggestions that seem reasonable include informing drivers about the size of the party they will be picking up. It may not be feasible to give drivers the option of refusing trips once they learn more about their characteristics, but given that people in general find uncertainty quite troubling, having more information up front might help to reduce the

psychological stress drivers are under. This seems like a relatively easy fix with a limited downside, and we recommend that Uber and Lyft look into it.

5.3.2.2 Better-optimized routing.

We have found that both drivers and passengers complain about detours that become excessive and routing that sometimes seems irrational. However, we acknowledge that detours are a fundamental characteristic of a shared ride service. Without doubt, some level of grumbling about irrational and excessive routing is destined to be part and parcel of sharing rides. Further, as we do not have access to the algorithms and data used by the companies, we are not in a position to judge whether Uber and Lyft are doing the best job of optimizing routing. We suspect, however, that given the data these companies have access to, and the sophistication of their operations, they are doing a good job making matches and optimizing routes subject to the constraints they face. Still, we encourage Uber and Lyft to continuously strive to improve routing, so that, for example, they avoid some of the most frustrating situations such as when routes double back on themselves or involve passing near a rider's destination without dropping them off, since even one nightmare trip might be enough to put off potential shared riders for good.

5.3.2.3 Limit route deviations and pick-ups.

Beyond striving to optimize routing, the companies might move to limit delay by imposing more stringent rules on whether to make some detours and pick-ups at all. For example, some drivers and riders suggested there might be a guarantee that no more than a single other passenger will be picked up or dropped off on a Pool or Shared trip. Another policy might be no new pick-ups when a rider is well past the ETA they were told at the start of the trip. Clearly, such policies would come with a cost in terms of the viability of the system, reducing potential matches, not taking full advantage of the excess capacity in shared ride vehicles, harming the financial viability of offering shared services, and eroding the economic and social advantages that may come from clustering rides and riders together. Without access to the data, it is difficult to know what a pick-up cap would mean for the operations and revenues of the shared services.

However, as with other ideas for improvements, there is also a possibility limited pick-ups, drop-offs, and detours would considerably increase the appeal of sharing rides for passengers and bring new riders into the system, as well as helping to retain current riders. Since this would not happen if passengers don't understand the new policy, we recommend that were such a program (or many of the others we outline) to be implemented, it should be accompanied by heavy advertising. Further, the cost of new policies to enhance the rider experience might be offset, at least partially, by raising revenue in other ways, most obviously by increasing the base fare.

5.3.2.4 Change the rules so that the person picked up first is automatically dropped off first.

We encountered a few suggestions for this change. However, it seems quite undesirable. In particular, it would conflict with another imperative which was much more widely cited:

reducing trip duration. Much more route deviation would likely have to take place under a first-in/first-out system, and it would be extremely frustrating for passengers to pass right by their house to complete a drop-off far away. It would also result in much more fuel consumed and hurt the environmentally-friendly nature of sharing. For these reasons, such a change in the rules seems undesirable.

5.3.2.5 Make the ETA given to passengers at the start of the trip more accurate, or at least less aggressive.

A substantial share of the passengers expressed a wish for more accurate ETAs. Clearly, however, there is limited scope for improving the reliability of this information, since pick-ups and drop-offs "on the fly" are an intrinsic part of ridesharing. Further, there may be unknowns such as unexpected traffic congestion. For these reasons it is infeasible to accede to the wishes of some riders to inform them of their route in advance, or to "guarantee" arrival time in the window initially given through the app.

However, there may be psychological benefits to being less aggressive in calculating the estimated arrival time, that is to say, providing riders with a longer projected travel time. The downside of this would be that later arrival times might discourage potential riders at the start of their trips. However, it may result in more psychologically satisfied customers at the end of their trips, as a higher share would arrive "on time" or even early at their destination, increasing the share of passengers who view their trip as a success. For this reason, it may be worth at least exploring less optimistic projected trip durations.

5.3.2.6 Give drivers greater leeway to refuse shared rides.

As we have noted, currently Uber drivers have the option to turn off shared ride requests. However, to do this they also have to give up UberX requests, which are the lion's share of requests, making refusing Pool trips financially unappealing. The services do allow ignoring requests, but Uber penalizes drivers who do this too frequently with a "time-out" on receiving new requests. Uber and Lyft might give drivers greater ability to refuse shared rides, in general or on a per trip basis. Our survey data suggest that the upside of this would be a potentially great improvement in driver morale, since a very large share of the drivers we surveyed said they would ignore shared rides if it were easier. However, were drivers to opt out at the level our data suggest they would, it would potentially undermine the viability of the shared services. Therefore we do not recommend making it easier for drivers to opt out of shared rides, but propose addressing the issue of driver morale in other ways such as reforming the way drivers are compensated.

5.3.2.7 Serve a wider area.

Years after their introduction, Pool and Shared are available only in a limited number of cities. Even though our sample was recruited only in cities that currently have the services, some respondents suggested that the service be made available in more places. On the surface, it would seem obvious that the benefits of the services for riders and society should be rolled out more widely. On the other hand, Uber and Lyft certainly have access to the data and it is possible that other cities do not have the number or

density of riders to make the shared services viable. If this is the case, it might not be time to expand. Still, we suggest that the companies seriously investigate the possibility of extending the services to more places. Note that within the cities where Pool/Shared are offered coverage seems to be good, as few non-riders in those cities gave unavailability as an important reason they don't ride.

5.3.2.8 Reduce vehicle crowding.

A substantial number of travelers said that crowding in the vehicles makes them less likely to use the services. Clearly, there are two ways to reduce crowding. First, fewer matches might be made and/or larger groups should not be matched. But as with many other suggestions, these policies might limit potential matches, making the services less viable.

The other option would be to restrict Pool/Shared service to drivers who have larger vehicles such as SUVs. However, this would drastically cut down on the number of vehicles serving Pool/Shared trips. This would run directly counter to the wishes of some of our respondents who complained that there are not enough vehicles serving Pool/Shared, making wait times too long. Thus we feel that dramatically reducing vehicle crowding is probably not a feasible idea. Instead it would probably be more fruitful to make the social experience of sharing more enjoyable so that crowding does not seem so onerous. We turn to ideas for doing this next.

5.3.3 Improvements to the Social Experience of Sharing

As our data show, the social experience of sharing may be both a strong negative and a strong positive for both users and drivers. As such, we are particularly interested in policies that may accentuate the social positives of sharing while reducing the negatives as much as possible.

5.3.3.1 Allow passengers to rate each other.

Currently, TNCs allow drivers to rate passengers. However, our Twitter analysis and survey did uncover suggestions that passengers be allowed to rate each other. Given the frequent complaints we uncovered about the behavior of other passengers, on the surface it might make sense to allow passengers to rate each other to sanction bad behavior. Even if miscreants are not somehow punished, it might be psychologically satisfying for passengers to be able to "vent" about antisocial behavior on the part of their co-travelers by being able to give them a bad rating, or to be able to "reward" those with whom they enjoyed sharing a ride. Further, a rating system might cause riders to improve their behavior.

However, in practice implementing such a system raises questions, some troubling. It is possible that passengers may use such a system to discriminate in unacceptable ways against others based on things like race, income, size, age, gender, sexual orientation, or other factors. This is not just speculation; attitudes such as these were uncovered in past studies about UberPool and Lyft Shared (Sarriera et al., 2017; Moody et al., 2019).

Passengers may give low scores to others who are traveling to neighborhoods they consider undesirable for various reasons.

Further, it is unclear how the results of such a rating system would be used. Would passengers be able to specify minimum star ratings that they will accept for fellow travelers? Would some passengers be banned from the services entirely if their ratings from fellow passengers are too low? This could lead to multiple problems. Disqualifying passengers based on their ratings would reduce the potential pool of rideshare matches. There may even be lawsuits from passengers who are barred from the services due to low scores, particularly if they feel they have been discriminated against due to factors like race or income. In fact, in 2016, an attorney in Boston filed a complaint against Uber, claiming that Uber's rating system allows racial discrimination. The complaint was made based on a case in which a driver was deactivated permanently from the service due to repeated low ratings from passengers, which he thought were because of his race (Adams, 2016).

We would also note that currently the drivers do rate passengers, so there is already a system in place to deal with egregiously bad behavior on the part of passengers.

With all of this said, however, we do feel rating other passengers would bring riders psychological satisfaction, and may discourage antisocial behavior. It may be worth implementing such a passenger rating system but quietly doing little to act on the results, as a sort of "placebo" that allows riders to harmlessly vent about those with whom they ride.

5.3.3.2 Promulgate a "Code of Conduct" for rideshare passengers.

Given complaints about the behavior of other passengers, it may seem sensible to promote some sort of code of good behavior for rideshare passengers. A number of drivers, riders and potential riders suggested this. Uber and Lyft might attempt to more aggressively warn riders that certain types of behavior are undesirable and/or will not be tolerated. One example might be banning racist, sexist, or indecent language. Other hypothetical examples of behavior that is discouraged might include talking about religion or politics, being drunk, talking loudly on the phone, playing radios loudly, eating in the vehicle, being late for the pick-up, making sexual advances, or even talking too much if the other rider makes clear they don't want to carry on a conversation.

However, such a step is problematic in a number of ways. First, it would be very difficult to define what types of behavior should or should not be acceptable. There would certainly be vigorous debate as to how to censor speech, for example. Second, attempting to ban certain behaviors may be a double-edged sword. One of the most noteworthy findings in our analysis is that, for some, the interactions with other passengers are a major plus of sharing, not a negative. While for some being the recipient of romantic overtures might be extremely uncomfortable, for others this may end up resulting in a date. While for some talk about politics might be maddening if the other passenger has different opinions, for others this may result in a scintillating exchange of views. It seems as if efforts to stifle certain forms of behavior may make ride sharing less annoying in some ways but less fun

in others. It should also be noted that while passengers may complain about having to share with people who are drunk, one of the most appealing aspects of Uber and Lyft is precisely that they get intoxicated people off the road, so it seems foolish to discourage the inebriated from using the service. Also, new rules may drive off potential riders, harming the efficacy of the services.

Finally, it is unclear how a code of conduct would be promoted or enforced. Obviously there will be no smell-meter determining what odors are emanating from passengers. For these reasons, although it is worthy of consideration, we do not see a code of conduct as a particularly fertile field for exploration.

5.3.3.3 Background checks for passengers.

A substantial share of passengers expressed concerns about safety while sharing, and there was a suggestion that riders have to undergo some sort of background checks. We consider this a nonstarter, because many users would undoubtedly find it unacceptably invasive, potentially leading to decreased ridership, and also because of the administrative burden it would place on the TNCs.

5.3.3.4 Be more aggressive in banning bad riders.

As we have noted it may be problematic to ban passengers based on ratings from fellow passengers, but the TNCs may be on firmer ground with being more aggressive in banning riders who consistently receive low scores from drivers. This may be more beneficial for shared rides than solo rides because bad behavior on the part of sharing passengers affects the other passengers as well as the driver. One obvious downside of such a policy would be disgruntlement on the part of banned riders; it may even lead to lawsuits. However, it may make considerable sense to more aggressively ban riders who consistently engage in truly antisocial behavior. Since the standards can be incremental, we suggest that this idea at least receive some consideration even if the actual banning of riders remains rare.

5.3.3.5 Give passengers some control over whom they share with.

We encountered a fair number of requests for giving riders some level of control over whom they share with. Presumably riders would be able to make selections at the start of their trip about whom they don't want to be matched with. Rider suggestions in our survey included the options of not sharing with travelers with small children, who have an undesirable employment status, who smoke, who bring pets into the vehicles, or who are of a certain age. Unfortunately, a small number asked to ban riders who are "too ghetto," an obvious racial slur.

Allowing riders more choice over whom they share with may have appeal to many, but there would be many serious problems with such a step. First, as with many of the policies above it would make it more difficult for the TNCs to make matches. This problem would be especially pronounced because passengers would have a clear incentive to refuse to share with people with all characteristics on which they are allowed to filter, because it is

always in the rider's interest to have a lower chance of being matched and a greater chance of getting a solo ride at a shared ride price. Another problem would be that the TNCs would have to have information on riders in order to know whom to exclude. This would be invasive and undoubtedly would alienate many riders. Finally, some riders would be exposed to discrimination and would have quite legitimate concerns about their travel being made more time-consuming and difficult due to the number of people screening them out. Thus, for the most part, we consider giving passengers control over whom they ride with to be an unpromising idea.

However, there is one case where we think it might be worth giving riders more control over choosing their co-riders, which we discuss next.

5.3.3.6 Improve perceived safety, particularly by allowing women-only sharing.

As we have noted, safety concerns surrounding sharing are prominent for a substantial share of current, former, and non-users. They were particularly prevalent among non-users of the system, and among women. It is troubling if such worries prevent a substantial number of people from sharing. The rub, however, is determining how to address such concerns. A number of riders expressed that they want the experience to be more safe but do not offer specific improvements to the service to make this happen. However, certain recommended policies may at least be worth consideration. We have noted above that we do not support background checks for riders. Also as we have noted, there may be some value to at least exploring banning more serially bad passengers, particularly if they create an environment in the vehicle that intimidates other passengers.

Given our findings, and previous research has shown that women are more willing to share a Pool or Shared ride with other female passengers due to safety concerns (Sarriera et al., 2017; Middleton, 2019), we suggest there is one further option which might be feasible: giving women the option of sharing only with women. This may go a long way toward alleviating the concerns of some women who fear sexual harassment and potentially crime or stalking made possible when co-riders learn their home or work address. Women-only service would not be unprecedented in the transportation realm: numerous countries have women-only buses and/or train cars, including Egypt, Brazil, Mexico, Japan, Indonesia, and Malaysia. Of course, selecting such an option would introduce complexity to the system and make finding successful matches more difficult, especially for the very women whom the policy is designed to help. On the other hand, the benefits of attracting what we believe is a substantial number of women who are unwilling to share for safety reasons may outweigh these costs. One possibility for paying for this service would be to charge a higher price for those selecting this option, although this "pink tax" might prove quite unpopular on equity grounds, and thus we hesitate to recommend it.

We reiterate that this is the only control over co-rider matches that we would recommend exploring, but suggest that this idea might be worth seriously considering, as it is concerning for the future of sharing rides that some women are currently being excluded.

5.3.3.7 Use Facebook to identify friends and interests that riders have in common.

As we have noted, Uber has patented a system to scan Facebook profiles of riders in order to inform them when they have interests and/or friends in common with their co-riders. We are unclear as to how far they have gone in terms of testing and considering the actual deployment of such a system. However, we see considerable upside for the potential of this idea. While negative opinion about the social experience of riding outweighed positive sentiment in our sample, we did find numerous people who report how enjoyable social contacts during the shared services can be. It seems like many rides that pass in awkward silence, or even result in tension between riders, could be turned into rich and vibrant social encounters if riders were to learn how much they have in common. We were aware of Uber's research when we conducted our survey and asked respondents if such a service would make them more likely to ride. The majority said "no," but a substantial minority (almost 40%) said it would make them at least "a little" more likely to ride. Further, when such a service was up and running, and producing results, attitudes might become even more positive.

We should note that some respondents commented that they did not like the idea of such a service as it would invade privacy. Thus we must stress that such a service should be completely voluntary and require users to actively opt in, with an easy way of opting out. Further, we do not recommend sharing any data between riders other than to notify them of friends or interests in common with other passengers. However, provided users are willing, we see this idea as a promising way of turning what may be a strong negative about sharing for many riders into a strong positive.

5.3.4 Advertise the Services Better

Finally, we turn to policies to advertise the services more effectively.

5.3.4.1 Better inform potential users about the services.

Most of our non-riders understand that sharing is an option and do not report that ignorance is keeping them from sharing. But still, a number of respondents expressed unfamiliarity with the services, and some drivers state that some riders who use the services don't seem to fully understand the rules. It seems as if there is scope for more effectively promoting the benefits of shared service. First, the basic rules and procedures for sharing should be well-known to riders. This information might be passed along by more aggressive advertising about sharing through the app, and also through other channels such as advertising on television and online (we discuss this further below). What might a sales pitch for sharing consist of? A specific suggestion follows.

5.3.4.2 Advertise the positive social experiences Pool and Shared can engender.

Given our findings about how polarized opinions about the social aspects of sharing can be, we suggest that Uber and Lyft make a concerted effort to emphasize the positives. Advertising campaigns might emphasize the fun experiences that many travelers have had sharing rides, for example showing people who have had positive social encounters,

made friends, and even fallen in love on a Pool or Shared ride. In particular, highlighting the social positives from sharing may help to alleviate safety concerns that our analysis indicates are preventing many people from using the shared services.

5.3.4.3 Aggressively advertise any changes to the services.

Many of the ideas we outline above may be costly to the TNCs up front, but over time would hopefully expand the rider base enough to pay for themselves or even result in increased profitability. However, if riders and potential riders do not know about these changes, this will not happen. This is especially the case in terms of reforms that might not be easily visible to riders. Thus we generally recommend heavy advertising if key aspects of the services are changed. To get the most bang for the buck from advertising dollars, the services should make multiple changes at once as a group and advertise them all in tandem, rather than rolling our reforms piecemeal and having to advertise each sequentially.

5.3.4.4 Use social media more aggressively to get the word out.

We uncovered numerous examples of Twitter being used to spread information about the shared services. These included topics such as special giveaways and promotions. Some of this information was generated by riders and other companies, but Uber and Lyft themselves also maintain a Twitter presence. In particular, Lyft seems to be utilizing Twitter effectively as a way to promote the service, but Uber far less so, though it is unclear if our sample is representative of total Lyft and Uber tweeting (it is possible we picked up fewer Uber tweets through random chance). If Lyft does tweet more, it may be evidence of Lyft having a more effective social media strategy. In any event, our findings suggest that Uber may be missing an opportunity to use Twitter more intensively to improve its service and promote its brand.

In any event, social media seems a promising route to spread the word about shared services. Platforms like Twitter can be a cost-effective way to promote the best aspects of shared services: while there is a cost for developing creative content and for tweets that are officially promoted by Twitter itself, Uber and Lyft can post whatever they want on their own profile for free. If their content is engaging and entertaining, it is likely to be shared across the platform by others—in effect, a social media WOM. Further, social media might be a good place for Uber and Lyft to listen as well as talk. If they are not already doing so, monitoring channels such as Twitter might give the services a better idea of how, when, and why passengers are dissatisfied, and provide ideas about how that dissatisfaction can be minimized. Conversely, Uber and Lyft might learn about the ways in which they are creating happy passengers and seek to use this in advertising. \

5.3.5 Further Research

The evidence uncovered in this study suggests that fruitful further research into sharing might be done in the future. Ideally, a study would have a more random sample of drivers and riders. We cannot be entirely sure that our data are fully representative of the driving and traveling public because our sample is selected from people who are registered for, and participate in, market research studies online. There may be differences between

such people and those who use the shared ride services more generally. It is important to note that we do not see any glaring reason why people who participate in market research should be very different from those who do not in ways that would affect their perception of shared TNC service, and thus believe our results are valid and useful. Still, an ideal research design would make use of random sampling of drivers and users. The problem, of course, would be reaching and recruiting those users, which would be quite difficult; this is why we, and many others who do market research, make use of panels of survey participants recruited in the manner we have undertaken.

Several of our findings raise interesting questions that we are not fully equipped to explore and answer given our data. For example, while we can make a reasonably well-supported argument as to why women may be more likely to give up the shared services than men (safety and social concerns), we are not clear as to why our data show that this would be the case for minorities. It is also not entirely clear why vehicle ownership should be negatively associated with sharing, even among TNC travelers. These and other issues raised by our data might be explored in future studies that are more specifically designed to address them.

Next, in our survey we asked about some ways of improving the service that might be effective in terms of attracting and retaining riders. However, we learned about many new ideas for improving the services through the survey. A follow-up survey focusing how these ideas, and perhaps other new ones, would be received by the traveling public, and particularly how they might increase ridership, would be welcome.

Finally, our work may ultimately be of use for Uber and Lyft themselves. They possess data on riders and the operation of the services that we do not have access to, and thus are far better placed to understand issues such as the sensitivity of customers to price and the efficiency of the algorithms that make matches and determine routing. Further, the companies are in a position to conduct experiments. For example, they might implement a different fare structure in a limited number of markets on a trial basis to see how it affects ridership.

In short, this report is not the final word on shared TNC service, and we hope that others will advance this research further.

5.3.5 Closing Remarks

TNCs are an important addition to the urban travel landscape. Utilizing dramatic improvements in real-time connectivity and data analytics to match travelers and the providers of transportation services, they are a new and exciting mobility option that is reducing travel time and delay and improving convenience and travel reliability. By doing this they are helping people access all of the things that are important for leading the good life. But the uncomfortable fact remains that, according to prior research, they are adding cars to our roads, with all of the problems this entails. Sharing of rides by TNC riders who have common origins and destinations is one of the best ways we can battle the trend towards increased VMT while still retaining the mobility benefits that TNCs offer.

Sharing service will never be for everyone, but there is no question it might expand its appeal and its customer base. This study has attempted to identify ways in which sharing is working well, as well as ways it isn't working well and might be improved. We hope that studies such as ours will make for more sharing in the future.

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