

# Rideshare Transportation to Health Care: Evidence From a Medicaid Implementation

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One substantial barrier to accessing health care is the lack of consistent transportation.<sup>1-3</sup> 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.<sup>4</sup> 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.<sup>5-7</sup> 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.<sup>4</sup> Inconsistent care due to transportation challenges can negatively affect health and increase preventable emergency department visits, particularly for individuals with chronic conditions.<sup>8,9</sup>

Nonemergency medical transportation (NEMT) is a mandatory benefit provided through Medicaid to travel to and from health care appointments.<sup>10</sup> NEMT is provided by nonmedical personnel through a range of vehicles, including wheelchair-accessible vans.<sup>8</sup> 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.<sup>11,12</sup>

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.<sup>13</sup> CMS drafted a proposed rule that would allow states more flexibility in providing NEMT,<sup>14</sup> and the current administration's budget proposals for fiscal years 2019 and 2020 proposed making NEMT an optional benefit.<sup>15</sup> 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 access<sup>16</sup>: 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.

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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.<sup>8</sup> Additionally, RMT can better track rides and collect data, potentially addressing quality, fraud, waste, and abuse.<sup>8</sup>

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.<sup>17,18</sup> Because the NEMT population is more likely to be low-income, older adults, and individuals with disabilities,<sup>4</sup> 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.<sup>19,20</sup> 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 appointments<sup>21</sup> and high safety and satisfaction ratings (> 95%).<sup>22</sup> However, recent studies contradict these pilots. A randomized controlled trial found no significant effect of RMT on missed appointments.<sup>23</sup> A recent analysis of Twitter posts suggested that passengers had overwhelmingly negative experiences with rideshare drivers.<sup>24</sup> Based on Andersen's conceptual model of health care access,<sup>25</sup> 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.<sup>26</sup>

### 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.<sup>27,28</sup> 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](http://ajmc.com)]). The differences were not a threat to internal validity because we were primarily interested in responses for enrollees who had taken NEMT.

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

Variable	Mean (SD) or median (IQR)
Age in years (continuous), mean (SD) <sup>a</sup>	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. <sup>a</sup>	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.

<sup>a</sup>Reverse 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,<sup>29</sup> 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 <sup>a</sup>	No RMT trips	Some RMT trips	Many RMT trips	P <sup>b</sup>
		(n = 172)	(< 50%) (n = 46)	(≥ 50%) (n = 48)	
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.  
<sup>a</sup>The 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.  
<sup>b</sup>Fisher’s exact test P value (for questions with cell counts ≤ 5) and Pearson’s  $\chi^2$  (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<sup>a</sup>

	Late pickup <sup>b</sup>		Failed pickup <sup>c</sup>	
	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.  
<sup>a</sup> $P < .05$ ; <sup>\*\*</sup> $P < .01$ .  
<sup>b</sup>Reference 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.  
<sup>c</sup>Usually or always vs sometimes or never. Hosmer-Lemeshow goodness of fit,  $\chi^2(8) = 1107$ ;  $P = .1997$ ; C statistic = 0.7528.  
<sup>d</sup>Sometimes, usually, or always vs never. Hosmer-Lemeshow goodness of fit,  $\chi^2(8) = 10.35$ ;  $P = .2411$ ; C statistic = 0.7327.

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.<sup>17,18</sup> 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.<sup>22</sup> 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.<sup>16</sup> 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.<sup>25</sup> 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.<sup>19,20</sup> 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%.<sup>27</sup> We were unable to reach many enrollees because changes of residence and phone number are common among the Medicaid population.<sup>28,30</sup> 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. ■

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**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 <sup>a</sup>	<.001
Number of Trips - median (1Q, 3Q)	38 (8.8, 112)	21 (6, 75.3)	104277.5 <sup>b</sup>	<.001
Has Guardian	62 (23.3)	312 (46.0)	41.186 <sup>c</sup>	<.001
No guardian	204 (76.7)	366 (54.0)		
DD waiver	49 (18.4)	93 (13.7)	3.308 <sup>c</sup>	0.069
Other waiver	217 (81.6)	585 (86.3)		
Urban County	116 (43.6)	289 (42.6)	0.075 <sup>c</sup>	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 <sup>c</sup>	0.003
3-24 trips taken	85 (32)	267 (39.4)		
25+ trips taken	156 (58.6)	316 (46.6)		
<p><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  <sup>a</sup> t-test  <sup>b</sup> Mann-Whitney U test  <sup>c</sup> chi-square test</p>				

**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 <sup>a</sup>	In the last Year				In the last 6 months			
		No RMT trips n=172	Some RMT trips <sup>b</sup> n=46	Many RMT trips <sup>c</sup> n=48	<i>p</i> <sup>b</sup>	No RMT trips n= 138	Some RMT trips <sup>b</sup> n= 36	Many RMT trips <sup>c</sup> n= 40	<i>p</i> <sup>b</sup>
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><sup>a</sup> 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><sup>b</sup> &lt; 50% <sup>c</sup> &gt; = 50%</p> <p>*p&lt;0.05, **p&lt;0.01, ***p&lt;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 <sup>ab</sup> (N = 207)		Late pickup during the last six months <sup>ac</sup> (N = 178)		Failed pickup during the last year <sup>de</sup> (N = 188)		Failed pickup during the last six months <sup>df</sup> (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)
<p>Significance: + p&lt;0.10 * p&lt;0.05 ** p&lt;0.01 *** p&lt;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.</p>								

<sup>a</sup> Usually or always vs. sometimes or never

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

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

<sup>d</sup> Usually, always or sometimes vs. never

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

<sup>f</sup> 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 <sup>a</sup>	Zero RMT trips n=74	Some RMT trips <sup>b</sup> n=20	Many RMT trips <sup>c</sup> n=22	p-value	Zero RMT trips n=98	Some RMT trips <sup>b</sup> n=26	Many RMT trips <sup>c</sup> 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><sup>a</sup> 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><sup>b</sup> Fisher's Exact test <i>p</i> value</p>									