

Transportation (Medical)	Pg
Service Category Definition – Part A	1
FY20 Performance Measures Report	7
Industry-Informed Perspectives on the Benefits of Rideshare-Based Medical Transportation - AJMC, February 2021	10
Improving Health Care through Transportation - National Academies, November 2020	13
Rideshare Transportation to Health Care - AJMC, September 2020	18

FY 2022 Houston EMA/HSDA Ryan White Part A Service Definition Medical Transportation (Van Based) (Revision Date: 07/26/2022)	
HRSA Service Category Title: RWGA Only	Medical Transportation
Local Service Category Title:	a. Transportation targeted to Urban b. Transportation targeted to Rural
Budget Type: RWGA Only	Hybrid Fee for Service
Budget Requirements or Restrictions: RWGA Only	<ul style="list-style-type: none"> • Units assigned to Urban Transportation must only be used to transport clients whose residence is in Harris County. • Units assigned to Rural Transportation may only be used to transport clients who reside in Houston EMA/HSDA counties <u>other than</u> Harris County. • Mileage reimbursed for transportation is based on the documented distance in miles from a client's Trip Origin to Trip Destination as documented by a standard Internet-based mapping program (i.e. Google Maps, Map Quest, Yahoo Maps) approved by RWGA. Agency must print out and file in the client record a trip plan from the appropriate Internet-based mapping program that clearly delineates the mileage between Point of Origin and Destination (and reverse for round trips). This requirement is subject to audit by the County. • Transportation to employment, employment training, school, or other activities not directly related to a client's treatment of HIV is <u>not</u> allowable. Clients may not be transported to entertainment or social events under this contract. • Taxi vouchers must be made available for documented emergency purposes and to transport a client to a disability hearing, emergency shelter or for a documented medical emergency. • Subrecipient must reserve 7% of the total budget for Taxi Vouchers. • Maximum monthly utilization of taxi vouchers cannot exceed 14% of the total amount of funding reserved for Taxi Vouchers. • Emergencies warranting the use of Taxi Vouchers include: van service is unavailable due to breakdown, scheduling conflicts or inclement weather or other unanticipated event. A spreadsheet listing client's 11-digit code, age, date of service, number of trips, and reason for emergency should be kept on-site and available for review during Site Visits. • Subrecipient must provide RWGA a copy of the agreement between Subrecipient and a licensed taxi vendor by March 31, 2023. • All taxi voucher receipts must have the taxi company's name, the driver's name and/or identification number, number of miles driven, destination (to and from), and exact cost of trip. The Subrecipient will add the client's 11-digit code to the receipt and include all receipts with the monthly Contractor Expense Report

	<p>(CER).</p> <ul style="list-style-type: none"> • A copy of the taxi company’s statement (on company letterhead) must be included with the monthly CER. Supporting documentation of disbursement payments may be requested with the CER.
<p>HRSA Service Category Definition: RWGA Only</p>	<p>Medical transportation services include conveyance services provided, directly or through voucher, to a client so that he or she may access health care services.</p>
<p>Local Service Category Definition:</p>	<p>a. Urban Transportation: Subrecipient will develop and implement a medical transportation program that provides essential transportation services to HRSA-defined Core Services through the use of individual employee or contract drivers with vehicles/vans to Ryan White Program-eligible individuals residing in Harris County. Clients residing outside of Harris County are ineligible for Urban transportation services. Exceptions to this requirement require <u>prior</u> written approval from RWGA.</p> <p>b. Rural Transportation: Subrecipient will develop and implement a medical transportation program that provides essential transportation services to HRSA-defined Core Services through the use of individual employee or contract drivers with vehicles/vans to Ryan White Program-eligible individuals residing in Houston EMA/HSDA counties other than Harris County. Clients residing in Harris County are ineligible for this transportation program. Exceptions to this requirement require <u>prior</u> written approval from RWGA.</p> <p>Essential transportation is defined as transportation to public and private outpatient medical care and physician services, substance abuse and mental health services, pharmacies and other services where eligible clients receive Ryan White-defined Core Services and/or medical and health-related care services, including clinical trials, essential to their well-being.</p> <p>The Subrecipient shall ensure that the transportation program provides taxi vouchers to eligible clients only in the following cases:</p> <ul style="list-style-type: none"> • To access emergency shelter vouchers or to attend social security disability hearings; • Van service is unavailable due to breakdown or inclement weather; • Client’s medical need requires immediate transport; • Scheduling Conflicts. <p>Subrecipient must provide clear and specific justification (reason) for the use of taxi vouchers and include the documentation in the client’s file for <u>each</u> incident. RWGA must approve supporting documentation for taxi voucher reimbursements.</p> <p>For clients living in the METRO service area, written certification</p>

	<p>from the client's principal medical provider (e.g. medical case manager or physician) is required to access van-based transportation, to be renewed every 180 days. Medical Certifications should be maintained on-site by the provider in a single file (listed alphabetically by 11-digit code) and will be monitored at least annually during a Site Visit. It is the Subrecipient's responsibility to determine whether a client resides within the METRO service area. Clients who live outside the METRO service area but within Harris County (e.g. Baytown) are not required to provide a written medical certification to access van-based transportation. All clients living in the Metro service area may receive a maximum of 4 non-certified round trips per year (including taxi vouchers). Non-certified trips will be reviewed during the annual Site Visit. Provider must maintain an up-to-date spreadsheet documenting such trips.</p> <p>The Subrecipient must implement the general transportation program in accordance with the Transportation Standards of Care that include entering all transportation services into the Centralized Patient Care Data Management System (CPCDMS) and providing eligible children with transportation services to Core Services appointments. Only actual mileage (documented per the selected Internet mapping program) transporting eligible clients from Origin to Destination will be reimbursed under this contract. The Subrecipient must make reasonable effort to ensure that routes are designed in the most efficient manner possible to minimize actual client time in vehicles.</p>
Target Population (age, gender, geographic, race, ethnicity, etc.):	<p>a. Urban Transportation: Persons with HIV and Ryan White Part A/B eligible affected individuals residing in Harris County.</p> <p>b. Rural Transportation: Persons with HIV and Ryan White Part A/B eligible affected individuals residing in Fort Bend, Waller, Walker, Montgomery, Austin, Colorado, Liberty, Chambers and Wharton Counties.</p>
Services to be Provided:	To provide Medical Transportation services to access Ryan White Program defined Core Services for eligible individuals. Transportation will include round trips to single destinations and round trips to multiple destinations. Taxi vouchers will be provided to eligible clients only for identified emergency situations. Caregiver must be allowed to accompany the person with HIV. Eligibility for Transportation Services is determined by the client's County of residence as documented in the CPCDMS.
Service Unit Definition(s): RWGA Only	One (1) unit of service = one (1) mile driven with an eligible client as passenger. Client cancellations and/or no-shows are <u>not</u> reimbursable.
Financial Eligibility:	Refer to the RWPC's approved current year <i>Financial Eligibility for Houston EMA Services</i> .
Client Eligibility:	a. Urban Transportation: Only individuals with HIV and Ryan White Program eligible affected individuals residing inside Harris County will be eligible for services.

	<p>b. Rural Transportation: Only persons with HIV and Ryan White Program eligible affected individuals residing in Houston EMA/HSDA Counties other than Harris County are eligible for Rural Transportation services.</p> <p>Documentation of the client’s eligibility in accordance with approved Transportation Standards of Care must be obtained by the Subrecipient prior to providing services. The Subrecipient must ensure that eligible clients have a signed consent for transportation services, client rights and responsibilities prior to the commencement of services.</p> <p>Affected significant others may accompany an person with HIV as medically necessary (minor children may accompany their caregiver as necessary). Ryan White Part A/B eligible affected individuals may utilize the services under this contract for travel to Core Services when the aforementioned criteria are met and the use of the service is directly related to a person with HIV. An example of an eligible transportation encounter by an affected individual is transportation to a Professional Counseling appointment.</p>
<p>Agency Requirements</p>	<p>Subrecipient must be a Certified Medicaid Transportation Provider. Subrecipient must furnish such documentation to Harris County upon request from Ryan White Grant Administration prior to March 1st annually. Subrecipient must maintain such certification throughout the term of the contract. Failure to maintain certification as a Medicaid Transportation provider may result in termination of contract.</p> <p>Subrecipient must provide each client with a written explanation of Subrecipient’s scheduling procedures upon initiation of their first transportation service, and annually thereafter. Subrecipient must provide RWGA with a copy of their scheduling procedures by March 31, 2023, and thereafter within 5 business days of any revisions.</p> <p>Subrecipient must also have the following equipment dedicated to the general transportation program:</p> <ul style="list-style-type: none"> • A separate phone line from their main number so that clients can access transportation services during the hours of 7:00 a.m. to 10:00 p.m. directly at no cost to the clients. The telephone line must be managed by a live person between the hours of 8:00 a.m. – 5:00 p.m. Telephone calls to an answering machine utilized after 5:00 p.m. must be returned by 9:00 a.m. the following business day. • A fax machine with a dedicated line. • All equipment identified in the Transportation Standards of Care necessary to transport children in vehicles. • Subrecipient must assure clients eligible for Medicaid transportation are billed to Medicaid. This is subject to audit by the County. <p>The Subrecipient is responsible for maintaining documentation to</p>

	<p>evidence that drivers providing services have a valid Texas Driver's License and have completed a State approved "Safe Driving" course. Subrecipient must maintain documentation of the automobile liability insurance of each vehicle utilized by the program as required by state law. All vehicles must have a current Texas State Inspection. The minimum acceptable limit of automobile liability insurance is \$300,000.00 combined single limit. Agency must maintain detailed records of mileage driven and names of individuals provided with transportation, as well as origin and destination of trips. <i>It is the Subrecipient's responsibility to verify the County in which clients reside in.</i></p>
Staff Requirements	<p>A picture identification of each driver must be posted in the vehicle utilized to transport clients. Criminal background checks must be performed on all direct service transportation personnel prior to transporting any clients. Drivers must have annual proof of a safe driving record, which shall include history of tickets, DWI/DUI, or other traffic violations. Conviction on more than three (3) moving violations within the past year will disqualify the driver. Conviction of one (1) DWI/DUI within the past three (3) years will disqualify the driver.</p>
Special Requirements: RWGA Only	<p>Individuals who qualify for transportation services through Medicaid are not eligible for these transportation services.</p> <p>Subrecipient must ensure the following criteria are met for all clients transported by Subrecipient's transportation program:</p> <p>Transportation Provider must ensure that clients use transportation services for an appropriate purpose through one of the following three methods:</p> <ol style="list-style-type: none"> 1. Follow-up hard copy verification between transportation provider and Destination Agency (DA) program confirming use of eligible service(s), or 2. Client provides receipt documenting use of eligible services at Destination Agency on the date of transportation, or 3. Scheduling of transportation services was made by receiving agency's case manager or transportation coordinator. <p>The verification/receipt form must at a minimum include all elements listed below:</p> <ul style="list-style-type: none"> • Be on Destination Agency letterhead • Date/Time • CPCDMS client code • Name and signature of Destination Agency staff member who attended to client (e.g. case manager, clinician, physician, nurse) • Destination Agency date stamp to ensure DA issued form.

FY 2024 RWPC “How to Best Meet the Need” Decision Process

Step in Process: Council		Date: 06/08/2023
Recommendations:	Approved: Y: _____ No: _____ Approved With Changes: _____	If approved with changes list changes below:
1.		
2.		
3.		
Step in Process: Steering Committee		Date: 06/01/2023
Recommendations:	Approved: Y: _____ No: _____ Approved With Changes: _____	If approved with changes list changes below:
1.		
2.		
3.		
Step in Process: Quality Improvement Committee		Date: 05/2023
Recommendations:	Approved: Y: _____ No: _____ Approved With Changes: _____	If approved with changes list changes below:
1.		
2.		
3.		
Step in Process: HTBMTN Workgroup #3		Date: 04/20/2023
Recommendations:	Financial Eligibility:	
1.		
2.		
3.		

Barbie Robinson, MPP, JD, CHC
Executive Director
2223 West Loop South | Houston, Texas 77027
Tel: (832) 927-7500 | Fax: (832) 927-0237



Michael Ha, MBA
Director, Disease Control & Clinical Prevention Division
2223 West Loop South | Houston, Texas 77027
Tel: (713) 439-6000 | Fax: (713) 439-6199

FY 2020 PERFORMANCE MEASURES HIGHLIGHTS

RYAN WHITE GRANT ADMINISTRATION

HARRIS COUNTY PUBLIC HEALTH (HCPH)

TABLE OF CONTENTS

Highlights from FY 2020 Performance Measures1

Summary Reports for all Services

 Transportation Services2

HCPH is the local public health agency for the Harris County, Texas jurisdiction. It provides a wide variety of public health activities and services aimed at improving the health and well-being of the Harris County community.

Follow us and stay up-to-date! | @hcphtx    

Highlights from FY 2020 Performance Measures

Measures in this report are based on the *2021-2022 Houston Ryan White Quality Management Plan, Appendix B. HIV Performance Measures*. The document can be referenced here: <https://publichealth.harriscountytexas.gov/Services-Programs/Programs/RyanWhite/Quality>

Transportation

- Van-Based Transportation:
 - During FY 2020 , 863 (67%) clients accessed primary care after utilizing van transportation services.
 - Among van-based transportation clients, 57% clients accessed LPAP services at least once during this time period after utilizing van transportation services.

- Bus Pass Transportation:
 - During FY 2020 , 473 (37%) clients accessed primary care after utilizing bus pass services.
 - Among bus pass clients, 22% of clients accessed LPAP services at least once during this time period after utilizing bus pass services.
 - Among bus pass clients, 92% clients accessed any RW or State service after accessing bus pass services.

Ryan White Part A
HIV Performance Measures
FY 2020 Report

Transportation
All Providers

Van-Based Transportation	FY 2019	FY 2020	Change
A minimum of 70% of clients will utilize Parts A/B/C/D primary care services after accessing Van Transportation services	550 (68.6%)	863 (67.0%)	-1.6%
55% of clients will utilize Parts A/B LPAP services after accessing Van Transportation services	455 (56.7%)	734 (57.0%)	0.3%

Bus Pass Transportation	FY 2019	FY 2020	Change
A minimum of 50% of clients will utilize Parts A/B/C/D primary care services after accessing Bus Pass services	908 (36.6%)	473 (37.7%)	1.1%
A minimum of 20% of clients will utilize Parts A/B LPAP services after accessing Bus Pass services	534 (21.5%)	279 (22.2%)	0.7%
A minimum of 85% of clients will utilize any RW Part A/B/C/D or State Services service after accessing Bus Pass services	1,941 (78.2%)	1,159 (92.4%)	14.2%

Industry-Informed Perspectives on the Benefits of Rideshare-Based Medical Transportation

Megan Callahan, MPH; Nicole Cooper, DrPH, MPH; Jennifer Sisto Gall, MPH; and Justin Yoo, BA

The recent article “Rideshare Transportation to Health Care: Evidence From a Medicaid Implementation” examined the association between utilization of rideshare-based nonemergency medical transportation (R-NEMT) among Medicaid beneficiaries and self-reported metrics of ride quality and late or failed passenger pickups.¹ The authors reported findings that higher values of rideshare trips as a proportion of total trips were not associated with perceptions of ride quality but were associated with reports of more frequent late and failed pickups.

The finding suggesting a negative relationship between R-NEMT utilization and health care access is not reflective of Lyft’s experience providing Medicaid beneficiaries with access to transportation over the past 5 years. Indeed, around the country we have consistently observed meaningful positive outcomes as a result of R-NEMT. Previous studies have found that R-NEMT utilization is associated with fewer missed primary care appointments, shorter average wait times, and a higher rate of on-time pickup compared with other modes of NEMT.^{2,3}

Lyft appreciates the authors’ addition to the emerging literature on R-NEMT. However, the study by Eisenberg et al suffers from a number of limitations that raise concerns about both external and internal validity.

Critically, large national rideshare companies were not included in the study design, heavily limiting the generalizability of the study findings. Based on internal and market-level data, Lyft maintains that neither Lyft nor any other major or national ridesharing company was operating in the study setting during the study period. Lyft and similar companies are large national providers of NEMT services in Medicaid, and their omission causes any generalization of study findings to rideshare as a class to be inappropriate and misleading.

Further, the rideshare entity involved in this study is a particularly poor proxy for national rideshare companies like Lyft. Although the authors do not name the state that was the object of study, the only Northwestern state employing a statewide broker model between 2016 and 2018 was the state of Idaho. During this time Idaho was under contract with a broker employing a *rideshare-like model*, which operates differently from national rideshare companies. Lyft has a nationwide rideshare presence and an existing network of drivers

that can launch seamlessly in new NEMT markets. However, in Idaho, the broker was a new entrant to the local market, and a new supply of drivers had to be recruited to meet existing demand. This *de novo* ramp-up period, which would not be required by a scaled, national rideshare company like Lyft, could have contributed to the access issues reported in the study.

In addition to the issue of low generalizability, the study has key methodological limitations that raise concerns about internal validity. One major limitation is the lack of trip-level outcome data. In this study, the authors examine not the association between an R-NEMT trip and outcomes, but rather the association between the proportion of R-NEMT trips and outcomes, with both defined at the level of a Medicaid beneficiary. This design that aggregates data to the individual level puts the study at risk of ecological fallacy. In other words, there is no way to know if a given outcome came from an R-NEMT trip or from a trip that involved another mode of NEMT. This is of particular concern for the failed pickups outcome, where even 1 failure may be enough for an individual to agree with the statement, “The driver often failed to pick me up for a medical appointment.” By aggregating data to the individual level, the study obscures the true relationship between R-NEMT utilization and outcomes and could even mask a trip-level association that is in the opposite direction of the individual-level association.

Additional issues further complicate the interpretability of the findings. The study contrasts use of R-NEMT with use of nonrideshare NEMT, but users of these 2 modes may not be comparable. For instance, nonrideshare NEMT includes transportation provided by a variety of vehicle types, such as ambulatory vehicles and wheelchair-accessible vehicles (WAVs). The assignment of a beneficiary to a WAV is unlikely to be random and is likely informed by varying rider needs. Although the authors attempted to adjust for these potential differences, sample sizes for some covariates were too small for substantive subanalyses.

The defined levels within the variables of interest also pose problems. For the independent variable, the levels are defined as no R-NEMT trips, some R-NEMT trips (< 50%), and many R-NEMT trips (≥ 50%). However, this scheme would group together someone

who received 1 of 2 rides using R-NEMT with someone who received 299 of 300 rides using R-NEMT, although these scenarios reflect 2 very different realities. Although the authors attempt to adjust for the number of total trips, this variable cannot be treated as a confounder, and including it in the model specification does not address fundamental issues with study design.

In summary, significant methodological limitations and the very model of transportation studied raise concerns about the internal and external validity of study findings. Findings from research performed by academics and Lyft's health care partners suggest that rideshare can have a major positive impact on health care access and utilization. More high-quality research is needed to assess the impacts of R-NEMT on health care access for Medicaid beneficiaries, particularly given recent increases in R-NEMT utilization, as well as technological and operational improvements in the sector. ■

Author Affiliations: Lyft, Inc (MC, NC, JSG, JY), San Francisco, CA.

Source of Funding: None.

Author Disclosures: Ms Callahan, Dr Cooper, and Ms Sisto Gall are employees of Lyft, a transportation network company whose perspectives are represented in this manuscript, and are shareholders of Lyft stock. Mr Yoo is a contracted employee of Lyft.

Authorship Information: Concept and design (MC, NC, JSG); drafting of the manuscript (MC, NC, JSG, JY); critical revision of the manuscript for important intellectual content (MC, NC, JSG, JY); administrative, technical, or logistic support (JY); and supervision (MC, NC, JSG).

Address Correspondence to: Nicole Cooper, DrPH, MPH, Lyft, Inc, 185 Berry St #5000, San Francisco, CA 94107. Email: ncooper@lyft.com.

REFERENCES

1. Eisenberg T, Owen R, Crabb C, Morales M. Rideshare transportation to health care: evidence from a Medicaid implementation. *Am J Manag Care.* 2020;26(9):e276-e281. doi:10.37765/ajmc.2020.88492
2. Chaiyachati KH, Hubbard RA, Yeager A, et al. Rideshare-based medical transportation for Medicaid patients and primary care show rates: a difference-in-difference analysis of a pilot program. *J Gen Intern Med.* 2018;33(6):863-868. doi:10.1007/s11606-018-4306-0
3. Powers B, Rinefort S, Jain SH. Shifting non-emergency medical transportation to Lyft improves patient experience and lowers costs. *Health Affairs.* September 13, 2018. Accessed October 15, 2020. <https://www.healthaffairs.org/doi/10.1377/hblog20180907.685440/tul/>

Visit ajmc.com/link/88590 to download PDF

Reply to “Industry-Informed Perspectives on the Benefits of Rideshare-Based Medical Transportation”

Yochai Eisenberg, PhD; Randall Owen, PhD; and Caitlin Crabb, PhD

We appreciate the opportunity to address Lyft's concerns with our study on rideshare-based nonemergency medical transportation (R-NEMT). Our study found that a higher proportion of rideshare trips was not associated with ride quality but was associated with reporting late and failed pickups—potentially affecting health care access.¹ Lyft's letter criticizes our methodology and internal/external validity, which we will address here. It is important to note that although we studied a program with similarities to Lyft, Lyft was not involved. Overall, readers should recognize that our study was conducted within the scope of evaluation research using the best data and measures available, while noting its limitations. Moreover, our article appears to have achieved one of its primary goals: to contribute to a dearth of published literature on R-NEMT and promote discussion on the topic.

Lyft indicates that its experience and previous studies have found a positive relationship with R-NEMT and health care access. Indeed, our article highlights extant findings but also cites the mixed results in peer-reviewed literature and a limited number of studies reporting outcomes. One study cited by Lyft found fewer missed primary care appointments among R-NEMT compared with usual care.² However, when scaled up to a larger study, R-NEMT was not associated with fewer missed appointments.³ The other source cited in Lyft's letter was a short blog post, which lacks crucial information, including methods and measures, to assess the validity of the findings.⁴

Lyft's letter implies that our findings lack external validity because the program was not administered by a large national rideshare company and is therefore not representative. An alternative view is that these evaluation findings add a valuable perspective: Not all R-NEMT is provided by large

LETTER TO THE EDITOR

national companies, so we should not dismiss research on R-NEMT implementation within smaller rideshare companies.

Another concern was the absence of trip-level outcome data, a valuable component of specific trip analysis; however, data required for such an analysis were unavailable. Rather, we focused on perceptions of ride quality and access as part of a statewide NEMT evaluation. Our study employed a survey using common measures of perceptions in transportation and health care literature.⁵ Importantly, we described in our paper¹ how such perceptions may be associated with an individual's willingness to use NEMT. We argue that it is not only the individual-trip experiences that affect perceptions but also the cumulative experiences of the NEMT service. This is not a case of ecological fallacy but a difference in research aims.

Lyft's letter suggests that it was inappropriate to compare consumers who use R-NEMT and traditional NEMT because some may have different needs. Yet, our study accounts for many of those needs by including factors such as age, mobility, and developmental disabilities. We also note that 29% of the people who use manual wheelchairs or powerchairs did have at least 1 rideshare trip, suggesting that excluding them from the analysis (as indicated by Lyft) is not appropriate. Additionally, Lyft suggests that the R-NEMT categories we used in our analysis were too coarse and that our attempt to control for potential confounding using "total trips" was insufficient. We disagree: "Total trips" is a valuable confounder that controls for frequency of rides. Additionally, we ran models (not shown here) with a continuous variable instead of the R-NEMT categories and found similar results.

High-quality R-NEMT research is needed. We call on rideshare companies and state Medicaid agencies contracting

with them to facilitate experimentation through independent research evaluations. Specifically, there is a need for longitudinal research that employs randomized controlled trial or quasi-experimental design. Nonetheless, there is value in nonexperimental cross-sectional designs, especially to inform this burgeoning area of R-NEMT evaluation. ■

Author Affiliations: Department of Disability and Human Development, University of Illinois at Chicago (YE, CC), Chicago, IL; College of Education and Human Development, University of Nevada (RO), Reno, NV.

Source of Funding: None.

Author Disclosures: The authors report no relationship or financial interest with any entity that would pose a conflict of interest with the subject matter of this article.

Authorship Information: Concept and design (YE, RO, CC); drafting of the manuscript (YE, RO, CC); critical revision of the manuscript for important intellectual content (YE, RO, CC); statistical analysis (YE); obtaining funding (RO); administrative, technical, or logistic support (YE, RO, CC); and supervision (YE, RO).

Address Correspondence to: Yochai Eisenberg, PhD, Department of Disability and Human Development, University of Illinois at Chicago, 1640 W Roosevelt Rd, MC 626, Chicago, IL 60608. Email: yeisen2@uic.edu.

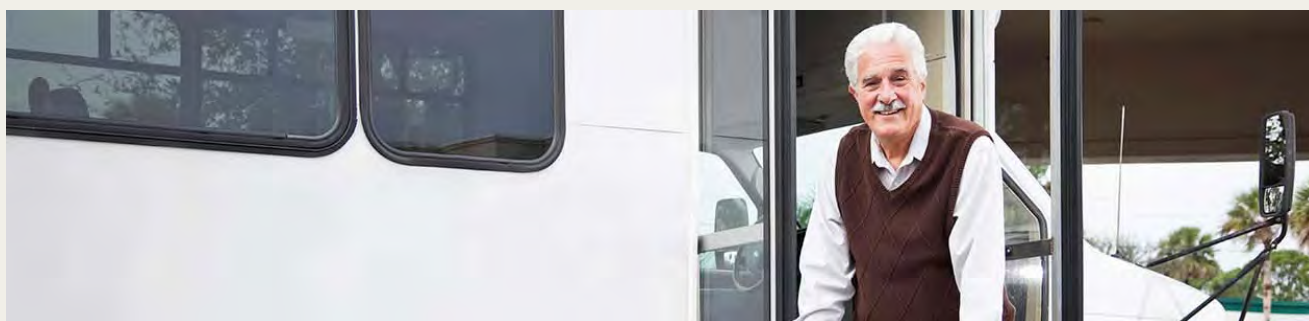
REFERENCES

1. Eisenberg Y, Owen R, Crabb C, Morales M. Rideshare transportation to health care: evidence from a Medicaid implementation. *Am J Manag Care*. 2020;26(9):e276-e281. doi:10.37765/ajmc.2020.88492
2. Chaiyachati KH, Hubbard RA, Yeager A, et al. Rideshare-based medical transportation for Medicaid patients and primary care show rates: a difference-in-difference analysis of a pilot program. *J Gen Intern Med*. 2018;33(6):863-868. doi:10.1007/s11606-018-4306-0
3. Chaiyachati KH, Hubbard RA, Yeager A, et al. Association of rideshare-based transportation services and missed primary care appointments. *JAMA Intern Med*. 2018;178(3):383-389. doi:10.1001/jamainternmed.2017.8336
4. Powers B, Rinefort S, Jain SH. Shifting nonemergency medical transportation to Lyft improves patient experience and lowers costs. *Health Affairs*. September 13, 2018. Accessed December 8, 2020. <https://www.healthaffairs.org/doi/10.1377/hblog20180907.685440/full/>
5. About CAHPS. Agency for Healthcare Research and Quality. Accessed December 8, 2020. <https://www.ahrq.gov/cahps/about-cahps/index.html>

Visit ajmc.com/link/88591 to download PDF

SHARE    

Improving Health Care through Transportation



Most healthcare news in 2020 has been focused, rightfully, on coronavirus disease (COVID-19). Meanwhile, many routine or non-emergency health care procedures have been postponed, and as these procedures make their way back onto our personal schedules, it's worth remembering that many people delay non-emergency but necessary medical procedures all the time for many different reasons. It should come as no surprise that transportation is one of these.

Successful partnerships between transportation and health care organizations are one way to overcome the transportation-related health challenges in communities. Innovative case studies along these lines are part of the TRB Transit Cooperative Research Program's (TCRP) [Guidebook and Research Plan to Help Communities Improve Transportation to Health Care Services](#). The pre-publication report also provides a research plan that outlines future research needs and priorities to better understand the complex relationship between transportation and health care.

In regards to finding the most appropriate solution for each individual's transportation needs, "both health care providers and transportation providers are capable of getting it right," says the TCRP report's principal investigator Ken Hosen, Vice President of KFH Group.

"It often takes a leader with a vision to initiate and pursue a partnership between the community's transportation provider and the health care sector," adds coauthor Buffy Ellis, Senior Transportation Planner at KFH Group. She cited examples in the case studies where one person was able to make a noticeable difference in driving these collaborative projects forward.

In Michigan, Texas, and Oregon, transportation agencies of various sizes have formed partnerships to offer options—including a model similar to ride-hailing services—to provide greater mobility. These include same-day trips and fixed route bus tickets, as well as ADA paratransit and Medicaid non-emergency medical transportation (NEMT).

In Colorado and Missouri, however, medical systems themselves have taken on the responsibility of coordinating or providing NEMT with similar methods like subscriptions, fixed route bus, vouchers, and using Lyft for on-demand trips for hospital discharges.

Social [isolation and loneliness](#) are serious yet underappreciated public health risks that affect a significant portion of the older adult population. A National Academies of Sciences, Engineering, and Medicine report recommends a similar approach to the TCRP Guidebook. When health care providers, organizations, and systems partner with social service providers, an effective team-based network of care can be created. This partnership allows community-based services to address social isolation and loneliness in older adults. A deeper look at the transportation aspects surrounding this issue will appear in the January/February 2021 issue of TRB's journal, *TR News*.

To further understand the models available for providing NEMT for Medicaid beneficiaries, TCRP's [Handbook for Examining the Effects of Non-Emergency Medical Transportation Brokerages on Transportation Coordination](#) explores options for states. NEMT coordination with public transit and human services transportation is highly dependent on the policies and priorities of Medicaid agencies in each state.

Transportation Access to Healthcare is a Major Equity Issue

In looking at further research needs at the intersection of health and transportation, the need for improved access to health care has become even more startlingly clear with the coronavirus pandemic. People living in communities with poor air quality and those in minority population groups seem to be more at risk for the disease. TCRP's handbook asks whether transportation access to health care is a factor contributing to disparities.

“We already knew that transportation access could be improved in many of the communities COVID-19 has hit the hardest. It was still startling to see how much impact the virus had in communities already struggling with social determinants of health,” says Ellis.

There is room for improvement between some of the largest agencies funding and coordinating transportation access to health care, but entities like the Federal Transportation Agency's Coordinating Council on Access and Mobility are working to improve opportunities for coordinating funding streams, say the coauthors.

Five complementary activities can facilitate the [integration of social care into health care](#) per a report from the National Academies of Sciences, Engineering, and Medicine. These activities, awareness, adjustment, assistance, alignment, and advocacy each have a transportation-related example clearly outlined in the report. The report recommends integrating these activities along with a workforce, digital infrastructure, financing, and further research to potentially improve health and reduce health disparities. Transportation has a role to place in each of these support structures.

Targeting Specific Health Care Transportation Challenges

For example, missed and shortened dialysis treatments lead to negative health outcomes, such as increased hospitalizations. For public transportation agencies, dialysis transportation has become a critical concern, as increasing numbers of individuals with end-stage renal disease turn to their community's public transit service for their required three roundtrips each week to access their dialysis clinic. TCRP's report, [Dialysis Transportation: The Intersection of Transportation and Healthcare](#), responds to major concerns of public transportation agencies about the rising demand and costs to provide kidney dialysis trips and about experiences showing these trips require service more specialized than public transportation is designed to provide.

An [article published in TR News](#) on a National Academies of Sciences, Engineering, and Medicine workshop highlighted transportation as related to community health and climate issues. One session tied active transportation and infrastructure to rates of obesity and diabetes in communities. Another noted strategies to address asthma by reducing traffic and levels of particulate matter.

The TRB Airport Cooperative Research Program (ACRP) pulled together experts in 2018 for a two-day event exploring the potential for [airports to reduce the transmission of communicable disease](#). Speakers from the Centers for Disease Control, international airports, and various local departments of health met with attendees from the public, private, and academic sectors to identify challenges, resources, and lessons learned.

When a vaccine for COVID-19 is approved and ready for distribution, [transportation will play a role](#) in ensuring equitable vaccine allocation.

Tools Are Ready to Measure Transportation to Health Care

Leveraging transportation projects to support positive health outcomes was further examined at a [TRB webinar](#) based on the TRB National Cooperative Highway Research Program's (NCHRP) [Research Roadmap for Transportation and Public Health](#). The 10-year strategic Roadmap offers a plan for funding research through the 2020s that can lead to greater consideration of health issues in transportation contexts. Tools for implementing such plans are also available.

Earlier this year, another [TRB webinar](#) explored how the federal government and state departments of transportation are researching and considering the health impacts of transportation investments. The presenters also addressed planning decisions, including how programming analyses and design considerations can encompass more than air emissions, noise, and water quality.

The tools and data sources for health-related transportation needs were discussed in depth at a TRB workshop in June 2016. Participants also shared information on collaboration in urban, suburban, and rural settings as well as the return on investment for these programs at [Exploring Data and Metrics of Value at the Intersection of Health Care and Transportation](#).

A study published in *Transportation Research Record* (TRR) confirms that in Canada, spatial accessibility is positively associated with the likelihood of consultations. Results show that living in a census tract with higher spatial accessibility correlates with an increase in an individual's odds of consultation with a health care professional at a hospital. The study controlled for factors of need and predisposition.

Staying prepared with TRB and the National Academies

In April 2020, TRB convened several thought leaders in transportation to develop a research agenda to assist research funding agencies in prioritization of activities and funding around COVID-19's impact on transportation. The [resulting summary](#) looks at all modes—both passenger and goods movement—so that research initiated as the situation unfolds can take advantage of immediate lessons learned.

Enabling scientists, engineers, entrepreneurs, health leaders, and policymakers to work together will help to comprehensively address the health challenges of people as they age. The National Academy of Medicine's [Healthy Longevity Global Grand Challenge](#) is a worldwide movement to do so through an evidence-based report as well as a Global Competition. The competition is open to innovators of any background and is a multiyear, multi-million-dollar international competition to accelerate breakthroughs in healthy longevity.

TRB has a long history in advancing best practices in integrating transportation and health goals, as told through a [Centennial Paper](#) on the topic.

There is plenty of work still to be done and we want to hear from you. Look for [ongoing information](#) on new projects, requests for proposals, or to nominate yourself or others to serve on a project panel. Submit problem statement research ideas and find new announcements in [TRB's weekly newsletter](#) or on the homepages for [ACRP](#), [NCHRP](#), and [TCRP](#).

You can also become a friend of one of TRB's standing committees working on transportation security, the [Standing Committee on Transportation and Public Health](#). However you chose to get involved will pay off for both your community and transportation research at large.

TRB reports cited in this article:

- [NCHRP Research Results Digest 393: Selected Indirect Benefits of State Investment in Public Transportation](#)
- [NCHRP Research Report 932: A Research Roadmap for Transportation and Public Health](#)
- [TCRP Research Report 202: Handbook for Examining the Effects of Non-Emergency Medical Transportation Brokerages on Transportation Coordination](#)
- [TCRP Research Report 203: Dialysis Transportation: The Intersection of Transportation and Healthcare](#)

Articles published in TRR:

- [Spatial Access by Public Transport and Likelihood of Healthcare Consultations at Hospitals,](#)

Articles published in *TR News*:

- [Protecting the Health and Well-Being of Communities in a Changing Climate](#)

Additional TRB resources:

- [Transportation Research Circular E-C267: Summary of Transportation Research Needs Related to COVID-19](#)
- [TCRP Web-Only Document 29: Cost-Benefit Analysis of Providing Non-Emergency Medical Transportation](#)
- [TRB Snap Search on Transportation & Health](#)
- [Transportation's Roles in Equitable Vaccine Allocation](#) **blog**
- [Centennial Paper on Public Health and Transportation](#)

Contact: Beth Ewoldsen, Content Strategist

Transportation Research Board

202-334-2353; bewoldsen@nas.edu

Published November 30, 2020

The National
Academies of

SCIENCES
ENGINEERING
MEDICINE



NATIONAL ACADEMY OF SCIENCES



NATIONAL ACADEMY OF ENGINEERING



NATIONAL ACADEMY OF MEDICINE

[About Us](#)

[Our Work](#)

[Events](#)

[Contact Us](#)

[Opportunities](#)

[Publications](#)

[Visit](#)

[Current Operating
Status](#)

[E-Newsletters](#)

[Privacy Statement](#) | [DMCA Policy](#) | [Terms of Use](#)
| [Site Map](#)

Copyright © 2021 National Academy of Sciences. All Rights Reserved.

Rideshare Transportation to Health Care: Evidence From a Medicaid Implementation

Yochai Eisenberg, PhD; Randall Owen, PhD; Caitlin Crabb, PhD; and Miguel Morales, MPH

One substantial barrier to accessing health care is the lack of consistent transportation.¹⁻³ Transportation challenges to health care are disproportionately experienced by individuals who are low-income, older adults, non-White, women, and less educated, many of whom are Medicaid enrollees.⁴ An estimated 25% to 55% of Medicaid enrollees missed, arrived late to, or did not try to go to a health care appointment because of transportation issues.⁵⁻⁷ Adults and children who missed medical appointments due to transportation issues had extensive comorbidities and a significantly higher prevalence of health conditions compared with those who missed care for other reasons.⁴ Inconsistent care due to transportation challenges can negatively affect health and increase preventable emergency department visits, particularly for individuals with chronic conditions.^{8,9}

Nonemergency medical transportation (NEMT) is a mandatory benefit provided through Medicaid to travel to and from health care appointments.¹⁰ NEMT is provided by nonmedical personnel through a range of vehicles, including wheelchair-accessible vans.⁸ The most common model of NEMT administration is through a third-party broker and/or managed care organization (MCO), in which the broker or MCO receives capitated payments by the state to broker, coordinate, manage, and/or administer NEMT.^{11,12}

Despite historical support for NEMT, this program is particularly susceptible to service and funding cuts. Some states have used Section 1115 waivers to exclude Medicaid expansion populations from NEMT benefits.¹³ CMS drafted a proposed rule that would allow states more flexibility in providing NEMT,¹⁴ and the current administration's budget proposals for fiscal years 2019 and 2020 proposed making NEMT an optional benefit.¹⁵ The rule could reduce patient access to NEMT and, subsequently, to needed medical services. This tension reflects the demands inherent in the Triple Aim of health care—cost, quality, and access¹⁶: It is extremely challenging to reduce NEMT costs without affecting quality and access or to improve quality without raising costs. It is important to consider how quality and access are affected by new cost-reducing models in NEMT.

Rideshare-based medical transportation (RMT) is a program in which NEMT is provided by drivers using their personal vehicles,

ABSTRACT

OBJECTIVES: Some managed care companies are testing rideshare services as an approach to providing transportation to health care for Medicaid enrollees. The objective of this study was to assess whether more rideshare transportation to health care was associated with improved self-reported ride experiences and fewer late/failed passenger pickups for Medicaid enrollees.

STUDY DESIGN: We surveyed a random sample of Medicaid enrollees in a northwestern US state on their experiences with nonemergency medical transportation (NEMT) in the past year. We linked survey responses to administrative data on NEMT utilization from the state's transportation broker to obtain an objective measure of rideshare utilization.

METHODS: We used bivariate tests and multivariable logistic regressions to examine associations between enrollee perspectives on the quality of and access to health care and rideshare use, defined as none, some, or many NEMT trips through rideshare services.

RESULTS: More than 35% of respondents received NEMT from rideshare services at least once. Perceptions of the ride experience, driver, and vehicle did not differ based on the proportion of rideshare trips received. Having more rideshare trips was associated with reporting late and failed pickups. In multivariable regression, the statistical significance held for failed pickups. Sensitivity analyses showed similar results.

CONCLUSIONS: This study suggests that rideshare to health care programs can meet similar goals of quality compared with traditional NEMT services but may have implications for health care access for Medicaid enrollees. Future evaluations need to include the perspectives of enrollees and explore potential differences among different Medicaid subpopulations.

Am J Manag Care. 2020;26(9):e276-e281. doi:10.37765/ajmc.2020.88492

similar to rideshare companies like Uber and Lyft. RMT can be combined with traditional NEMT to also provide rides via prearranged vans or taxis. RMT is appealing because it may provide more flexibility for passengers; is well suited for last-minute rides, like hospital discharges; and may reduce wait times and cost.⁸ Additionally, RMT can better track rides and collect data, potentially addressing quality, fraud, waste, and abuse.⁸

Conversely, critiques of RMT include lower pay for drivers, lack of access in rural areas, inadequate driver screening, and safety issues for drivers and riders.^{17,18} Because the NEMT population is more likely to be low-income, older adults, and individuals with disabilities,⁴ additional specialized training for drivers is needed. Ridesharing companies not specific to NEMT have also faced criticism and even legal action for a lack of accessibility for individuals with disabilities.^{19,20} Rideshare vehicles are typically not equipped to provide rides to those using wheelchairs/scooters.

Some early evaluations of RMT implementation suggest mixed results regarding health care access and service quality. Preliminary results from pilot tests suggested that RMT leads to decreased missed appointments²¹ and high safety and satisfaction ratings (> 95%).²² However, recent studies contradict these pilots. A randomized controlled trial found no significant effect of RMT on missed appointments.²³ A recent analysis of Twitter posts suggested that passengers had overwhelmingly negative experiences with rideshare drivers.²⁴ Based on Andersen's conceptual model of health care access,²⁵ perceptions of the ride experience, driver, and vehicle appropriateness may affect individuals' willingness to use NEMT. It is important to understand consumers' perceptions of RMT because perceptions likely influence NEMT service utilization and overall access to health care.

In this paper, our aim was to determine whether RMT was associated with users' perceptions of quality and access to care. In a northwestern state in the United States, the Medicaid transportation broker included rideshare services as part of its NEMT. Unlike typical rideshare services, there was no passenger-side smartphone app; the rides were requested on behalf of the passenger directly from the NEMT broker (ie, passengers may not have known whether or not they received a rideshare driver). In this way, the passenger did not change their usual practice for scheduling rides. Enrollees' trips were simply assigned to RMT or traditional NEMT based on availability of rideshare drivers and origin/destination. Thus, factors that affect a patient's willingness and ability to use ridesharing and the associated smartphone app did not confound our analysis.

We assessed whether having a greater proportion of rides from rideshare drivers was associated with greater satisfaction and better access to care. To our knowledge, no other studies have examined the association between rideshare use and passenger perspectives through a systematic independent evaluation controlling for

TAKEAWAY POINTS

Ridesharing is an understudied service delivery method deployed by managed care organizations for nonemergency medical transportation (NEMT) for Medicaid enrollees. Our study found that:

- ▶ Perceptions of ride quality were not affected by the proportion of ridesharing trips, indicating that ridesharing within NEMT can maintain goals of quality like traditional NEMT.
- ▶ Having more rideshare trips was associated with greater odds of failed pickups, which affects access to health care for Medicaid enrollees.
- ▶ Managed care organizations and transportation brokers seeking to use ridesharing should systematically evaluate patient-reported measures of ride quality and access to care to understand the impacts of ridesharing.

multiple potential confounding factors. We examined the following research questions: (1) Was receiving more rides through RMT associated with a higher quality of service (vehicle appropriateness, safety, and cleanliness)? and (2) Was receiving more rides through RMT associated with a lower likelihood of reporting late and/or failed pickups?

METHODS

We obtained administrative data on all NEMT rides from the NEMT broker's administrative database for the years 2016 to 2018. To assess the experiences of NEMT users, we developed a survey that was distributed to a stratified random sample of individuals eligible for Medicaid NEMT within the state. The questionnaire included 29 questions that covered transportation utilization, access, experiences, satisfaction, and demographics. Many survey questions were drawn from standard Consumer Assessment of Healthcare Providers and Systems surveys, a national standardized survey tool developed by the Agency for Healthcare Research and Quality.²⁶

Sampling

We employed proportionate stratified random sampling to ensure that perspectives from a variety of groups were included in the survey. We stratified sampling based on having a legal guardian (for those younger than 18 years and those with a developmental disability), prior NEMT utilization, and county of residence. Based on a power analysis, we estimated that a sample of 1101 was needed. Surveys were distributed to the selected enrollees through the mail at least twice. Up to 3 telephone reminders were made, with the option to complete the survey over the telephone. If requested, the survey and accompanying materials were available in Spanish.

Overall, the response rate was 28.3%, consistent with other Medicaid mail surveys.^{27,28} Compared with nonresponders, responders were older (mean age, 43 vs 35 years), took more NEMT trips (median number of trips, 38 vs 21), and had a lower proportion with a legal guardian (23.3% vs 46.0%) (eAppendix Table 1 [eAppendix available at ajmc.com]). The differences were not a threat to internal validity because we were primarily interested in responses for enrollees who had taken NEMT.

POLICY

TABLE 1. Sample Characteristics of a Sample of Medicaid Enrollees (N = 266)

Variable	Mean (SD) or median (IQR)
Age in years (continuous), mean (SD) ^a	42.9 (20.6)
Total NEMT trips, median (IQR)	34.5 (6-110)
	n (%)
Demographic factors	
Age in years (categorical)	
< 18	39 (14.7)
18-64	184 (69.2)
≥ 65	43 (16.2)
Male gender	99 (38.8)
White race	189 (71.1)
Missing response to race items	30 (11.3)
Latino ethnicity	34 (12.8)
On Medicaid DD waiver	49 (18.4)
Mobility disability	117 (44.0)
NEMT use	
Proportion of RMT trips (categorical)	
No RMT trips (0)	172 (64.7)
Some RMT trips (<50%)	46 (17.3)
Many RMT trips (≥50%)	48 (18.0)
Ride experience	
Low frequency of medical appointments	79 (30.9)
≥31 minutes to get to primary care provider's facility	55 (21.5)
The vehicle was often appropriate to meet your transportation needs.	197 (87.9)
The driver was often polite and courteous.	209 (89.7)
I often felt safe when riding with a transportation driver.	205 (87.6)
The vehicle was often clean.	204 (87.9)
The vehicle was often in good mechanical repair.	194 (84.3)
The driver was often late to pick me up to or from an appointment. ^a	69 (30.0)
The driver often failed to pick me up for a medical appointment.	105 (50.2)

DD, developmental disability; IQR, interquartile range; NEMT, nonemergency medical transportation; RMT, rideshare-based medical transportation.

^aReverse coded for consistency.

Variables

Dependent variables. The dependent variables were responses to 7 questions related to transportation quality and access (eAppendix Table 2). For most questions, responses were dichotomized into usually/always and never/sometimes. For the failed pickup question, the response options were dichotomized into sometimes/usually/always and never, because a failed pickup is a more extreme event that may have a large impact on access to care and acceptability of the service.

Independent variable of interest. The transportation broker provided a data set of one-way trip details for each respondent. We selected all trips made within 1 year of the month that the survey

was received, reflecting the time frame of the survey question wording. For each respondent, we calculated the proportion of total NEMT trips that were provided by a rideshare driver. A categorical variable was coded as “many” for having at least 50% of trips with a rideshare driver, “some” for having 1% to 49%, and “none” for having no rideshare trips. Nonrideshare trips were provided through ambulatory vehicles (sedans), wheelchair-accessible vans, public transportation, and mileage reimbursement. However, 95% of rides came from ambulatory vehicles or wheelchair-accessible vans.

Covariates. We included several covariates to control for confounding, including age, sex, race/ethnicity, frequency of health care visits, total NEMT trips (one-way), and trip distance. Through interviews with advocates, we learned that RMT was not working well for the population with developmental disability (DD), so we included a dummy variable for that group based on administrative data from the state (unpublished data). Finally, we included a dummy variable on mobility disability, which was defined as needing any type of specialized equipment or services to travel outside the home (eg, assistance from another person, interpreter, manual wheelchair).

Statistical Analysis

We computed descriptive statistics (frequencies and counts) for all items. We examined bivariate correlations between the receipt of RMT (none, some, and many) and the dependent variables using Fisher's exact tests. We conducted subanalyses to compare results for those with and without mobility disability. The sample sizes for the other covariates were too small for meaningful subanalyses.

For variables that were significant in bivariate analyses, we used multivariable logistic regressions to determine the odds of rating the outcome variables positively while controlling for confounders. The variable for on-time pickup was reverse-coded for easier interpretation of results and will be referred to as “late pickup.” To correct bias from the small sample size,²⁹ we bootstrapped the standard errors with 500 repetitions to increase confidence in the statistical significance of our findings. Model fit was assessed using the Hosmer-Lemeshow goodness-of-fit test.

Sensitivity Analyses

To determine if our choice of timing affected the results, we tested both the bivariate association and full regression models utilizing a 6-month time period before the survey was received instead of a 1-year time period.

RESULTS

Table 1 shows the sample characteristics. The majority of respondents were aged between 18 and 64 years (69.2%), female (61.2%), and White (71.1%). More than 18% of the respondents were on the DD waiver, and 44% had a mobility disability. Among all respondents, 18.0% had many RMT trips, 17.3% had some RMT trips, and 64.7% had no RMT trips. A large majority of respondents had positive ratings for the ride

quality questions. Just over half of respondents (50.2%) reported having a failed pickup often.

Table 2 shows the bivariate associations between the proportion of rideshare trips and each of the questions on quality and access. Ride quality measures did not differ across the proportion of RMT trips provided. In contrast, having more rideshare trips was associated with reporting late pickup ($P = .012$) and failed pickup ($P < .001$). For late pickup, 47.8% of individuals with many RMT trips reported they often had a late pickup compared with 27.3% for those with some RMT trips and 25.0% for those with no RMT trips. For failed pickup, 65.2% of those with many RMT trips reported they often had a failed pickup and 67.6% of those with some RMT trips agreed compared with 39.7% of those with no RMT trips. The sensitivity analyses using NEMT data from the last 6 months instead of from the last year yielded similar results (**eAppendix Table 3**). Results and tables for the bivariate analysis by mobility disability are shown in **eAppendix Table 4** and reveal that, for this subgroup, responses for some of the dependent variables differed by proportion of RMT.

Multivariable Logistic Regression Analyses

Table 3 shows the results for 2 logistic regression models for the late pickup and failed pickup outcomes. All models passed the goodness-of-fit tests. In the first model, having some or many RMT trips compared with no RMT trips was associated with increased odds of reporting a late pickup, but the association was no longer statistically significant. There was a small (odds ratio [OR], 0.970; 95% CI, 0.949-0.992) but significant decrease in the odds of late pickup for every 1-year increase in age. There were no significant associations between the other variables and reporting late pickup.

In the second model, having some RMT trips increased the odds of failed pickup by a factor of 3.44 compared with those with no RMT trips, and having many RMT trips increased the odds of failed pickup by a factor of 3.06. There was also a small decrease in the odds of failed pickup for every year increase in age (OR, 0.979; 95% CI, 0.959-1.000). In our sensitivity analyses (**eAppendix Table 3**), both models with a shorter time window (6 months instead of 1 year prior

TABLE 2. Differences in Responses to Items on Ride Quality and Access to Care by Proportion of NEMT Trips From Rideshare Drivers Among a Sample of Medicaid Enrollees

Survey items	Level ^a	No RMT trips (n = 172)	Some RMT trips (< 50%) (n = 46)	Many RMT trips (≥ 50%) (n = 48)	P ^b
The vehicle was often appropriate to meet your transportation needs.	Disagree	19 (13.3%)	2 (5.3%)	6 (14.0%)	.40
	Agree	124 (86.7%)	36 (94.7%)	37 (86.0%)	
The driver was often polite and courteous.	Disagree	14 (9.7%)	3 (7.0%)	7 (15.6%)	.44
	Agree	131 (90.3%)	40 (93.0%)	38 (84.4%)	
I often felt safe when riding with a transportation driver.	Disagree	16 (11.0%)	4 (9.3%)	9 (19.6%)	.27
	Agree	129 (89.0%)	39 (90.7%)	37 (80.4%)	
The vehicle was often clean.	Disagree	17 (12.0%)	5 (11.4%)	6 (13.0%)	.96
	Agree	125 (88.0%)	39 (88.6%)	40 (87.0%)	
The vehicle was often in good mechanical repair.	Disagree	21 (14.9%)	5 (11.4%)	10 (22.2%)	.35
	Agree	120 (85.1%)	39 (88.6%)	35 (77.8%)	
The driver was often late to pick me up to or from an appointment.	Disagree	105 (75.0%)	32 (72.7%)	24 (52.2%)	.012
	Agree	35 (25.0%)	12 (27.3%)	22 (47.8%)	
The driver often failed to pick me up for a medical appointment.	Disagree	76 (60.3%)	12 (32.4%)	16 (34.8%)	<.001
	Agree	50 (39.7%)	25 (67.6%)	30 (65.2%)	

NEMT, nonemergency medical transportation; RMT, rideshare-based medical transportation.

^aThe original responses to the survey items were "never" or "sometimes" for disagree and "usually" or "always" for agree, except for the last item, "The driver often failed to pick me up..." for which "never" is disagree and "sometimes," "usually," or "always" is agree.

^bFisher's exact test P value (for questions with cell counts ≤ 5) and Pearson's χ^2 (for questions with cell counts > 5).

TABLE 3. Multivariable Logistic Regression Results for Having Late and Failed Pickup to Health Care Appointments Among a Sample of Medicaid Enrollees^a

	Late pickup ^b (n = 207)		Failed pickup ^c (n = 188)	
	OR	95% CI	OR	95% CI
No RMT trips (reference)				
Some RMT trips (< 50%)	1.594	0.571-4.448	3.443	1.368-8.666**
Many RMT trips (≥ 50%)	2.449	0.954-6.290	3.056	1.259-7.420*
Age	0.970	0.949-0.992**	0.979	0.959-1.000*
Male	1.423	0.627-3.229	0.597	0.268-1.327
White	0.984	0.388-2.497	1.251	0.498-3.138
Missing race	1.114	0.267-4.649	1.405	0.286-6.903
Latino	0.952	0.334-2.708	1.363	0.368-5.047
On DD waiver	1.166	0.310-4.389	0.350	0.086-1.424
Mobility disability	0.735	0.326-1.657	1.569	0.714-3.449
Total trips	0.997	0.993-1.000	0.999	0.997-1.002
Frequency of medical appointments	0.460	0.183-1.154	0.700	0.300-1.633
Trip > 30 minutes	2.392	0.970-5.901	1.046	0.420-2.600

DD, developmental disability; OR, odds ratio; RMT, rideshare-based medical transportation.

* $P < .05$; ** $P < .01$.

^aReference groups: gender: female; race: minority; missing race: responded to race question; frequent medical appointments: infrequent medical appointments; trip time: less than 30 minutes; waiver: other waiver; mobility disability: does not have a mobility disability.

^bUsually or always vs sometimes or never. Hosmer-Lemeshow goodness of fit, $\chi^2(8) = 1107$; $P = .1997$; C statistic = 0.7528.

^cSometimes, usually, or always vs never. Hosmer-Lemeshow goodness of fit, $\chi^2(8) = 10.35$; $P = .2411$; C statistic = 0.7327.

POLICY

to the survey) had results similar to the main models. One exception was that in the shorter time window, having some RMT trips was no longer statistically significant in the failed pickup model.

DISCUSSION

This study sought to identify whether having more RMT trips was associated with better quality ratings of NEMT and improved access to care for a sample of Medicaid enrollees. We found that having more RMT trips was not associated with reported quality of NEMT in terms of appropriateness, safety of the vehicle, or driver courteousness. In contrast, having more rideshare trips was associated with reporting late and failed pickups of NEMT riders. The statistical significance of the associations held in multivariable analysis for reporting failed pickup.

The appropriateness of the rideshare vehicle, safety, and driver attitudes are major concerns for use of RMT.^{17,18} Some preliminary results from an RMT pilot in New York City and California indicated a high level of safety and satisfaction, yet there was no control group for comparison and only pilot results have been reported.²² In this study, we were able to compare groups with different levels of rideshare trips (none, some, and many). Across groups, the ratings for ride quality were generally high. We did not find significant differences in responses to the ride quality measures between those with some or many trips with RMT compared with those with traditional NEMT only; this finding can be interpreted both positively and negatively. On one hand, RMT use had similar ratings of driver and ride quality. If maintaining quality was the goal, it would be met. On the other hand, RMT may be less attractive if improving quality was an important outcome for a state's Medicaid program.

As the proportion of RMT increased, the likelihood of late and failed pickup of NEMT riders also increased: Those who received RMT more frequently were more likely to report late pickup or failed pickup compared with those who received RMT less frequently or used only traditional NEMT. These findings suggest that access to health care may be affected by RMT trips; more research is needed to determine why these differences exist.

RMT may affect health care access for various reasons. One potential explanation is that rideshare drivers may not receive adequate training and may not face consequences for a failed or late pickup. Rideshare dispatch technology problems can lead to access issues. Additional measures may be needed when providing RMT to enrollees with mobility disability, such as building a larger pool of accessible vehicles. Additionally, lower access may be related to cost-reduction strategies used by the NEMT broker. We learned that the NEMT broker in the state under study had a lower bid for its contract and drivers were generally dissatisfied by the pay rate (unpublished data). As costs are reduced, quality or access to care is often affected.¹⁶ The evaluation was completed during the second year of the broker's contract. It is possible that access may improve over a longer period of time when both drivers and enrollees are more familiar with RMT.

Transportation brokers have a plethora of data on shared ride logistics like pickup time and location. However, it is important to understand patients' perceived access (in this case, late or failed pickup) because these perceptions could be reasons for why consumers may or may not continue to use transportation services. In the course of our evaluation, we also found that the NEMT broker could track late pickups but not failed pickups. Although drivers could report consumers who do not show, consumers may be underreporting when drivers do not show. In a previous evaluation, we found that consumers dissatisfied with an NEMT service sometimes do not bother calling the broker but focus on finding alternative transportation. Understanding the experiences of patients with new services like RMT is critical to tease out patient satisfaction and the likelihood of repeated use. Lower satisfaction with NEMT threatens consistent attendance of medical appointments by the enrollees who are in the most need of care.²⁵ One group in particular to consider is individuals with mobility disabilities. In subanalyses, individuals with mobility disabilities with more RMT trips had significantly lower ratings for some of the quality and access measures than those with no RMT. This may reflect problems with vehicle accessibility, which have also been cited in lawsuits against rideshare companies in Chicago and parts of California.^{19,20} Future research should evaluate RMT for other transportation-disadvantaged subgroups. This research would be useful for policy makers and other stakeholders in understanding access and experiences with RMT.

Strengths and Limitations

Our study had several strengths. This paper was novel because we linked survey data on consumer experiences to administrative records of health care trips for Medicaid recipients. Our measure for the proportion of RMT was not biased by patient behavioral factors but focused the analysis on the rideshare trip. Finally, the research was based on an independent evaluation of NEMT that was not associated with any rideshare company.

Our study also had some limitations. Like many Medicaid surveys, our response rate was low, at 28.3%.²⁷ We were unable to reach many enrollees because changes of residence and phone number are common among the Medicaid population.^{28,30} Our comparison of administrative data for responders and nonresponders indicated significant differences, which affects the generalizability of our results. Respondents did not answer all the questions, which reduced the analytic sample for some of the analyses. Clients may have become aware that the driver was not from a traditional transportation company. Because our analysis was cross-sectional and lacked any causal approaches to address omitted variable bias, the results can only reflect associations between RMT and quality and access.

CONCLUSIONS

Rideshare companies continue to expand into transportation to health care appointments. As more states incorporate ridesharing

into their NEMT delivery models, it is critical to evaluate patient experiences and perceptions. Although RMT may be attractive for its efficiency and lower costs, additional research is needed in diverse settings and varied populations to understand how RMT differs from traditional NEMT and how RMT affects quality and access to care. ■

Acknowledgments

The authors thank Helen Rottier and Amy Hofstra for their contributions to this paper by editing and adding pertinent literature when needed.

Author Affiliations: Department of Disability and Human Development, University of Illinois at Chicago (YE, RO, CC, MM), Chicago, IL.

Source of Funding: This evaluation was funded by the state department that houses the Medicaid agency in the state where the research was conducted.

Author Disclosures: The authors report no relationship or financial interest with any entity that would pose a conflict of interest with the subject matter of this article.

Authorship Information: Concept and design (YE, RO, CC); acquisition of data (RO, CC); analysis and interpretation of data (YE, RO, CC, MM); drafting of the manuscript (YE, RO, CC, MM); critical revision of the manuscript for important intellectual content (YE, RO, CC); statistical analysis (YE, RO, CC); administrative, technical, or logistic support (YE, MM); and supervision (YE, RO).

Address Correspondence to: Yochai Eisenberg, PhD, Department of Disability and Human Development, University of Illinois at Chicago, 1640 W Roosevelt Rd, MC 626, Chicago, IL 60608. Email: yeisen2@uic.edu.

REFERENCES

- Bellamy GR, Stone K, Richardson SK, Goldstein RL. Getting from here to there: evaluating West Virginia's rural nonemergency medical transportation program. *J Rural Health*. 2003;19(suppl 5):397-406. doi:10.1111/j.1748-0361.2003.tb01060.x
- Norris TL, Aiken M. Personal access to health care: a concept analysis. *Public Health Nurs*. 2006;23(1):59-66. doi:10.1111/j.0737-1209.2006.230109.x
- Syed ST, Gerber BS, Sharp LK. Traveling towards disease: transportation barriers to health care access. *J Community Health*. 2013;38(5):976-993. doi:10.1007/s10900-013-9681-1
- Wallace R, Hughes-Cromwick P, Mull H, Khasnabis S. Access to health care and nonemergency medical transportation: two missing links. *Transp Res Rec*. 2005;1924(1):76-84. doi:10.1177/0361198105192400110
- Silver D, Blustein J, Weitzman BC. Transportation to clinic: findings from a pilot clinic-based survey of low-income suburbanites. *J Immigr Minor Health*. 2012;14(2):350-355. doi:10.1007/s10903-010-9410-0
- Yang S, Zarr RL, Kass-Hout TA, Kourosh A, Kelly NR. Transportation barriers to accessing health care for urban children. *J Health Care Poor Underserved*. 2006;17(4):928-943. doi:10.1353/hpu.2006.0137
- Hobson J, Quiroz-Martinez J. *Roadblocks to Health: Transportation Barriers to Healthy Communities*. Transportation and Land Use Coalition; 2002.
- Powers BW, Rinefort S, Jain SH. Nonemergency medical transportation: delivering care in the era of Lyft and Uber. *JAMA*. 2016;316(9):921-922. doi:10.1001/jama.2016.9970
- Starbird LE, DiMaina C, Sun CA, Han HR. A systematic review of interventions to minimize transportation barriers among people with chronic diseases. *J Community Health*. 2019;44(2):400-411. doi:10.1007/s10900-018-0572-3
- Rosenbaum S, Lopez N, Morris MJ, Simon M. Medicaid's medical transportation assurance: origins, evolution, current trends, and implications for health reform. *Policy Brief George Wash Univ Cent Health Serv Res Policy*. 2009;1-24.
- Musumeci M, Rudowitz R. Medicaid non-emergency medical transportation: overview and key issues in Medicaid expansion waivers. Kaiser Family Foundation. February 24, 2016. Accessed January 7, 2020. <https://www.kff.org/medicaid/issue-brief/medicaid-non-emergency-medical-transportation-overview-and-key-issues-in-medicaid-expansion-waivers/>
- Adelberg M, Simon M. Non-emergency medical transportation: will reshaping Medicaid sacrifice an important benefit? *Health Affairs*. September 20, 2017. Accessed January 7, 2020. <https://www.healthaffairs.org/doi/10.1377/hblog20170920.062063/full/>
- Musumeci M, Rudowitz R. The ACA and Medicaid expansion waivers. Kaiser Family Foundation. November 20, 2015. Accessed January 7, 2020. <https://www.kff.org/report-section/the-aca-and-medicaid-expansion-waivers-issue-brief/>
- Dickson V. CMS is developing a rule that could curtail Medicaid transportation access. *Modern Healthcare*. November 7, 2018. Accessed January 7, 2020. <https://www.modernhealthcare.com/article/20181107/NEWS/181109932/cms-is-developing-a-rule-that-could-curtail-medicaid-transportation-access>
- Parfate-Claude D. CMS possibly delaying publication of NEMT rule. *American Network of Community Options and Resources (ANCOR)*. July 1, 2019. Accessed January 8, 2020. <https://www.ancor.org/newsroom/news/cms-possibly-delaying-publication-nemt-rule>
- Berwick DM, Nolan TW, Whittington J. The triple aim: care, health, and cost. *Health Aff (Millwood)*. 2008;27(3):759-769. doi:10.1377/hlthaff.27.3.759
- Ganuza A, Davis R. Disruptive innovation in Medicaid non-emergency transportation. *Center for Health Care Strategies, Inc*. February 2017. Accessed January 7, 2020. <https://www.chcs.org/media/NEMT-Issue-Brief-022717.pdf>
- Chaudhry B, Yasar AUH, El-Amine S, Shakshuki E. Passenger safety in ride-sharing services. *Procedia Comput Sci*. 2018;130:1044-1050. doi:10.1016/j.procs.2018.04.146
- Said C. Lyft sued by disability advocates over wheelchair access. *San Francisco Chronicle*. March 13, 2018. Accessed January 9, 2020. <https://www.sfchronicle.com/business/article/Lyft-sued-by-disabled-advocates-over-lack-of-12750101.php>
- Lien T. California lawsuits accuse Uber and Lyft of discriminating against wheelchair users. *Los Angeles Times*. March 15, 2018. Accessed January 7, 2020. <https://www.latimes.com/business/technology/la-fi-tn-uber-lyft-wheelchair-20180315-story.html>
- Chaiyachati KH, Hubbard RA, Yeager A, et al. Rideshare-based medical transportation for Medicaid patients and primary care show rates: a difference-in-difference analysis of a pilot program. *J Gen Intern Med*. 2018;33(6):863-868. doi:10.1007/s11606-018-4306-0
- Powers B, Rinefort S, Jain SH. Shifting non-emergency medical transportation to Lyft improves patient experience and lowers costs. *Health Affairs*. September 13, 2018. Accessed January 7, 2020. <https://www.healthaffairs.org/doi/10.1377/hblog20180907.685440/full/>
- Chaiyachati KH, Hubbard RA, Yeager A, et al. Association of rideshare-based transportation services and missed primary care appointments. *JAMA Intern Med*. 2018;178(3):383-389. doi:10.1001/jamainternmed.2017.8336
- Pratt AN, Morris EA, Zhou Y, Khan S, Chowdhury M. What do riders tweet about the people that they meet? analyzing online commentary about UberPool and Lyft Shared/Lyft Line. *Transp Res Part F Traffic Psychol Behav*. 2019;62:459-472. doi:10.1016/j.trf.2019.01.015
- Andersen RM. Revisiting the behavioral model and access to medical care: does it matter? *J Health Soc Behav*. 1995;36(1):1-10.
- About CAHPS. Agency for Healthcare Research and Quality. Accessed January 8, 2020. <https://www.ahrq.gov/cahps/about-cahps/index.html>
- Gallagher PM, Fowler EJ Jr, Stringfellow VL. The nature of nonresponse in a Medicaid survey: causes and consequences. *J Off Stat*. 2005;21(1):73-87.
- Owen R, Heller T, Bowers A. Health services appraisal and the transition to Medicaid Managed Care from fee for service. *Disabil Health J*. 2016;9(2):239-247. doi:10.1016/j.dhjo.2015.10.004
- Nemes S, Jonasson JM, Genell A, Steineck G. Bias in odds ratios by logistic regression modelling and sample size. *BMC Med Res Methodol*. 2009;9(1):56. doi:10.1186/1471-2288-9-56
- Fredrickson DD, Jones TL, Molgaard CA, et al. Optimal design features for surveying low-income populations. *J Health Care Poor Underserved*. 2005;16(4):677-690. doi:10.1353/hpu.2005.0096

Visit ajmc.com/link/88492 to download PDF and eAppendix

eAppendix Table 1. Baseline Differences for Responders and Non-responders of the NEMT Transportation Survey

	Responders (n = 266)	Non-responders (n = 678)	Test value	P value
Mean age-mean (sd)	43.08 (20.63)	34.62 (22.95)	5.487 ^a	<.001
Number of Trips - median (1Q, 3Q)	38 (8.8, 112)	21 (6, 75.3)	104277.5 ^b	<.001
Has Guardian	62 (23.3)	312 (46.0)	41.186 ^c	<.001
No guardian	204 (76.7)	366 (54.0)		
DD waiver	49 (18.4)	93 (13.7)	3.308 ^c	0.069
Other waiver	217 (81.6)	585 (86.3)		
Urban County	116 (43.6)	289 (42.6)	0.075 ^c	0.784
Rural County	150 (56.4)	389 (57.4)		
Trips in past year				
0-2 trips taken	25 (9.4)	95 (14.0)	11.562 ^c	0.003
3-24 trips taken	85 (32)	267 (39.4)		
25+ trips taken	156 (58.6)	316 (46.6)		
<i>Note:</i> DD = developmental disability; NEMT = non-emergency medical transportation; SD = standard deviation; 1Q = first quartile; 3Q = third quartile.				
Data sources: Administrative records of Medicaid Enrollees				
^a t-test				
^b Mann-Whitney U test				
^c chi-square test				

eAppendix Table 2. Sensitivity Analysis of Differences in Responses to Items on Ride Quality and Access to Care by Proportion of Non-Emergency Medical Transportation Trips from Rideshare Drivers Among a Sample of Medicaid Enrollees

Survey Items	Level ^a	In the last Year				In the last 6 months			
		No RMT trips n=172	Some RMT trips ^b n=46	Many RMT trips ^c n=48	<i>p</i> ^b	No RMT trips n= 138	Some RMT trips ^b n= 36	Many RMT trips ^c n= 40	<i>p</i> ^b
The vehicle was often appropriate to meet your transportation needs.	Disagree	19 (13.3%)	2 (5.3%)	6 (14.0%)	0.40	17 (13.6%)	1 (3.6%)	4 (10.8%)	0.35
	Agree	124 (86.7%)	36 (94.7%)	37 (86.0%)		108 (86.4%)	27 (96.4%)	33 (89.2%)	
The driver was often polite and courteous.	Disagree	14 (9.7%)	3 (7.0%)	7 (15.6%)	0.44	12 (9.5%)	2 (6.1%)	5 (13.2%)	0.60
	Agree	131 (90.3%)	40 (93.0%)	38 (84.4%)		114 (90.5%)	31 (93.9%)	33 (86.8%)	
I often felt safe when riding with a transportation driver.	Disagree	16 (11.0%)	4 (9.3%)	9 (19.6%)	0.27	12 (9.5%)	3 (9.1%)	7 (17.9%)	0.33
	Agree	129 (89.0%)	39 (90.7%)	37 (80.4%)		114 (90.5%)	30 (90.9%)	32 (82.1%)	
The vehicle was often clean.	Disagree	17 (12.0%)	5 (11.4%)	6 (13.0%)	0.96	13 (10.5%)	3 (8.8%)	4 (10.3%)	1.00
	Agree	125 (88.0%)	39 (88.6%)	40 (87.0%)		111 (89.5%)	31 (91.2%)	35 (89.7%)	
The vehicle was often in good mechanical repair.	Disagree	21 (14.9%)	5 (11.4%)	10 (22.2%)	0.35	17 (13.7%)	4 (11.8%)	10 (26.3%)	0.16
	Agree	120 (85.1%)	39 (88.6%)	35 (77.8%)		107 (86.3%)	30 (88.2%)	28 (73.7%)	
	Disagree	105 (75.0%)	32 (72.7%)	24 (52.2%)	0.012	95 (77.2%)	26 (76.5%)	21 (53.8%)	0.021

The driver was often late to pick me up to or from an appointment.	Agree	35 (25.0%)	12 (27.3%)	22 (47.8%)		28 (22.8%)	8 (23.5%)	18 (46.2%)	
The NEMT transportation often failed to pick me up for a medical appointment.	Disagree	76 (60.3%)	12 (32.4%)	16 (34.8%)	< 0.001	65 (59.1%)	12 (42.9%)	12 (30.8%)	0.007
	Agree	50 (39.7%)	25 (67.6%)	30 (65.2%)		45 (40.9%)	16 (57.1%)	27 (69.2%)	
<p>^a The original responses to the survey items was "Never" or "Sometimes" for Disagree and "Usually" or "Always" for Agree, except for the last item, "The driver often failed to pick me up ..." for which "Never" is Disagree and "Sometimes," "Usually" or "Always" is Agree.</p> <p>^b < 50% ^c > = 50%</p> <p>*p<0.05, **p<0.01, ***p<0.001</p> <p>Fisher's Exact test <i>p</i> value</p>									

eAppendix Table 3. Sensitivity Analyses Comparing Multivariable Logistic Regression Results for Late Pickup and Failed Pickup by One Year VS Six Months of NEMT Trip Data from the Month of Participant Survey

	Late pickup during the last year ^{ab} (N = 207)		Late pickup during the last six months ^{ac} (N = 178)		Failed pickup during the last year ^{de} (N = 188)		Failed pickup during the last six months ^{df} (N = 161)	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
No RMT trips (Ref)								
Some RMT trips (< 50%)	1.594	(0.571, 4.448)	1.303	(0.411, 4.127)	3.443	(1.368, 8.666) **	2.150	(0.703, 6.572)
Many RMT trips (> 50%)	2.449	(0.954, 6.290)	2.942	(0.965, 8.965)	3.056	(1.259, 7.420) *	4.437	(1.540, 12.78) **
Age	0.970	(0.949, 0.992) **	0.975	(0.950, 0.999) *	0.979	(0.959, 1.000) *	0.984	(0.960, 1.007)
Male	1.423	(0.627, 3.229)	1.495	(0.623, 3.590)	0.597	(0.268, 1.327)	0.523	(0.238, 1.149)
White	0.984	(0.388, 2.497)	0.904	(0.303, 2.701)	1.251	(0.498, 3.138)	1.089	(0.353, 3.359)
Missing race	1.114	(0.267, 4.649)	0.84	(0.147, 4.788)	1.405	(0.286, 6.903)	1.451	(0.184, 11.43)
Latino	0.952	(0.334, 2.708)	1.067	(0.281, 4.051)	1.363	(0.368, 5.047)	1.288	(0.350, 4.733)
On the DD waiver	1.166	(0.310, 4.389)	1.043	(0.219, 4.968)	0.350	(0.086, 1.424)	0.513	(0.102, 2.569)
Mobility disability	0.735	(0.326, 1.657)	0.544	(0.213, 1.391)	1.569	(0.714, 3.449)	1.383	(0.577, 3.315)
Total trips	0.997	(0.993, 1.000)	0.996	(0.990, 1.002)	0.999	(0.997, 1.002)	0.999	(0.995, 1.004)
Frequency of medical appointments	0.460	(0.183, 1.154)	0.512	(0.168, 1.558)	0.700	(0.300, 1.633)	0.572	(0.222, 1.474)
Trip greater than 30 min	2.392	(0.970, 5.901)	3.53	(1.112, 11.21) *	1.046	(0.420, 2.600)	1.192	(0.453, 3.131)
Significance: + p<0.10 * p<0.05 ** p<0.01 *** p<0.001 Reference groups: Gender: female; race: minority; missing race: responded to race question; frequent medical appointments: infrequent medical appointments; trips time: less than 30 minutes; waiver: other waiver; mobility disability: does not have a mobility disability.								

^a Usually or always vs. sometimes or never

^b Hosmer-Lemeshow Goodness of Fit, $X^2(8) = 1107$, $p = 0.1997$; *C statistic* = 0.7528

^c Hosmer-Lemeshow Goodness of Fit, $X^2(8) = 6.90$, $p = 0.5474$; *C statistic* = 0.7682

^d Usually, always or sometimes vs. never

^e Hosmer-Lemeshow Goodness of Fit, $X^2(8) = 10.35$, $p = 0.2411$; *C statistic* = 0.7327

^f Hosmer-Lemeshow Goodness of Fit, $X^2(8) = 1.65$, $p = 0.9899$; *C statistic* = 0.7298

In the bivariate analysis by mobility disability (see Table A.4), there were no differences for most of the ride quality variables across those having none, some, or many rideshare trips for both those with and without mobility disabilities. However, among those with mobility disabilities, a lower percentage (74%) with many RMT trips agreed that, ‘The vehicle was often appropriate to meet your transportation needs’ compared to 100% of those with some RMT trips and 89% of those with no RMT trips. There was no difference among RMT trips group and those without mobility disabilities for the same question on vehicle appropriateness. For the access to care questions, there were significant differences across RMT trips groups. Among respondents with mobility disabilities, 55% of those with many RMT trips agreed that the driver was often late for pickups compared to 28% for those with some RMT trips and 15% for those with no RMT trips ($p = 0.02$). For those without mobility disabilities, there was no difference in the distribution across RMT trips groups for the late pickup question ($p = 0.52$). For the question on failed pickups, there was a significant difference across rideshare groups for both people with and without mobility disabilities. In both cases, the more rides from RMT drivers, the higher percentage that agreed they often had a failed pickup.

eAppendix Table 4. Differences in Responses to Items on Ride Quality and Access to Care by Proportion of Non-Emergency Medical Transportation Trips and Mobility Disability from Rideshare Drivers

Survey Items	Mobility Disability n= 116				No Mobility Disability n= 150				
	Level ^a	Zero RMT trips n=74	Some RMT trips ^b n=20	Many RMT trips ^c n=22	p-value	Zero RMT trips n=98	Some RMT trips ^b n=26	Many RMT trips ^c n=26	p-value
The vehicle was often appropriate to meet your transportation needs.	Disagree	7 (11%)	0 (0%)	5 (26%)	0.046	12 (15%)	2 (10%)	1 (4%)	0.37
	Agree	56 (89%)	17 (100%)	14 (74%)		68 (85%)	19 (90%)	23 (96%)	
The driver was often polite and courteous.	Disagree	5 (8%)	0 (0%)	4 (20%)	0.12	9 (11%)	3 (12%)	3 (12%)	1.00
	Agree	59 (92%)	17 (100%)	16 (80%)		72 (89%)	23 (88%)	22 (88%)	
I often felt safe when riding with a transportation driver.	Disagree	5 (8%)	1 (6%)	3 (15%)	0.59	11 (14%)	3 (12%)	6 (23%)	0.46
	Agree	59 (92%)	17 (94%)	17 (85%)		70 (86%)	22 (88%)	20 (77%)	
The vehicle was often clean.	Disagree	6 (10%)	1 (6%)	5 (25%)	0.18	11 (14%)	4 (15%)	1 (4%)	0.34
	Agree	55 (90%)	17 (94%)	15 (75%)		70 (86%)	22 (85%)	25 (96%)	
The vehicle was often in good mechanical repair.	Disagree	7 (11%)	1 (6%)	4 (20%)	0.41	14 (18%)	4 (15%)	6 (24%)	0.77
	Agree	56 (89%)	17 (94%)	16 (80%)		64 (82%)	22 (85%)	19 (76%)	
The driver was often late to pick me up to or from an appointment.	Disagree	52 (85%)	13 (72%)	9 (45%)	0.002	53 (67%)	19 (73%)	15 (58%)	0.52
	Agree	9 (15%)	5 (28%)	11 (55%)		26 (33%)	7 (27%)	11 (42%)	

The NEMT transportation often failed to pick me up for a medical appointment.	Disagree	31 (57%)	2 (14%)	8 (40%)	0.011	45 (63%)	10 (43%)	8 (31%)	0.013
	Agree	23 (43%)	12 (86%)	12 (60%)		27 (38%)	13 (57%)	18 (69%)	
<p>^a The original responses to the survey items was "Never" or "Sometimes" for Disagree and "Usually" or "Always" for Agree, except for the last item, "The driver often failed to pick me up ..." for which "Never" is Disagree and "Sometimes," "Usually" or "Always" is Agree.</p> <p>^b Fisher's Exact test <i>p</i> value</p>									