

Allegheny County Discounted Fares Pilot: Interim Results



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The Allegheny County
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OVERVIEW

Public transportation systems are a vital component of urban infrastructure, facilitating access to employment, healthcare, education and social services. Yet, for low-income individuals, the cost of public transportation can pose a significant barrier, exacerbating social and economic disparities. Within the United States and in Allegheny County, affordability and operational hurdles have been identified as obstacles that hinder the mobility of economically disadvantaged populations. A 2021 Allegheny County Needs Assessment underscored these challenges; 30% of unemployed respondents interested in becoming employed reported challenges with transportation to a job and 17% identified transportation as their most urgent need.¹ The issue was reinforced by a 2018 Rider Satisfaction Bus Report prepared by Pittsburgh Regional Transit (PRT, Allegheny County's public transit agency), which found that approximately 35% of riders had an annual income of less than \$25,000. This suggests a potential link between transportation affordability and economic mobility.²

The spatial mismatch between low-income neighborhoods and employment opportunities, as documented in studies such as Ihlanfeldt and Sjoquist (1998) and Kain (1992), further complicates this issue and highlights the role of public transportation in bridging the gap between people and essential services. Easily accessible and affordable public transportation networks may improve individual welfare across health, economic and social outcomes. However, despite the importance of affordable transportation in improving the wellbeing of low-income communities, there is limited direct evidence on the impact of fare discounts on riders' behavior and overall wellbeing.³

In November 2022, in response to these challenges and to shed light on the significance of transportation affordability barriers on the lives of low-income public transportation riders, the Allegheny County Department of Human Services (DHS), in partnership with PRT, launched a 12-month discounted fare pilot (the "Pilot") for County residents receiving Supplemental Nutrition Assistance Program (SNAP) benefits. SNAP recipients represent a substantial portion of low-income residents in Allegheny County and selecting this group enabled simple eligibility verification using administrative records at DHS. The Pilot was designed to evaluate the impact of fare reductions on public transportation ridership and mobility, facilitating residents' access to comprehensive services including healthcare, education, training opportunities and other social services, as well as employment. The results of the Pilot were also expected to guide future financial investments by DHS to increase transportation affordability for economically disadvantaged Allegheny County residents.

Pilot eligibility was open to adults, ages 18 through 64, who resided in Allegheny County, received SNAP at least as of September 2022, and were not already receiving a PRT discount through an employer or school. Eligibility was limited to one adult participant per SNAP household. Youth ages 6 through 17 were also eligible to participate. Recruitment strategies included direct text message outreach to local SNAP recipients, public advertisements on PRT buses and digital banner ads in the Transit smartphone app.

¹ <https://www.alleghenycountyanalytics.us/wp-content/uploads/2022/01/21-ACDHS-15-EconomicSecurityv6.pdf>

² <https://www.pittsburghforpublictransit.org/wp-content/uploads/2020/09/PPT-COVID-relief-reportfinal.pdf>

³ Two recent studies, Rosenblum (2020) and Brough et al. (2023), conducted randomized tests of public transit fare subsidies for low-income riders in Boston and Seattle, respectively.

Randomization was conducted at the SNAP household level, where a household consisted of one adult (ages 18 through 64) and their children (if the adult chose to include their children in the program). Pilot participants were randomly assigned to one of three groups, offering varying levels of fare discounts:

- Free fares on all PRT trips (100% discount)
- 50% fare discount on all PRT trips
- No discount (i.e., control group, the “status quo policy”)

Each participant received a PRT fare card (ConnectCard) programmed with the appropriate discount level. ConnectCards for participants in the no-discount and 50% discount groups were preloaded with \$10 to encourage initial card use. Once the balance was exhausted, participants in the no-discount and 50% group could replenish ConnectCards with cash or a fare product (e.g., a monthly pass) to continue using them with the relevant applied discount. For example, while a PRT ride normally costs \$2.75, the 50% discount group paid \$1.35 per ride. The 100% discount group received ConnectCards that allowed unlimited free rides for all PRT trips.

PILOT PARTICIPANTS

The Pilot enrolled 14,472 individuals (9,544 adults and 4,928 youth). **Table 1** presents the characteristics of the participants prior to enrollment in the Pilot. The majority of participants were Black (58.9%) and female (72.1%), and 54.8% reported having only a high school education. Participants reported taking an average of 10 PRT trips and spending an average of \$29.90 on public transportation in the past week. Less than half (42.7%) of the sample was employed. Those who were employed reported working 30.8 hours per week and earning an average of \$13.48 per hour.

We also measured participants' earnings using administrative data from Pennsylvania unemployment insurance (UI) wage records. These data corroborate the low average earnings of the Pilot sample, as participants with UI records (98.7% of total adults in Pilot) earned an average of \$2,276 in the quarter prior to enrollment. This translates into annual earnings that fall well below the federal poverty level for a single adult. **Table 1** also demonstrates that the random assignment worked as intended and yielded groups that were balanced on key characteristics. Small differences between the groups are not statistically significant at rates higher than what would be expected by random chance alone.

TABLE 1: Baseline sample characteristics for adults

	ALLEGHENY COUNTY MEAN	0% DISCOUNT		50% DISCOUNT		100% DISCOUNT		0% VS. 100% DIFF
		N	MEAN	N	MEAN	N	MEAN	
Panel A. Demographics								
Female	0.512	3,149	0.717	3,241	0.726	3,154	0.721	0.004 (0.011)
Age (years)	40.58	3,149	39.64	3,241	39.56	3,154	39.42	0.214 (0.312)
Race								
- Black	0.150	3,149	0.588	3,241	0.591	3,154	0.588	<0.001 (0.012)
- White	0.822	3,149	0.346	3,241	0.332	3,154	0.334	0.012 (0.012)
- Other	0.097	3,149	0.044	3,241	0.050	3,154	0.056	0.012** (0.006)
Hispanic	0.024	3,149	0.032	3,241	0.033	3,154	0.035	0.003 (0.005)
Children in household (N)		3,149	1.10	3,241	1.12	3,154	1.18	0.084** (0.035)
Highest education								
- Less than high school	0.044	3,149	0.072	3,241	0.084	3,154	0.088	0.016** (0.007)
- High school	0.233	3,149	0.560	3,241	0.552	3,154	0.532	0.028** (0.013)
- More than high school	0.723	3,149	0.364	3,241	0.358	3,154	0.375	0.011 (0.012)
Panel B. Transportation								
Owens a car		3,149	0.057	3,241	0.057	3,154	0.058	0.001 (0.006)
PRT trips last week (N)		3,149	10.12	3,241	9.99	3,154	10.00	0.118 (0.332)
PRT spending last week (\$)		3,149	30.36	3,241	30.02	3,154	29.32	1.04 (0.803)
Panel C. Employment (from baseline survey)								
Employed past 12 months	0.820	3,149	0.611	3,241	0.598	3,154	0.603	0.008 (0.012)
Currently employed	0.762	3,149	0.432	3,241	0.424	3,154	0.425	0.007 (0.012)
Hours worked per week at main job (N)		1,361	30.41	1,373	30.91	1,340	30.96	0.556 (0.424)
Hourly wage at main job (\$)		1,361	13.59	1,373	13.39	1,338	13.46	0.128 (0.141)
Panel D. Employment in quarter prior to enrollment (from UI records)								
Total earnings (\$)	13,692	3,114	2,277	3,198	2,267	3,108	2,285	7.56 (83.29)
Received nonzero UI benefits		3,114	0.028	3,198	0.035	3,108	0.031	0.003 (0.004)
Total sample size		3,149		3,241		3,154		

Notes: Table presents mean baseline characteristics for the adult sample. The demographics and transportation characteristics come from the baseline survey that all participants were required to complete immediately before enrolling in the study. The 'hours worked per week at main job' and 'hourly wage at main job' numbers only include the participants who reported being currently employed in the baseline survey. The employment characteristics in the bottom panel come from Pennsylvania unemployment insurance (UI) records. Allegheny County means are for 18-to 64-year-old residents and are calculated from ACS PUMS data or derived from ACS Table DP05 2021 1-year estimates. Baseline survey items that permitted unbounded continuous-valued responses are winsorized at the 99th percentile. Sample sizes vary across characteristics due to differing baseline survey item response rates and incomplete UI records for the sample. The significance of 0% versus 100% discount group mean differences is estimated using a regression with no covariate adjustment. Robust standard errors are in parentheses. ***p <0.01, **p <0.05, *p <0.1

Table 2 describes participants’ human services involvement in three time periods: 1) the month prior to enrollment in the Pilot, 2) within 12 months prior to enrollment and 3) any time prior to their enrollment. Nearly three-fourths (73.1%) of the adult participants received publicly funded behavioral health care at some point prior to their enrollment. More than 37% had been the defendant in a criminal court case in Allegheny County, and one-third (32.6%) had spent time in the Allegheny County Jail. More than 99% of the adult sample was enrolled in Medicaid during the month prior to joining the Pilot.

Adult Pilot participants had higher rates of involvement in certain services than the average 18- through 64-year-old Allegheny County SNAP recipient. For example, only 7% of countywide SNAP adults have ever received homelessness services, compared with 13.3% of the adults in the Pilot. Comparable trends are observed in criminal justice outcomes. Specifically, 37.8% of individuals participating in the Pilot had a previous criminal case in the County’s justice system, in contrast to 29% of all individuals receiving SNAP benefits. Additionally, 32.6% of Pilot participants had been booked into Allegheny County Jail, compared with 25% of the broader SNAP recipient group.

Table 2: Human services involvement rates among study sample

	IN MONTH PRIOR		WITHIN 12 MONTHS PRIOR		ANY TIME PRIOR	
	ADULTS	CHILDREN	ADULTS	CHILDREN	ADULTS	CHILDREN
(ADULT N = 9,544; CHILD N = 4,928)						
Youth and family services						
Childcare subsidy (as parent or child)	0.070	0.073	0.091	0.110	0.120	0.188
Child welfare system (as parent or child)	0.028	0.031	0.054	0.078	0.305	0.372
Early childhood program (as parent or child)	0.012	0.000	0.019	0.009	0.096	0.428
Independent living	0.012	0.006	0.017	0.008	0.054	0.009
Criminal justice						
County court criminal case	0.077	<0.001	0.129	0.001	0.378	0.001
County jail	0.006	<0.001	0.040	<0.001	0.326	0.001
Pittsburgh Police arrest or citation	0.002	<0.001	0.037	0.008	0.247	0.019
Public benefits						
Public housing	0.102	0.117	0.103	0.119	0.204	0.241
Section 8 housing	0.220	0.334	0.225	0.340	0.360	0.430
Supplemental Security Income (SSI)	0.157	0.098	0.162	0.101	0.183	0.115
Temporary Assistance for Needy Families (TANF)	0.070	0.189	0.129	0.313	0.211	0.450
Medicaid	0.973	0.984	0.975	0.988	0.991	0.995
Medical Assistance Transportation Program (MATP)	0.138	0.036	0.191	0.056	0.550	0.301
Public services						
Aging	0.006	0.000	0.019	0.000	0.046	0.000
Behavioral health care	0.193	0.104	0.320	0.180	0.731	0.379
Homelessness services	0.012	<0.001	0.022	0.001	0.133	0.049
Intellectual disabilities	0.005	0.002	0.005	0.002	0.007	0.002

Notes: Table presents rates of human services involvement among the child and adult study participants prior to their enrollment in the study. Data come from DHS administrative records. Homelessness services include emergency shelter stays, street outreach and transitional housing. Early childhood programs include Head Start, Early Head Start and Pre-K Counts. Behavioral health care covers claims that were paid by Medicaid or by DHS. Independent living services are for youth ages 14 through 24 who have had child welfare placements. Criminal court and jail involvement do not count expunged records.

DATA AND METHODS

Reduced public transportation fares have the potential to impact many aspects of a person's life. We measured a variety of participant outcomes in order to capture the breadth of the Pilot's effects. In particular, we used a combination of administrative data and survey data to measure participant outcomes related to transportation, travel, employment, health care and criminal justice, as well as self-reported measures of financial stability, health and wellbeing. These outcome domains, which reflect several of DHS's priority areas, motivated the Pilot.⁴

The randomized design of the Pilot allowed us to estimate the impact of fare discounts on participants' outcomes. For all outcomes, we compared the average outcome across the three discount groups. The differences in average outcomes between groups represent the impact of the fare discount. We adjusted these comparisons of group means by statistically controlling for baseline characteristics to make the impact estimates more precise and reduce the influence of chance imbalances between groups.

Many of the impacts presented in the following tables are based on self-reported data from follow-up surveys and travel diaries. While all adult participants were invited to complete these surveys, many did not respond. In addition to increasing imprecision, this non-response introduces the possibility that the survey data and our resulting impact estimates are not representative of the full study sample. A series of tables at the end of the **Appendix** explore the extent of non-response bias in analyses to assess robustness of findings. While it is impossible to rule out the presence of non-response bias in our survey-based outcome measures, we find evidence that suggests that the rate of response is not related to participants' Pilot outcomes after controlling for a limited set of baseline characteristics. Therefore, our preferred method for estimating impacts on survey-based outcomes is to include the same regression controls for baseline characteristics that we use for all other impact estimates in this report, with no further statistical adjustment. Certain survey questions permitted unbounded continuous-valued responses, resulting in some extremely high or low response values. For these survey items, we capped (i.e. "winsorized") the response values at the 99th percentile to reduce the influence of outliers⁵

⁴ The analysis plan of this study was pre-registered in the AEA RCT registry and is available at <https://www.socialscienceregistry.org/trials/11001>.

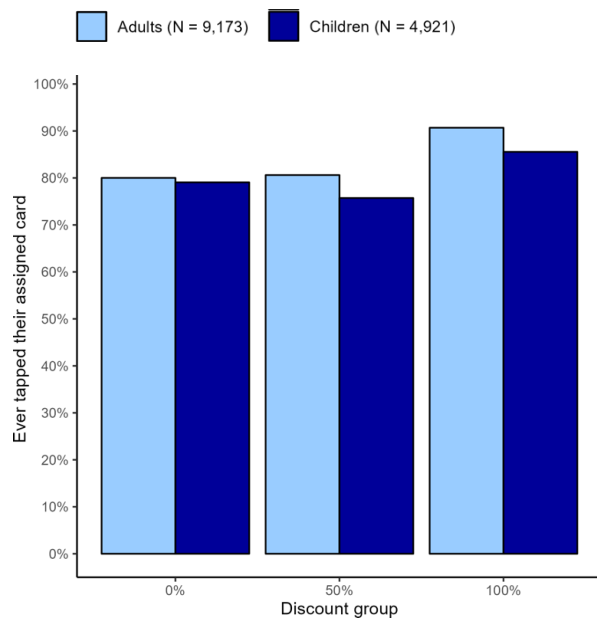
⁵ **Table 10** (in **Appendix**) explores the robustness of impacts on outcomes from the midline survey when using uncapped data and alternative model specifications. Column (2) of this table is our benchmark approach that is reported in the main text.

RESULTS

Transportation use and travel

We began by exploring participants' use of their Pilot ConnectCards and their travel behavior. **Figure 1** shows the percentage of adult and child participants in each of the three discount groups who ever tapped their assigned ConnectCard in a PRT vehicle through December 2023. Twenty percent of adults in the no-discount or half-fare discount groups did not tap their ConnectCard at all during the study period, according to PRT fare transaction data. Among the 9,173 adult participants for whom we were able to observe their ConnectCard taps, 1,385 (15.1%) of them never tapped their assigned ConnectCard.⁶ The rate of initial card use differed across the three discount groups; 90% of adults in the free-fare group tapped their card at least once, the highest rate among the three discount groups. Over one-third of non-users (35.7%, 600 adults and 343 children) never received their ConnectCard, either because they did not pick up the card in person or the mailed envelope containing the card was returned as undeliverable. Moreover, 664 (18.4%) of the respondents to the six-month follow-up survey reported that they never received their ConnectCard, indicating that some mailed cards did not reach the intended recipient even though the envelope was not returned as undeliverable. Participants were able to obtain an unlimited number of replacement cards throughout the Pilot if their previous card was lost, stolen, or damaged.

FIGURE 1: Share of study participants who ever used their assigned ConnectCard when boarding a Pittsburgh Regional Transit vehicle, by discount group



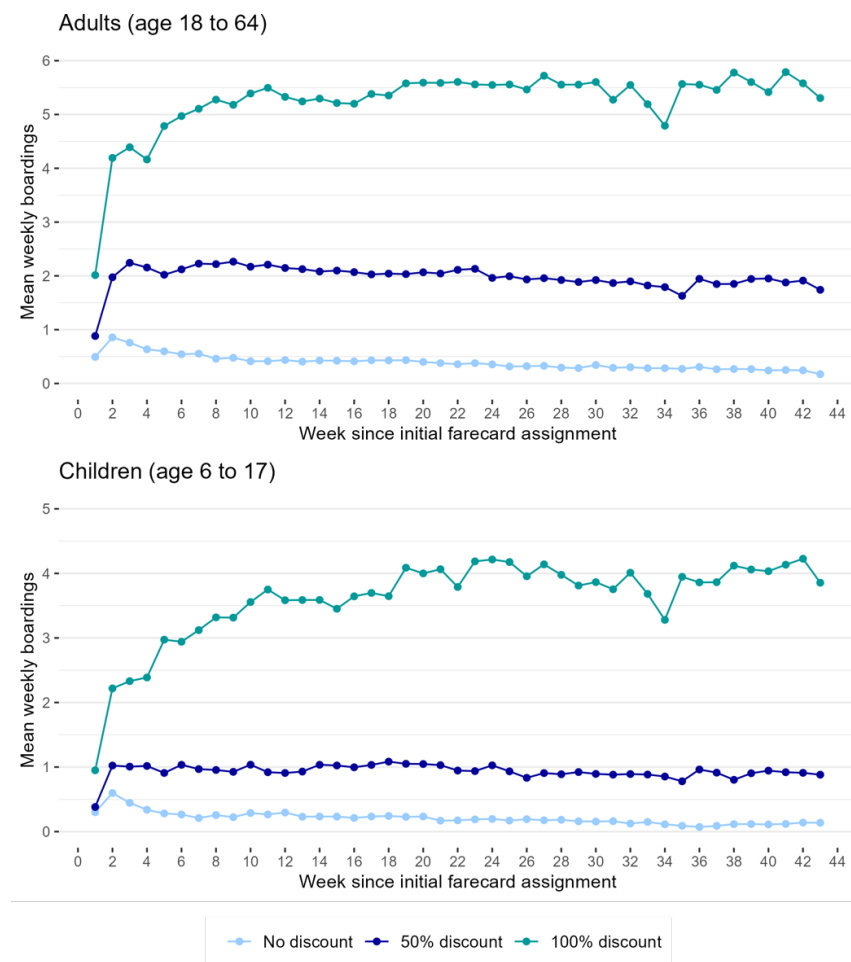
Notes: Calculations are based on data from PRT fare transaction records. Analysis excludes 357 adult study participants who were not assigned a ConnectCard because they were randomly assigned to the 0% or 50% discount arm and noted on their application that they already receive a 50% fare discount through the PRT disability fare program. Analysis also excludes another 14 adult and 7 child participants whose ConnectCard number was not recorded properly in the program database.

⁶ We did not observe ConnectCard taps for 357 adult participants who were not assigned a ConnectCard because they were randomly assigned to the 0% or 50% discount group and noted on their application that they already receive a 50% fare discount through

the PRT disability fare program. We also do not observe the ConnectCard taps for another 14 adult participants because their Pilot-issued card number was not recorded properly in the program database.

Figure 2 shows the mean weekly number of taps of the Pilot-issued farecards over time, grouped by discount level and adults versus children. The data in this figure come from PRT fare transaction data for the Pilot-issued ConnectCards. The adults in the free fare group had an average of five to six taps per week in most weeks, while adults in the half-fare group tapped their cards an average of two times a week in most weeks. The average control group adult used their assigned card less than once per week. It is likely that the fare transaction data for the control group undercounts the group’s true level of PRT ridership during the Pilot, because this group had no incentive to continue using their assigned ConnectCard once their initial \$10 preloaded fare was exhausted, a measurement challenge we discuss below.

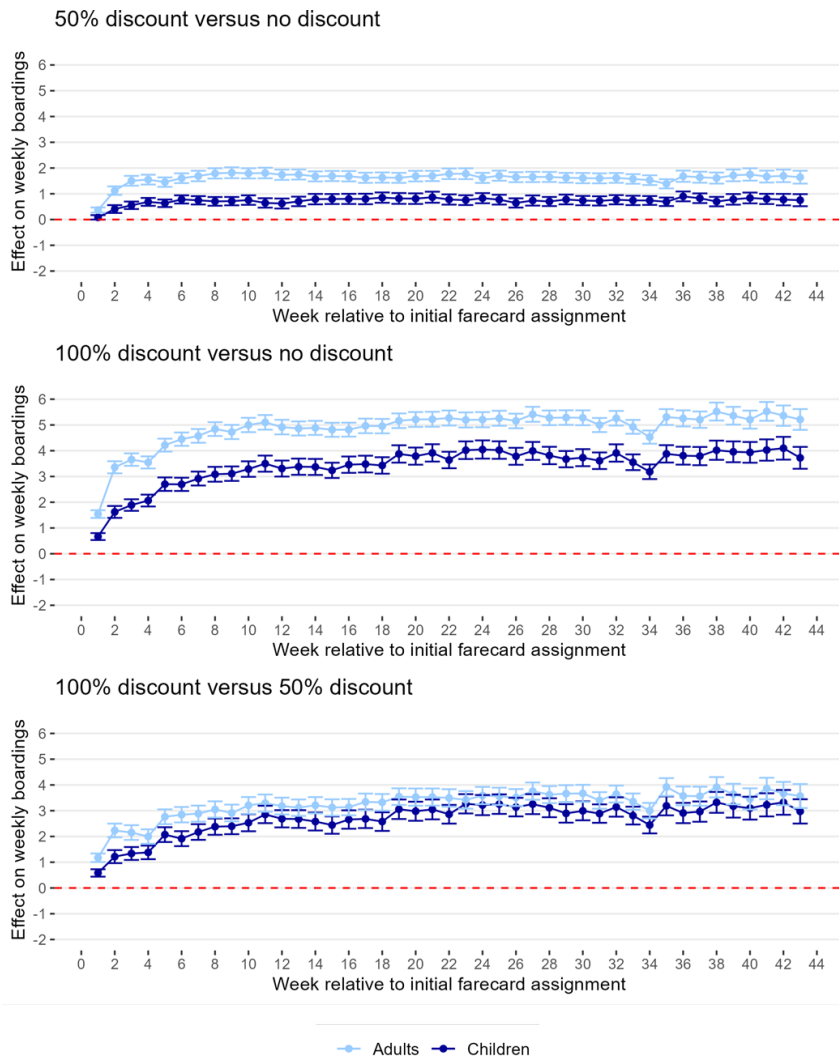
FIGURE 2: Weekly use of Pilot ConnectCards, by discount level and age group



Notes: Figure presents participants’ weekly use of their assigned ConnectCards over time. Calculations are based on data from PRT fare transaction records. Analysis excludes 357 adult study participants who were not assigned a ConnectCard because were randomly assigned to the 0% or 50% discount arm and they noted on their application that they already receive a 50% fare discount through the PRT disability fare program. Analysis also excludes another 14 adult and 7 child participants whose ConnectCard number was not recorded properly in the program database.

Figure 3 translates the ConnectCard tap comparisons from Figure 2 into causal impacts. Among the adult sample, the half-fare discount increased usage of the assigned ConnectCards by two taps per week relative to the no-discount group, and the free-fare discount increased ridership by approximately five taps per week relative to the no-discount group. All of the weekly impact estimates across the three comparisons are statistically significant at the 5% level for both children and adults, suggesting the observed results are highly unlikely to be due to random chance.

FIGURE 3: Impacts on weekly Pilot ConnectCard use, by fare discount and age group



Notes: Figure 3 presents the impacts on participants' use of their assigned ConnectCards by week. Each dot represents the impact on PRT ridership in the given week (i.e., seven-day period) relative to initial card assignment date. Treatment effect estimates are from a regression of the outcome on indicators for each treatment status. The regressions for the adult participants include the following baseline covariates: Age (years), female (y/n), Black (y/n), more than high school education (y/n), currently employed (y/n), PRT trips taken last week (N) and lives within the PRT 7-day frequent service walkshed (y/n). Each treatment effect comes from a separate regression. Error bars represent 95% confidence intervals using robust standard errors. Calculations are based on data from PRT fare transaction records. Analysis excludes 357 adult study participants who were not assigned a ConnectCard because they were randomly assigned to the 0% or 50% discount arm and they noted on their application that they already receive a 50% fare discount through the PRT disability fare program. Analysis also excludes another 14 adult and 7 child participants whose ConnectCard number was not recorded properly in the program database.

We next examine the impacts of the Pilot on other transportation and travel-related outcomes, as summarized in **Table 3**. Panel A reports estimates on the impact of fare discounts using transactional ConnectCard tap data. Relative to the control group, the 50% discount group had 1.58 more taps of their assigned ConnectCard per week and the 100% discount group had 4.86 more taps per week, implying that transactional measures of ridership more than double as the fare prices are reduced from half-off to free. Annualizing these estimates indicate that clients in the 50% and 100% discount groups take 100 and 270 trips per 12 months, respectively.

Panel B displays the self-reported survey-based estimates of ridership behavior. Self-reported measures of ridership are significantly higher than those derived from transactional card tap data. The control group's self-reported rides in the prior week were 9.87, nearly twice the number of rides by individuals in the 100% discount group measured in the card tap data. While the survey estimates of responsiveness to free fares were lower than the transactional card tap data and statistically indistinguishable from zero, part of these muted effects is explained by large self-reported values for rides. Comparing medians rather than means yields an increase of two (33%) weekly rides for the full-discount group over the no-discount group (see Table 10).

Both the transactional card tap data and survey data have limitations that help to contextualize the differing magnitudes of ridership and the impacts of discounts. Transactional data may understate true ridership by missing instances where individuals use another payment method or take unpaid trips. While undercounting may affect all groups, it is more likely for the 0% discount group given the absence of strong incentives to use the assigned ConnectCard after the preloaded \$10 amount is exhausted; the time trend in **Figure 3** supports this hypothesis. Survey data suffer from known accuracy issues as well, including limited and imperfect recall on past behavior, social desirability bias, non-response bias and misinterpretation of questions.

Panel C, which displays estimates of transit use from smartphone GPS data, helps to resolve the differences between survey and administrative data as an alternative measure of travel behavior that does not depend on individual recall or use of an assigned ConnectCard. The GPS data indicate that assignment to the 50% discount increased PRT trips per week by 0.95 (30.5%, not statistically significant) and the 100% discount increased PRT trips per week by 1.91 (61.4%, statistically significant). Relative to the 50% discount group, receiving the 100% discount increased individuals' PRT rides, on average, by 23.4%. Average weekly rides for the 100% group are similar between the GPS data and ConnectCard tap data and much closer than the survey data estimates (5.02 and 5.20 versus 10.45, respectively), bolstering our confidence in the transactional and GPS data for the 100% discount group.

TABLE 3: Impacts on transportation use and travel behavior

OUTCOME	N	CONTROL MEAN	TREATMENT EFFECT		
			50% DISCOUNT	100% DISCOUNT	100% VS. 50%
Panel A. Outcomes from PRT farebox data					
PRT farecard taps per week (N)	9,173	0.339	1.58*** (0.070)	4.86*** (0.101)	3.28*** (0.119)
Panel B. Outcomes from midline survey					
PRT trips last week (N)	3,819	9.87	-0.471 (0.451)	0.581 (0.453)	1.05*** (0.401)
PRT spending last week (\$)	3,366	33.22	-8.92*** (1.44)	-17.61*** (1.49)	-8.69*** (1.16)
Missed work or appt in past 4 wks b/c no transit	3,829	0.595	-0.100*** (0.020)	-0.262*** (0.020)	-0.162*** (0.019)
Panel C. Outcomes from smartphone GPS data					
PRT trips per week (N)	287	3.11	0.95 (0.66)	1.91*** (0.72)	0.95 (0.70)
Private vehicle trips per week (N)	287	13.35	-0.82 (1.97)	-1.73 (1.92)	-0.91 (1.76)
Total trips per week (N)	287	21.66	-0.30 (1.97)	0.01 (1.98)	0.31 (1.78)
Panel D. Outcomes from travel diaries					
Number of places visited yesterday (N)	6,856	3.69	-0.569*** (0.181)	-0.616*** (0.179)	-0.047 (0.157)
Likelihood of taking at least one trip yesterday					
Car trip	6,931	0.346	-0.003 (0.010)	-0.001 (0.010)	0.002 (0.009)
Walk or bike trip	6,912	0.474	-0.037*** (0.011)	-0.060*** (0.011)	-0.023** (0.010)
PRT trip	6,920	0.580	-0.013 (0.011)	0.006 (0.011)	0.020** (0.010)
Likelihood of leaving house yesterday					
For work	6,892	0.407	-0.025** (0.010)	-0.016* (0.010)	0.008 (0.009)
For school	6,892	0.131	-0.013* (0.007)	-0.017** (0.007)	-0.003 (0.006)
For groceries	6,892	0.507	-0.028*** (0.010)	-0.045*** (0.010)	-0.017* (0.009)
For leisure	6,892	0.239	-0.014 (0.009)	-0.016* (0.008)	-0.003 (0.008)
For health care	6,892	0.173	-0.021*** (0.007)	-0.027*** (0.007)	-0.006 (0.007)
For social services	6,892	0.083	-0.013** (0.006)	-0.029*** (0.005)	-0.016*** (0.005)
For other reason	6,892	0.286	-0.021** (0.009)	-0.025*** (0.009)	-0.004 (0.008)
Did not leave house yesterday	6,892	0.134	0.026*** (0.007)	0.024*** (0.007)	-0.002 (0.007)

Notes: Table presents estimates of the effect of being assigned to each treatment status (50% discount or 100% discount) on transportation use and travel behavior for the adult sample. Data in panel A come from PRT fare transaction records. Data in panel B are self-reported and come from the midline survey, which took place six months after the participant enrolled in the study. Data in panel C come from participants' smartphone Google Maps location history, which was collected at various intervals throughout the study. Data in panel D are self-reported and come from the travel diary surveys. These surveys were sent to participants via text message every three days for the first two months of their participation, then once a month for the next 10 months. The midline survey also included a travel diary module. The outcome variables in panel D are the participant's mean response to the diary question across all of their completed diaries. Column N indicates the number of participants across the three study arms that have non-missing data for the given outcome. In panel D, column N indicates the number of participants across the three study arms that gave at least one response to the given diary question. Sample sizes vary across outcomes due to differing survey item response rates. All treatment effect estimates are from a regression of the outcome on indicators for each treatment status, adjusting for the following baseline covariates: Age (years), female (y/n), Black (y/n), more than high school education (y/n), currently employed (y/n), PRT trips taken last week (N) and lives within the PRT 7-day frequent service walkshed (y/n). Outcome data are winsorized at the 99th percentile if they come from a survey question that permitted an unbounded numeric response. Robust standard errors are in parentheses. ***p < 0.01, **p < 0.05, *p < 0.1

Other rows in **Table 3** paint a more detailed picture of the Pilot's effects on travel behavior. The 100% discount reduced self-reported weekly spending on PRT trips by \$17.61 on average, with an \$8.92 decrease for the 50% discount group. Discounted fares also reduced the share of participants (by 10 percentage points (16.8%) and 22.6 percentage points (44.0%) for the half-discount and full-discount groups, respectively) who reported that they had to miss work or an appointment in the past four weeks because they had no way of getting there. Furthermore, fare discounts reduced the likelihood that travel diary respondents reported taking a walking or biking trip yesterday, suggesting substitution across modes of transportation (Panel D).⁷

Taken together, the results in **Table 3** provide strong evidence on the responsiveness on the impact of the fare discounts on travel-related outcomes across ride frequency, spending, and barriers to work, health and social service attendance. While survey data point to a reduction in numbers of places participants reported visiting yesterday and rates of leaving the house, in future work we will confirm these preliminary findings by cross-checking travel diary responses against smartphone GPS data.

⁷ See the **Appendix** for additional impact estimates: **Table 6** presents the impact of free fares versus no discount among the participants who took at least one discounted ride. **Table 10** presents additional estimates of the free-fare versus no-discount impacts on ridership and other self-reported outcomes when using alternative model

specifications. **Tables 7, 8 and 9** further explore the heterogeneity of the impacts by various subgroups (**Tables 7 and 8**) and by whether the participant lives near public transportation (**Table 9**). **Table 11** presents additional estimates of travel diary-based outcomes when using alternative model specifications.

Employment, financial and health outcomes

In this section, we analyze the impact of the Pilot on outcomes related to employment, financial stability and health. As shown in TABLE 4, the intervention had no effect on self-reported rates of employment, weekly work hours or total monthly earnings (Panel A). The effects on select financial outcomes were similarly small and not statistically significant (Panel B). Regarding participants’ health status, the 100% fare discount reduced the share of midline survey respondents who rated their health as good or better by 4.2 percentage points on average, a puzzling result that we will explore in follow-up work for the final analysis of the Pilot.

TABLE 4: Impacts on self-reported employment, financial and health outcomes, six months after enrollment

OUTCOME	N	CONTROL MEAN	TREATMENT EFFECT		100% VS. 50% EFFECTS
			50% DISCOUNT	100% DISCOUNT	
Panel A. Employment outcomes					
Employed	3,601	0.506	-0.007 (0.018)	-0.011 (0.018)	-0.004 (0.017)
Unemployed and seeking work	3,601	0.179	0.039** (0.017)	0.008 (0.017)	-0.031* (0.016)
Hourly wage at main job (\$)	1,621	14.63	-0.070 (0.381)	0.323 (0.395)	0.393 (0.345)
Weekly work hours (N)	1,617	33.93	-0.966 (1.28)	0.009 (1.54)	0.975 (1.52)
Total monthly earnings (\$)	1,526	1503.89	-265.02 (165.47)	-141.78 (184.68)	123.24 (132.35)
Panel B. Financial outcomes					
Cannot afford \$400 expense	3,434	0.567	0.016 (0.022)	-0.014 (0.022)	-0.030 (0.020)
CFPB financial well-being score (0-100)	3,119	40.46	0.074 (0.474)	0.443 (0.487)	0.369 (0.452)
Monthly savings (\$)	3,348	73.26	-5.79 (6.23)	-8.51 (6.48)	-2.73 (5.53)
Panel C. Health outcomes					
Current health good or better	3,838	0.523	-0.030 (0.021)	-0.042** (0.020)	-0.012 (0.019)
Life satisfaction rating (0-10)	3,511	5.60	0.042 (0.128)	0.242** (0.122)	0.200* (0.119)
Feeling anxious last 2 weeks	3,838	0.275	-0.009 (0.018)	-0.015 (0.018)	-0.006 (0.017)

Notes: Table presents estimates of the effect of being assigned to each treatment status (50% discount or 100% discount) on self-reported employment, financial and health outcomes for the adult sample. Data come from the midline survey, which took place six months after the participant enrolled in the study. The hourly wage, weekly work hours and monthly earnings numbers only include the respondents who reported being currently employed or on a temporary leave from work. Estimates are from a regression of the outcome on indicators for each treatment status, adjusting for the following baseline covariates: Age (years), female (y/n), Black (y/n), more than high school education (y/n), currently employed (y/n), PRT trips taken last week (N), and lives within the PRT 7-day frequent service walkshed (y/n). Column N indicates the number of individuals across the three study arms that have non-missing data for the given outcome. Sample sizes vary across outcomes due to differing midline survey item response rates. Outcome data is winsorized at the 99th percentile if it comes from a survey question that permitted an unbounded numeric response. Robust standard errors are in parentheses. ***p <0.01, **p <0.05, *p <0.1

Table 5 presents the impact of the fare discounts on adult participants' use of Medicaid-funded health care.⁸ Overall, discounted fares had limited impacts on health care utilization and showed mixed effects across discount groups and service types with no clear patterns emerging. The discounts had no discernible impact on the likelihood of receiving health care in the first 270 days after enrollment. These results contrast with a discounted fares pilot in King County, Washington that found that free fares reduced Medicaid service utilization.⁹ The health care estimates are affected by the fact that Medicaid enrollees in Allegheny County were already entitled to unlimited free trips to and from medical appointments through the Medical Assistance Transportation Program (MATP). **Appendix Table 13** presents the impact of the fare discounts on the use of MATP services. The 100% discount group took 23% fewer MATP-funded trips per month since joining the Pilot (a 0.096-trip reduction from a baseline of 0.422 trips per month), suggesting that Pilot participants partially substituted one form of discounted transit for another when taking health care-related trips.¹⁰

8 These data come from the universe of Medicaid managed care claims for Allegheny County residents. These claims cover all forms of health care, including health care received outside of Allegheny County or Pennsylvania. We only observed health care utilization for Pilot participants who receive Medicaid. While 97% of adult participants were enrolled in Medicaid at the time they joined the study, Appendix Figure 6 shows that rates of Medicaid enrollment among the Pilot sample decreased in the months after enrollment. This decrease was uniform across the three study groups, meaning that the observed impacts on health care utilization are not biased by differential rates of attrition from Medicaid.

9 Brough et al. (2023) find that free fares relative to half-fares caused a 5.6 percentage-point decrease in the likelihood of having any type of Medicaid claim (physical or behavioral health) in the first three months after random assignment.

10 We further explore the impacts on health care utilization in the **Appendix: Table 12** presents impacts on adherence to certain long-term medications. **Table 14** presents descriptive statistics on the continuous-valued measures of health care usage. **Tables 15 and 16** explore the robustness of the impacts when using alternative model specifications. **Figures 4 and 5** present impacts on quantiles of the distribution of

care usage outcomes. **Table 17** presents impacts on log-transformed continuous care usage outcomes when only looking at the participants who had a non-zero value of the given outcome. **Tables 18, 19, and 20** explore the robustness of the impacts when only looking at, respectively, the participants who received the given type of health care in the 180 days prior to enrollment, the participants who took at least one MATP trip in the 180 days prior to enrollment, and the participants who lived in the PRT seven-day frequent service walkshed at the time of enrollment. **Figures 7 and 8** present the effects of free fares versus no discount on the likelihood of receiving health care by month.

Table 5: Impacts on health care utilization among the adult sample within the first 270 days after enrollment

OUTCOME	N	CONTROL MEAN	TREATMENT EFFECT		100% VS. 50% EFFECTS
			50% DISCOUNT	100% DISCOUNT	
Received any health care	9,544	0.870	0.000 (0.008)	0.003 (0.008)	0.002 (0.008)
Panel A. Physical health care					
Has at least one claim					
- Non-ER outpatient	9,544	0.803	-0.005 (0.010)	-0.001 (0.010)	0.004 (0.010)
- ER outpatient	9,544	0.450	-0.021* (0.012)	-0.009 (0.012)	0.012 (0.012)
- Non-ER inpatient	9,544	0.044	-0.001 (0.005)	0.011** (0.005)	0.012** (0.005)
- ER inpatient	9,544	0.043	-0.005 (0.005)	-0.000 (0.005)	0.005 (0.005)
Prescription fills (N)	9,544	9.31	0.033 (0.287)	-0.033 (0.283)	-0.066 (0.286)
Days covered by a prescription (N)	9,544	117.58	0.263 (1.68)	0.527 (1.69)	0.263 (1.68)
Panel B. Behavioral health care					
Has at least one claim					
- Non-crisis	9,544	0.481	-0.015 (0.012)	-0.010 (0.012)	0.005 (0.012)
- Crisis	9,544	0.233	-0.020* (0.010)	-0.002 (0.011)	0.018* (0.010)
- Substance use treatment	9,544	0.095	0.002 (0.006)	-0.003 (0.006)	-0.005 (0.006)
Prescription fills (N)	9,544	1.84	-0.086 (0.101)	0.002 (0.101)	0.088 (0.099)
Days covered by a prescription (N)	9,544	46.45	0.358 (1.29)	1.66 (1.30)	1.30 (1.32)
Cost of care to managed care org. (\$)	9,544	1190.98	-102.04 (84.59)	-17.10 (86.83)	81.29 (82.53)

Notes: Table presents estimates of the effect of being assigned to each treatment status (50% discount or 100% discount) on health care utilization for the adult sample, as measured in the first 270 days after enrollment. Data come from Medicaid claims. The 'received any health care' outcome in the first row represents the likelihood that the participant received any type of Medicaid-funded health care in the first 270 days post-enrollment. The 'days covered by a prescription' outcome counts the cumulative number of days in the first 270 days post-enrollment for which the participant had a remaining dose from a filled prescription. The 'cost of care to managed care org' outcome measures the cumulative dollar amount of claims that providers have billed to the Allegheny County Medicaid behavioral health managed care organization. All continuous-valued outcome measures in the table are winsorized at the 99th percentile to reduce the influence of high outliers. Estimates are from a regression of the outcome on indicators for each treatment status, adjusting for the following baseline covariates: Age (years), female (y/n), Black (y/n), more than high school education (y/n), currently employed (y/n), PRT trips taken last week (N), lives within the PRT 7-day frequent service watershed (y/n), and the given outcome measured in the 365 days prior to study enrollment. Column N indicates the total number of individuals across the three study arms that have non-missing data for the given outcome. Robust standard errors are in parentheses. ***p < 0.01, **p < 0.05, *p < 0.1

CONCLUSION AND NEXT STEPS

In this interim report, we analyze the preliminary results from the Allegheny County Discounted Fares Pilot program. Taken together, the results provide evidence of the impact of the fare discounts on travel-related outcomes across ride frequency, spending and barriers to accessing work, health and social services. Additionally, the results point to opportunities for further exploration to improve our understanding of Pilot participants' access to services and wellbeing, including their mobility patterns and health care utilization and costs.

We will continue to analyze the longer-term effects of the Pilot as more data are collected from the travel diaries and forthcoming waves of follow-up surveys. We will draw upon administrative data to examine the Pilot's effect on labor market outcomes as data become available. We will also estimate the effect of the Pilot on additional outcomes for the youth participants, such as their Pittsburgh Public School attendance and their use of health care. Additionally, we will explore participants' aggregate spatial mobility patterns using PRT data that report the geolocation of each farecard tap, as well as GPS data collected from the smartphones of a subset of participants. These analyses will be included in a final evaluation report to be published in late 2024.

In addition to the quantitative analysis, DHS staff conducted qualitative interviews with approximately 30 Pilot participants. The interviewees were chosen to reflect a diversity of demographic traits and programmatic experiences. We will extract key themes and sentiments from these interviews and present excerpts from the interviews in the final evaluation report to give a direct voice to the participants. This qualitative component will add context to the quantitative impact estimates, while also providing richer insight into the effects of the Pilot that may not appear in numerical data.

In December 2023, Allegheny County announced a continued commitment to fare discounts based on results from the Pilot. The County is collaborating with PRT on a half-fare program, which will be launched in June 2024 for SNAP beneficiaries. More details will be available at <https://discountedfares.alleghenycounty.us/>. Both parties expressed a shared commitment to exploring options for augmenting the discount, with the ultimate goal of providing cost-free PRT trips for individuals with limited financial means. We will continue to use the findings from the Pilot to inform the design of these permanent discount offerings.

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REFERENCES**REFERENCES**

Brough, R., Freedman, M., & Phillips, D. C. (2023). *Eliminating fares to expand opportunities: Experimental evidence on the impacts of free public transportation on economic and social disparities* (Working paper).

Coffman, L., Conlon, J., Featherstone, C., & Kessler, J. (2019). Liquidity affects job choice: Evidence from Teach for America. *The Quarterly Journal of Economics*, 134 (4), 2203– 2236.

Dutz, D., Huitfeldt, I., Lacouture, S., Mogstad, M., Torgovitsky, A., & van Dijk, W. (2022). *Selection in surveys: Using randomized incentives to detect and account for nonresponse bias* (tech. rep.). National Bureau of Economic Research, Working paper 29549.

Ihlanfeldt, K. R., & Sjoquist, D. L. (1998). The spatial mismatch hypothesis: A review of recent studies and their implications for welfare reform. *Housing Policy Debate*, 9 (4), 849– 892.

Kain, J. F. (1992). The spatial mismatch hypothesis: Three decades later. *Housing Policy Debate*, 3 (2), 371–392.

Rosenblum, J. L. (2020). *Expanding access to the city: How public transit fare policy shapes travel decision making and behavior of low-income riders* (Doctoral dissertation). Massachusetts Institute of Technology.

APPENDIX

APPENDIX

Additional exploratory impact estimates

TABLE 6: Impact of 100% discount versus 0% discount, self-reported outcomes, 6 months post-enrollment, only participants who tapped their assigned ConnectCard at least once

OUTCOME	N	CONTROL MEAN	EFFECT	FIRST-STAGE F STAT	FIRST-STAGE R-SQUARED
Panel A. Transportation use					
PRT trips last week (N)	2,444	10.01	0.595 (0.468)	15,432.03	0.865
PRT spending last week (\$)	2,150	33.87	-18.72*** (1.52)	15,728.16	0.881
Could not get to work or appointment	2,451	0.602	-0.277*** (0.021)	15,528.27	0.865
Took PRT trip yesterday	4,070	0.586	0.012 (0.012)	22,757.31	0.849
Panel B. Employment outcomes					
Employed	2,295	0.518	-0.008 (0.019)	15,845.22	0.875
Unemployed and seeking work	2,295	0.182	0.004 (0.017)	15,845.22	0.875
Hourly wage at main job (\$)	1,054	14.66	-0.137 (0.329)	7,898.79	0.884
Weekly work hours (N)	1,048	34.05	-0.432 (1.08)	7,752.90	0.883
Total monthly earnings (\$)	985	1,526.60	-120.55 (154.04)	7,585.50	0.887
Panel C. Financial outcomes					
Cannot afford \$400 expense	2,184	0.567	-0.009 (0.023)	14,986.16	0.874
CFPB financial well-being score (0-100)	1,981	40.34	0.719 (0.502)	14,611.17	0.882
Monthly savings (\$)	2,131	71.98	-8.66 (6.44)	14,464.46	0.873
Panel D. Health outcomes					
Current health good or better	2,458	0.531	-0.057*** (0.021)	15,613.63	0.865
Life satisfaction rating (0-10)	2,240	5.59	0.257** (0.126)	15,790.36	0.877
Feeling anxious last 2 weeks	2,458	0.273	-0.022 (0.019)	15,613.63	0.865

Notes: Table reports the effect of the 100% discount versus no discount on various self-reported outcomes for the adult sample when only looking at the participants who tapped their assigned ConnectCard at least one time. (Some participants never tapped their card in the Pilot.) This way of looking at treatment effects is known as the “local average treatment effect”. All outcomes except for ‘took PRT trip yesterday’ came from the midline survey, which took place six months after the participant enrolled in the study. The ‘took PRT trip yesterday’ outcome comes from the travel diary data. Outcome data is winsorized at the 99th percentile if it comes from a survey question that permitted an unbounded numeric response. Estimates are from a two-stage least squares regression that adjusts for the following baseline covariates: Age (years), female (y/n), Black (y/n), more than high school education (y/n), currently employed (y/n), PRT trips taken last week (N) and lives within the PRT 7-day frequent service walkshed (y/n). Compliers in the 100% discount group are defined as the participants who used a 100% discount ConnectCard for at least one boarding. Robust standard errors are in parentheses. N indicates the number of participants across the 100% discount and no-discount arms that have non-missing data for the given outcome. Sample sizes vary across outcomes due to differing midline survey item response rates. The N’s and control means in this table differ from those in Table 3 (for the travel outcomes) and from those in Table 4 (for the employment, financial, and health outcomes) because those tables include the 357 study participants who were not assigned a ConnectCard, whereas this table does not include them. ***p <0.01, **p <0.05, *p <0.1

APPENDIX

TABLE 7: Heterogeneity in impact of 100% discount versus no discount, by baseline subgroups (Part 1)

	CHILDREN ENROLLED		RACE			SEX	
	NO	YES	NON-WHITE	WHITE	MALE	FEMALE	
Panel A. PRT trips last week (N)							
Control mean	9.79	10.04	10.43	9.02	9.57	9.96	
Treatment effect	0.568	-1.08	0.650	0.352	1.49	0.286	
SE	(0.557)	(1.02)	(0.558)	(0.781)	(0.983)	(0.516)	
P-value of diff.	[0.979]		[0.999]			[0.295]	
Panel B. Currently employed							
Control mean	0.468	0.588	0.542	0.454	0.464	0.519	
Treatment effect	0.007	-0.033	-0.025	0.023	-0.020	-0.008	
SE	(0.021)	(0.044)	(0.023)	(0.028)	(0.037)	(0.020)	
P-value of diff.	[0.229]		[0.272]			[0.950]	
Panel C. Total monthly earnings (\$)							
Control mean	1242.32	1939.84	1446.52	1601.31	1521.82	1499.04	
Treatment effect	220.77	-1102.46**	-246.70	68.16	386.69 2,101	-275.78	
SE	(184.60)	(518.21)	(237.75)	(282.00)	(409.50)	(220.87)	
P-value of diff.	[0.019]		[0.318]			[0.240]	
Panel D. Monthly savings (\$)							
Control mean	78.16	62.90	80.66	62.64	108.76	62.59	
Treatment effect	-8.08	13.03	-6.61	-11.00	-26.39	-4.79	
SE	(7.52)	(19.54)	(8.67)	(9.61)	(19.18)	(5.79)	
P-value of diff.	[0.674]		[0.841]			[0.310]	
Panel E. Life satisfaction rating (0-10)							
Control mean	5.50	5.80	5.88	5.19	5.27	5.69	
Treatment effect	0.225	0.208	0.118	0.368*	0.453*	0.169	
SE	(0.150)	(0.324)	(0.159)	(0.198)	(0.251)	(0.142)	
P-value of diff.	[0.635]		[0.159]			[0.400]	
N – Control	2,252	901	2,062	1,091	892	2,261	
N – Treatment	2,206	950	2,101	1,055	881	2,275	

Notes: This table reports the variation in treatment effects on selected outcomes across certain sample subgroups defined by baseline characteristics. All outcomes are self-reported and come from the midline survey, which took place six months after the participant enrolled in the study. Outcome data is winsorized at the 99th percentile if it comes from a survey question that permitted an unbounded numeric response. The 'children enrolled' subgroup indicates whether the adult participant also had one or more children enrolled who were also enrolled in the study. The coefficient reported in row 'Treatment effect' comes from a regression of the outcome of interest on a treatment indicator. Robust standard errors are in parentheses. The p-value of the difference between columns 1 and 2, 3 and 4, and 5 and 6 are calculated by regressing the outcome variable on a treatment variable, an indicator for being in the even numbered column, and the interaction of these two variables. The p-value of the interaction term is reported in row 'P-value of diff.'. All regressions also adjust for the following baseline covariates: Age (years), female (y/n), Black (y/n), more than high school education (y/n), currently employed (y/n), PRT trips taken last week (N), and lives within the PRT 7-day frequent service walkshed (y/n). ***p <0.01, **p <0.05, *p <0.1

APPENDIX

TABLE 8: Heterogeneity in impact of 100% discount versus no discount, by baseline subgroups (Part 2)

	EMPLOYED AT BASELINE		OWNS VEHICLE		ABOVE 75P EARNINGS	
	NO	YES	NO	YES	NO	YES
Panel A. PRT trips last week (N)						
Control mean	8.78	11.15	10.37	3.99	9.33	11.34
Treatment effect	1.23**	-0.163	0.534	-1.39	0.705	1.34
SE	(0.592)	(0.738)	(0.465)	(2.54)	(0.537)	(1.07)
P-value of diff.		[0.164]		[0.277]		[0.963]
Panel B. Currently employed						
Control mean	0.255	0.795	0.506	0.506	0.414	0.737
Treatment effect	-0.023	0.020	-0.012	0.041	-0.019	0.005
SE	(0.025)	(0.026)	(0.018)	(0.117)	(0.022)	(0.050)
P-value of diff.		[0.255]		[0.833]		[0.696]
Panel C. Total monthly earnings (\$)						
Control mean	1593.12	1471.66	1472.68	1891.24	1234.54	1771.00
Treatment effect	-213.25	-0.598	-220.73	3682.04**	-104.56	-231.71
SE	(310.11)	(134.91)	(189.06)	(1802.53)	(212.97)	(326.84)
P-value of diff.		[0.469]		[0.071]		[0.286]
Panel D. Monthly savings (\$)						
Control mean	57.78	91.87	75.08	52.11	67.95	90.97
Treatment effect	-3.63	-7.36	-10.62	11.68	-12.50	7.84
SE	(8.07)	(10.00)	(6.54)	(51.22)	(7.93)	(18.69)
P-value of diff.		[0.584]		[0.251]		[0.672]
Panel E. Life satisfaction rating (0-10)						
Control mean	5.47	5.75	5.61	5.51	5.53	5.73
Treatment effect	0.174	0.361**	0.223*	1.28	0.203	0.745**
SE	(0.168)	(0.183)	(0.126)	(0.814)	(0.148)	(0.299)
P-value of diff.		[0.438]		[0.537]		[0.299]
N – Control	1,790	1,363	2,975	178	2,266	780
N – Treatment	1,816	1,340	2,974	182	2,281	767

Notes: This table reports the variation in treatment effects on selected outcomes across certain adult sample subgroups defined by baseline characteristics. All outcomes are self-reported and come from the midline survey, which took place six months after the participant enrolled in the study. Outcome data is winsorized at the 99th percentile if it comes from a survey question that permitted an unbounded numeric response. The 'above 75p earnings' subgroup indicates whether the participant had earnings that were above the 75th percentile in the third quarter prior to their quarter of enrollment, according to Pennsylvania unemployment insurance records. The coefficient reported in row 'Treatment effect' comes from a regression of the outcome of interest on a treatment indicator. Robust standard errors are in parentheses. The p-value of the difference between columns 1 and 2, 3 and 4, and 5 and 6 are calculated by regressing the outcome variable on a treatment variable, an indicator for being in the even numbered column, and the interaction of these two variables. The p-value of the interaction term is reported in row 'P-value of diff.' All regressions also adjust for the following baseline covariates: Age (years), female (y/n), Black (y/n), more than high school education (y/n), currently employed (y/n), PRT trips taken last week (N), and lives within the PRT 7-day frequent service walkshed (y/n). ***p < 0.01, **p < 0.05, *p < 0.1

APPENDIX

TABLE 9: Heterogeneity in impact of 100% discount versus no discount on transportation use and travel behavior, by whether the person lived within the Pittsburgh Regional Transit (PRT) walkshed at baseline

	5-DAY WALKSHED		6-DAY WALKSHED		7-DAY WALKSHED		7-DAY FREQ SVC WALKSHED	
	NO	YES	NO	YES	NO	YES	NO	YES
Panel A. PRT farecard taps per week (N; from farebox data)								
N	738	5,571	863	5,446	943	5,366	4,050	2,259
Control mean	0.244	0.434	0.274	0.434	0.282	0.435	0.368	0.494
Treatment effect	3.73***	5.16***	3.55***	5.21***	3.65***	5.22***	4.65***	5.54***
SE	(0.276)	(0.115)	(0.251)	(0.117)	(0.253)	(0.118)	(0.131)	(0.186)
P-value of diff.		[0.000]		[0.000]		[0.000]		[0.000]
Panel B. PRT trips last week (N; from midline survey data)								
N	738	5,571	863	5,446	943	5,366	4,050	2,259
Control mean	6.79	10.23	6.62	10.36	7.32	10.31	9.61	10.34
Treatment effect	2.48**	0.430	2.07*	0.449	1.61	0.474	0.550	0.430
SE	(1.17)	(0.484)	(1.09)	(0.491)	(1.13)	(0.494)	(0.583)	(0.775)
P-value of diff.		[0.186]		[0.292]		[0.608]		[0.655]
Panel C. PRT spending last week (\$; from midline survey data)								
N	738	5,571	863	5,446	943	5,366	4,050	2,259
Control mean	30.73	33.47	30.79	33.53	31.23	33.52	34.05	31.81
Treatment effect	-12.75***	-18.05***	-14.82***	-17.89***	-14.32***	-17.94***	-18.41***	-17.77***
SE	(4.40)	(1.58)	(4.66)	(1.59)	(4.21)	(1.61)	(1.98)	(2.43)
P-value of diff.		[0.440]		[0.563]		[0.623]		[0.890]
Panel D. Took a PRT trip yesterday (from travel diary data)								
N	738	5,571	863	5,446	943	5,366	4,050	2,259
Control mean	0.445	0.600	0.437	0.605	0.451	0.606	0.570	0.609
Treatment effect	0.028	0.009	0.024	0.009	0.013	0.009	0.002	0.021
SE	(0.037)	(0.012)	(0.035)	(0.012)	(0.033)	(0.012)	(0.014)	(0.018)
P-value of diff.		[0.329]		[0.387]		[0.523]		[0.434]
Panel E. Number of places visited yesterday (N; from travel diary data)								
N	738	5,571	863	5,446	943	5,366	4,050	2,259
Control mean	3.54	3.84	3.47	3.86	3.47	3.86	3.67	4.07
Treatment effect	-1.15**	-0.828***	-1.24***	-0.821***	-1.23***	-0.816***	-0.777***	-1.02***
SE	(0.485)	(0.198)	(0.464)	(0.201)	(0.418)	(0.204)	(0.210)	(0.358)
P-value of diff.		[0.779]		[0.729]		[0.640]		[0.551]

Notes: Table presents treatment effects on transportation use and travel behavior among adult participants, disaggregated by whether the participant lived in the Pittsburgh Regional Transit (PRT) “walkshed” when they enrolled in the study. PRT defines a walkshed as the 1/4 mile area around a transit stop or the 1/2 mile area around a transit station. The 5-day walkshed includes the stops and stations that have service 5 days a week (i.e. the minimum level of PRT service). The 6-day and 7-day walksheds include only the stops and stations that have service 6 days a week or 7 days a week, respectively. The 7-day frequent service walkshed includes only the stops and stations where transit vehicles come, on average, every 15 minutes for 15 hours of the day and every 30 minutes for an additional 5 hours of the day, every day of the week. Row N reports the total number of participants across the 100% and 0% subsidy groups that lives inside versus outside each walkshed. The coefficient reported in row ‘Treatment effect’ comes from a regression of the outcome on a treatment indicator, adjusting for the following baseline covariates: Age (years), female (y/n), Black (y/n), more than high school education (y/n), currently employed (y/n), PRT trips taken last week (N), and lives within the PRT 7-day frequent service walkshed (y/n). Robust standard errors are in parentheses. The p-value of the difference between subgroup effects is calculated by regressing the outcome on a treatment indicator, an indicator for living in the given PRT walkshed at time of enrollment, and the interaction of these two variables. The p-value of the interaction term is reported in row ‘P-value of diff.’ Outcome data is winsorized at the 99th percentile if it comes from a survey question that permitted an unbounded numeric response. ***p <0.01, **p <0.05, *p <0.1

APPENDIX

TABLE 10: Robustness of impact of 100% discount versus 0% discount on self-reported outcomes from midline survey

OUTCOME	N	MIN/MAX RESPONSE VALUES (RAW)	CONTROL MEAN (RAW)	CONTROL MEDIAN (RAW)	(1)	(2)	(3)	(4)	(5)	(6)
Panel A. Transportation use										
PRT trips last week (N)	2,516	[0; 1,000]	11.52	6.0	-0.869 (1.45)	0.581 (0.453)	-1.43 (1.39)	0.676 (0.487)	2.00*** (0.567)	1.62*** (0.378)
PRT spending last week (\$)	2,216	[0; 10,000]	50.32	25.0	-30.76* (16.41)	-17.61*** (1.49)	-37.06** (14.90)	-17.29*** (1.65)	-25.00*** (0.000)	-24.45*** (0.246)
Missed work or appt in past 4 wks b/c no transit	2,523	[0; 1]	0.595	1.0	-0.262*** (0.020)	-0.262*** (0.020)	-0.266*** (0.023)	-0.266*** (0.022)	N/A	N/A
Panel B. Employment outcomes										
Employed	2,365	[0; 1]	0.506	1.0	-0.01 (0.018)	-0.01 (0.018)	-0.018 (0.020)	-0.018 (0.020)	N/A	N/A
Unemployed and seeking work	2,365	[0; 1]	0.179	0.0	0.008 (0.017)	0.008 (0.017)	0.015 (0.019)	0.015 (0.019)	N/A	N/A
Hourly wage at main job (\$)	1,076	[0; 698]	16.30	14.5	2.55 (2.12)	0.323 (0.395)	0.704 (4.17)	0.044 (0.641)	0.500 (0.514)	0.434 (0.400)
Weekly work hours (N)	1,066	[0; 168]	33.93	35.0	0.009 (1.54)	0.009 (1.54)	-0.898 (2.26)	-1.98 (1.83)	-0.000 (0.961)	0.332 (1.07)
Total monthly earnings (\$)	1,002	[0; 160,000]	1674.06	1,000.0	49.24 (400.07)	-141.78 (184.68)	301.28 (985.97)	-96.70 (296.09)	-49.37 (62.25)	-24.00 (63.57)
Panel C. Financial outcomes										
Cannot afford \$400 expense	2,248	[0; 1]	0.567	1.0	-0.014 (0.022)	-0.014 (0.022)	-0.019 (0.026)	-0.019 (0.026)	N/A	N/A
Monthly savings (\$)	2,196	[-700; 47,000]	125.45	10.0	-22.81 (48.22)	-8.51 (6.48)	-9.37 (67.47)	-10.79 (7.40)	-5.00 (4.53)	-4.74 (5.25)
Panel D. Health outcomes										
Current health good or better	2,530	[0; 1]	0.523	1.0	-0.042** (0.020)	-0.042** (0.020)	-0.030 (0.023)	-0.030 (0.023)	N/A	N/A
Life satisfaction rating (0-10)	2,307	[0; 10]	5.60	6.0	0.242** (0.122)	0.242** (0.122)	0.275* (0.145)	0.275* (0.142)	-0.000 (0.123)	0.138 (0.212)
Feeling anxious last 2 weeks	2,530	[0; 1]	0.275	0.0	-0.015 (0.018)	-0.015 (0.018)	-0.005 (0.021)	-0.005 (0.021)	N/A	N/A
Impact on mean outcome					X	X	X	X		
Impact on median outcome									X	X
Survey non-response weights (IPW)							X	X		X
Controls for baseline covariates					X	X	X	X		X
Data winsorized at 99th pctile						X		X		

Notes: Table explores the robustness of the effect of being assigned to the 100% discount versus the 0% discount among the adult sample. All outcomes come from the midline survey, which took place six months after the participant enrolled in the study. The inverse probability weights for survey non-response are generated using a logit model that includes the following baseline characteristics: Age (years), female (y/n), Black (y/n), more than high school education (y/n), currently employed (y/n), PRT trips taken last week (N), and lives within the PRT 7-day frequent service walkshed (y/n). This same set of covariates is used in the models that include baseline controls. Impacts on the median are not estimated for binary outcomes. Column 'N' indicates the number of participants across the 100% discount and no-discount study arms that have non-missing data for the given outcome. The 'min/max response values (raw)' column reports the minimum and maximum value of the given survey item in the data across the 0% and 100% discount groups, prior to any winsorization. The control group means and medians are also measured prior to any winsorization. Sample sizes vary across outcomes due to differing midline survey item response rates. Robust standard errors are in parentheses. ***p < 0.01, **p < 0.05, *p < 0.1

APPENDIX

TABLE 11: Robustness of impact of 100% discount relative to 0% discount on self-reported outcomes from travel diaries

OUTCOME	N	CONTROL MEAN	(1)	(2)	(3)	(4)	(5)	(6)
Number of places visited yesterday (N)	4,522	3.69	-0.616*** (0.179)	-0.381** (0.172)	-0.560*** (0.149)	-0.556*** (0.148)	-0.619*** (0.181)	-0.559*** (0.160)
Likelihood of taking at least one trip yesterday								
Car trip	4,567	0.346	-0.001 (0.010)	-0.029** (0.013)	-0.029*** (0.011)	-0.031*** (0.011)	-0.002 (0.009)	-0.031*** (0.004)
Walk or bike trip	4,556	0.474	-0.060*** (0.011)	-0.047*** (0.015)	-0.045*** (0.013)	-0.045*** (0.013)	-0.061*** (0.011)	-0.046** (0.021)
PRT trip	4,559	0.580	0.006 (0.011)	0.006 (0.015)	0.024** (0.012)	0.025** (0.012)	0.007 (0.011)	0.026* (0.013)
Likelihood of leaving house yesterday								
For work	4,542	0.407	-0.016* (0.010)	-0.011 (0.014)	-0.025** (0.011)	-0.026** (0.011)	-0.017* (0.010)	-0.026*** (0.006)
For school	4,542	0.131	-0.017** (0.007)	-0.022** (0.010)	-0.012* (0.007)	-0.012* (0.007)	-0.017** (0.007)	-0.013** (0.005)
For groceries	4,542	0.507	-0.045*** (0.010)	-0.058*** (0.015)	-0.029*** (0.011)	-0.029*** (0.011)	-0.044*** (0.010)	-0.029*** (0.010)
For leisure	4,542	0.239	-0.016* (0.008)	-0.021 (0.013)	-0.023** (0.010)	-0.024** (0.010)	-0.016* (0.008)	-0.025 (0.016)
For health care	4,542	0.173	-0.027*** (0.007)	-0.020 (0.012)	-0.010 (0.007)	-0.011 (0.007)	-0.027*** (0.008)	-0.011 (0.011)
For social services	4,542	0.083	-0.029*** (0.005)	-0.033*** (0.009)	-0.019*** (0.005)	-0.019*** (0.005)	-0.029*** (0.005)	-0.019*** (0.007)
For other reason	4,542	0.286	-0.025*** (0.009)	-0.013 (0.008)	-0.013 (0.010)	-0.011 (0.010)	-0.024*** (0.009)	-0.011 (0.013)
Did not leave house yesterday	4,542	0.134	0.024*** (0.007)	0.033*** (0.010)	0.022*** (0.007)	0.023*** (0.007)	0.024*** (0.007)	0.023*** (0.005)
Pooled mean outcome across all diaries			X	X			X	
Panel data					X	X		X
Day, month, and year fixed effects						X		X
Only diaries from follow-up surveys				X				
Non-response weights							X	X

Notes: Table explores the robustness of the effect of being assigned to the 100% discount relative to the 0% discount on outcomes collected from travel diaries, among the adult sample. Travel diaries were sent to participants via text message at various intervals throughout the study. Each follow-up survey also included a module with the travel diary questions. Column (2) only uses the travel diary data collected from follow-up surveys (not from the text message surveys). Columns (1), (2), and (5) use a pooled OLS regression in which the outcome is the average of all the participant's responses to the given diary question. Columns (3), (4), and (6) use a panel regression with one observation per diary response per person. Columns (4) and (6) include fixed effects for the weekday, month, and year of the person's travel diary response. The survey non-response weights in columns (5) and (6) are generated using a logic model that includes the following baseline characteristics: Age (years), female (y/n), Black (y/n), more than high school education (y/n), currently employed (y/n), PRT trips taken last week (N), and lives within the PRT 7-day frequent service walkshed (y/n). These same covariates are included in all treatment effect-estimating regressions in columns (1) through (6). Column 'N' indicates the number of participants across the 100% discount and no-discount study arms that answered the given travel diary question at least one time. Robust standard errors are in parentheses. ***p < 0.01, **p < 0.05, *p < 0.1

APPENDIX

Additional health care-related analyses

TABLE 12: Impacts of 100% discount versus no discount on adherence to long-term prescription medications

DAYS WITHOUT PRESCRIPTION COVERAGE IN FIRST 120 DAYS AFTER STUDY ENROLLMENT (N)	N	CONTROL MEAN	TREATMENT EFFECT		100% VS. 50% EFFECTS
			50% DISCOUNT	100% DISCOUNT	
Opioid use disorder medication	521	22.20	5.45 (8.98)	6.20 (8.77)	0.755 (7.97)
Antipsychotic medication	174	21.69	-5.68 (8.81)	-3.31 (9.35)	2.37 (8.23)

Notes: Table presents the effect of being assigned to the 100% discount versus the 0% discount on adult participants' adherence to opioid treatment medications and antipsychotic medications. These types of medications are meant to be taken continuously for a relatively long period of time. The opioid treatment data comes from the Pennsylvania Prescription Drug Monitoring Program, which covers the universe of filled prescriptions for schedule I- and schedule II-controlled substances in Pennsylvania. The opioid treatment medications include naltrexone, buprenorphine and methadone. The antipsychotic medication data comes from Medicaid claims and includes a variety of drugs, most commonly aripiprazole, risperidone, and olanzapine. The sample in this table is limited to the adult study participants who had an active prescription for the given type of medication within 30 days prior to enrolling in the study. Column N indicates the total number of participants across the three study arms that meet this baseline criterion. The outcome is defined as the number of days in the first 120 days after the participant enrolled in the study in which they were not covered by a filled prescription for the given medication. Estimates are from a regression of the outcome on indicators for each treatment status, adjusting for the following baseline covariates: Age (years), female (y/n), Black (y/n), more than high school education (y/n), currently employed (y/n), PRT trips taken last week (N), and lives within the PRT 7-day frequent service walkshed (y/n). Robust standard errors are in parentheses. ***p < 0.01, **p < 0.05, *p < 0.1

TABLE 13: Impacts on number of Medical Assistance Transportation Program (MATP) trips taken per month

MATP TRIPS PER MONTH	N	CONTROL MEAN	TREATMENT EFFECT		100% VS. 50% EFFECTS
			50% DISCOUNT	100% DISCOUNT	
All modes	9,544	0.422	-0.035 (0.041)	-0.096** (0.039)	-0.061* (0.035)
Public transit	9,544	0.243	-0.008 (0.029)	-0.082*** (0.024)	-0.074*** (0.023)
Drive self	9,544	0.034	-0.090 (0.113)	-0.034 (0.103)	0.056 (0.076)
Ridehailing	9,544	0.004	0.054 (0.177)	-0.283*** (0.093)	-0.337** (0.153)
ACCESS paratransit	9,544	0.142	0.075 (0.102)	0.058 (0.092)	-0.018 (0.090)

Notes: Table presents estimates of the effect of being assigned to each treatment status (50% discount or 100% discount) on the adult sample's use of the Pennsylvania Medical Assistance Transportation Program (MATP). This program provides unlimited free trips to and from medical appointments for individuals with Medicaid health insurance. A single MATP trip is defined as a one-way trip, either from home to the doctor or vice versa. The mode of the trip depends on MATP policies related to the mobility needs of the rider and the feasibility of taking public transit to the appointment. Data comes from MATP administrative records that are complete going back to January 1, 2015. Estimates are from a regression of the outcome on indicators for each treatment status, adjusting for the following baseline covariates: Age (years), female (y/n), Black (y/n), more than high school education (y/n), currently employed (y/n), PRT trips taken last week (N), lives within the PRT 7-day frequent service walkshed (y/n), and the total number of MATP trips of the given mode that the participant took prior to their study enrollment (N). Column N indicates the number of individuals across the three study arms that have non-missing data for the given outcome. Robust standard errors are in parentheses. ***p < 0.01, **p < 0.05, *p < 0.1

APPENDIX

TABLE 14: Distribution of continuous measures of health care utilization, first 270 days after enrollment

OUTCOME	MIN	25TH PCTILE	MEDIAN	MEAN	75TH PCTILE	99TH PCTILE	99.9TH PCTILE	MAX
Number of days with any type of claim (N)	0	3	11	25.28	29	232	269	269
Panel A. Physical health care								
Days with at least one claim (N)								
- Non-ER outpatient	0	1	4	10.25	9	193	269	269
- ER outpatient	0	0	0	1.18	1	10	26	51
- Non-ER inpatient	0	0	0	0.239	0	5	23	89
- ER inpatient	0	0	0	0.335	0	10	30	56
Prescription fills (N)	0	1	4	9.40	13	60	92	127
Days covered by a prescription (N)	0	3	90	118.13	249	270	270	270
Panel B. Behavioral health care								
Days with at least one claim (N)								
- Non-crisis	0	0	0	7.02	4	114	269	269
- Crisis	0	0	0	0.773	0	13	36	105
- Substance use treatment	0	0	0	2.65	0	76	161	200
Prescription fills (N)	0	0	0	1.96	1	22	33	51
Days covered by a prescription (N)	0	0	0	47.69	39	270	270	270
Cost of care to managed care org. (\$)	0	0	0	1499.04	219	26,651	66,300	209,872

Notes: Table presents the distribution of continuous-valued health care utilization outcomes for the adult sample across all three study arms, as measured in the first 270 days after enrollment. Data comes from Medicaid claims. The 'days with at least one claim (N)' outcome counts the cumulative number of days in which the participant had at least one claim in the first 270 days post-enrollment. The 'days covered by a prescription (N)' outcome counts the cumulative number of days in the first 270 days post-enrollment in which the participant had a remaining dose from a filled prescription. The 'cost of care to managed care org (\$)' outcome measures the cumulative dollar amount of claims that providers have billed to the Allegheny County Medicaid behavioral health managed care organization.

APPENDIX

TABLE 15: Robustness of impact of 50% discount relative to no discount on health care utilization, first 270 days after enrollment

OUTCOME	N	MIN/MAX OUTCOME VALUES (RAW)	CONTROL MEAN (RAW)	CONTROL MEDIAN (RAW)	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A. Physical health care											
Days with at least one claim (N)											
- Non-ER outpatient	6,390	[0; 269]	10.20	4	-0.064 (0.700)	-0.057 (0.348)	0.001 (0.605)	0.008 (0.329)	-0.057 (0.348)	-0.426** (0.190)	-0.151 (0.172)
- ER outpatient	6,390	[0; 51]	1.21	0	-0.040 (0.061)	-0.048 (0.048)	-0.045 (0.046)	-0.050 (0.039)	-0.044 (0.045)	-0.066** (0.032)	0.000 (0.000)
- Non-ER inpatient	6,390	[0; 55]	0.200	0	-0.004 (0.038)	-0.009 (0.037)	-0.003 (0.018)	-0.005 (0.018)	-0.023 (0.030)	0.002 (0.011)	0.000 (0.000)
- ER inpatient	6,390	[0; 53]	0.322	0	0.028 (0.057)	0.012 (0.051)	-0.017 (0.030)	-0.021 (0.029)	0.005 (0.048)	0.008 (0.019)	0.000 (0.000)
Prescription fills (N)	6,390	[0; 127]	9.41	4	0.026 (0.317)	-0.030 (0.306)	0.085 (0.297)	0.033 (0.287)	-0.003 (0.303)	-0.172 (0.216)	-0.088 (0.267)
Days covered by a prescription (N)	6,390	[0; 270]	117.36	86	0.187 (2.69)	0.263 (1.68)	0.187 (2.69)	0.263 (1.68)	0.263 (1.68)	-0.077 (1.35)	2.54 (7.02)
Panel B. Behavioral health care											
Days with at least one claim (N)											
- Non-crisis	6,390	[0; 269]	7.63	1	-1.06* (0.560)	-0.091 (0.318)	-0.939** (0.420)	-0.256 (0.262)	-0.091 (0.318)	-0.129 (0.159)	-0.018 (0.038)
- Crisis	6,390	[0; 105]	0.756	0	-0.028 (0.070)	-0.041 (0.059)	-0.052 (0.043)	-0.058 (0.039)	-0.064 (0.053)	0.010 (0.029)	0.000 (0.000)
- Substance use treatment	6,390	[0; 200]	2.93	0	-0.210 (0.366)	-0.333 (0.281)	-0.101 (0.272)	-0.193 (0.210)	-0.317 (0.279)	-0.245* (0.129)	0.000 (0.000)
Prescription fills (N)	6,390	[0; 51]	1.98	0	-0.083 (0.110)	-0.106 (0.107)	-0.064 (0.104)	-0.086 (0.101)	-0.100 (0.106)	-0.086 (0.063)	0.000 (0.000)
Days covered by a prescription (N)	6,390	[0; 270]	47.51	0	-0.901 (2.15)	0.358 (1.29)	-0.901 (2.15)	0.358 (1.29)	0.358 (1.29)	-0.522 (0.779)	0.000 (0.000)
Cost of care to managed care org. (\$)	6,390	[0; 209,872]	1,672.50	0	-293.88* (151.89)	-102.99 (120.75)	-216.53** (101.74)	-102.04 (84.59)	-153.49 (106.72)	-76.09 (52.20)	0.000 (0.000)
Impact on mean outcome					X	X	X	X	X	X	
Impact on median outcome											X
Controls for baseline care utilization						X		X	X	X	
Data winsorized at 99th percentile							X	X			
Data winsorized at 99.9th percentile									X		
Rule-of-thumb outlier removal										X	

Notes: Table explores the robustness of the effect of being assigned to the 50% discount relative to no discount on health care utilization for the adult sample, as measured in the first 270 days after enrollment. Data comes from Medicaid claims. The 'days with at least one claim' outcome counts the cumulative number of days in which the participant had at least one claim in the first 270 days post-enrollment. The 'days covered by a prescription' outcome counts the cumulative number of days in the first 270 days post-enrollment for which the participant had a remaining dose from a filled prescription. The 'cost of care to managed care org' outcome measures the cumulative dollar amount of claims that providers have billed to the Allegheny County Medicaid behavioral health managed care organization. All specifications adjust for the following baseline covariates: Age (years), female (y/n), Black (y/n), more than high school education (y/n), currently employed (y/n), PRT trips taken last week (N), and lives within the PRT 7-day frequent service walkshed (y/n). Columns (2) and (4) also adjust for the given outcome as measured in the 365 days prior to study enrollment. Column (4) corresponds to the estimates presented in Table 5 in the main text. Column (6) drops observations that exceed rule-of-thumb thresholds for certain regression statistics (further description available upon request). Column 'N' indicates the number of participants across the 50% discount and no-discount study arms that have non-missing data for the given outcome. The 'min/max response values (raw)' column reports the minimum and maximum value of the given outcome across the 0% and 50% discount groups, prior to any winsorization. The control group means and medians are also

APPENDIX

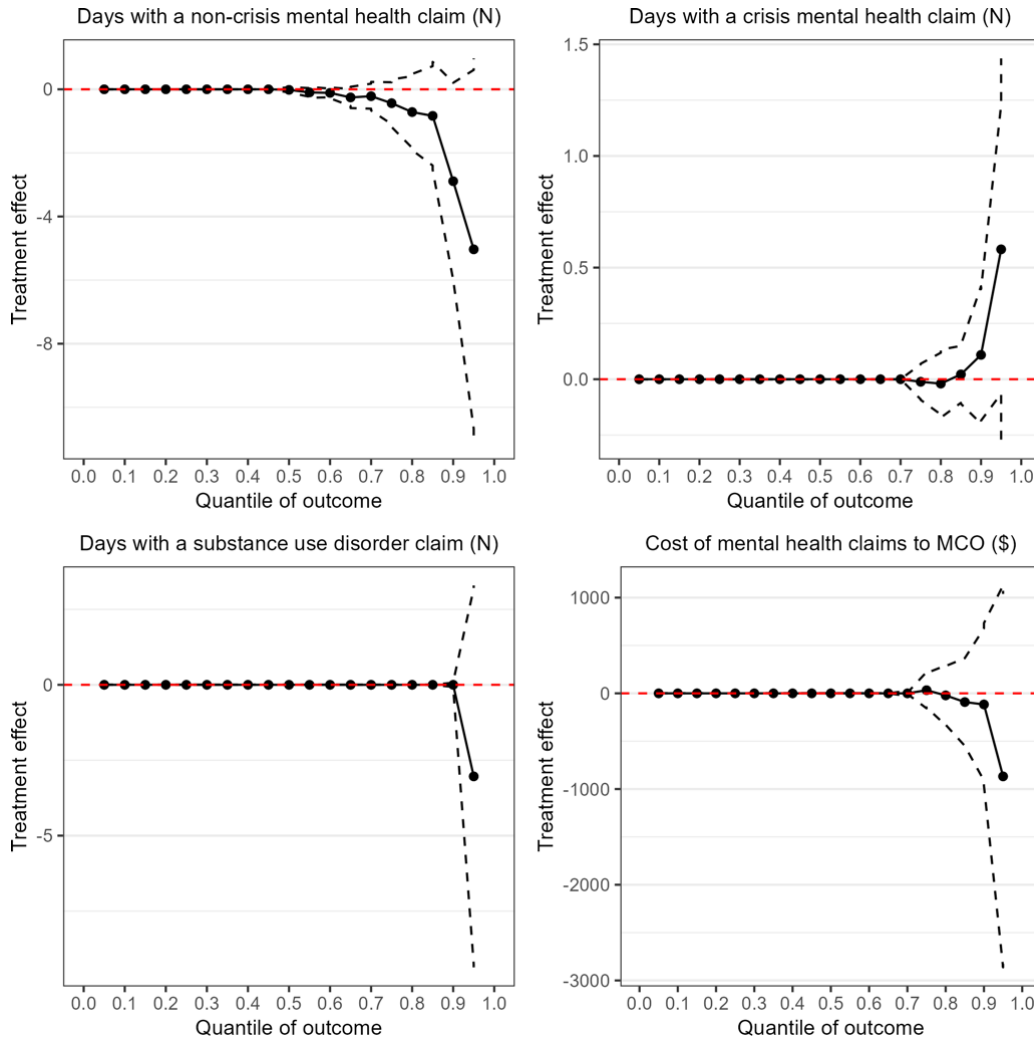
TABLE 16: Robustness of impact of 100% discount relative to no discount on health care utilization, first 270 days after enrollment

OUTCOME	N	MIN/MAX OUTCOME VALUES (RAW)	CONTROL MEAN (RAW)	CONTROL MEDIAN (RAW)	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A. Physical health care											
Days with at least one claim (N)											
- Non-ER outpatient	6,303	[0; 269]	10.20	4	0.208 (0.722)	-0.020 (0.327)	0.132 (0.615)	-0.054 (0.315)	-0.020 (0.327)	-0.357* (0.208)	0.166 (0.152)
- ER outpatient	6,303	[0; 51]	1.21	0	-0.039 (0.060)	-0.018 (0.049)	-0.031 (0.046)	-0.016 (0.040)	-0.014 (0.047)	-0.029 (0.032)	0.000 (0.000)
- Non-ER inpatient	6,303	[0; 89]	0.200	0	0.119** (0.054)	0.131** (0.059)	0.043** (0.021)	0.045** (0.022)	0.079** (0.038)	0.021 (0.014)	0.000 (0.000)
- ER inpatient	6,303	[0; 56]	0.322	0	0.013 (0.053)	0.033 (0.051)	0.001 (0.031)	0.012 (0.030)	0.026 (0.046)	-0.014 (0.019)	0.000 (0.000)
Prescription fills (N)	6,303	[0; 127]	9.41	4	-0.045 (0.313)	-0.100 (0.303)	0.018 (0.294)	-0.033 (0.283)	-0.070 (0.300)	0.045 (0.216)	0.370 (0.279)
Days covered by a prescription (N)	6,303	[0; 270]	117.36	86 (2.69)	2.31 (1.69)	0.527 (2.69)	2.31 (1.69)	0.527 (1.69)	0.527 (1.36)	0.460 (6.24)	5.93
Panel B. Behavioral health care											
Days with at least one claim (N)											
- Non-crisis	6,303	[0; 269]	7.63	1	-0.740 (0.585)	-0.378 (0.294)	-0.841* (0.431)	-0.572** (0.248)	-0.378 (0.294)	-0.228 (0.157)	-0.018 (0.042)
- Crisis	6,303	[0; 76]	0.756	0	0.078 (0.071)	0.132* (0.068)	0.037 (0.050)	0.074 (0.046)	0.104* (0.060)	0.072** (0.031)	0.000 (0.000)
- Substance use treatment	6,303	[0; 200]	2.93	0	-0.643* (0.347)	-0.687** (0.271)	-0.351 (0.253)	-0.380* (0.199)	-0.677** (0.267)	-0.682*** (0.136)	0.000 (0.000)
Prescription fills (N)	6,303	[0; 51]	1.98	0	0.026 (0.113)	-0.011 (0.109)	0.036 (0.104)	0.002 (0.101)	-0.006 (0.108)	-0.017 (0.065)	0.000 (0.000)
Days covered by a prescription (N)	6,303	[0; 270]	47.51	0	1.63 (2.19)	1.66 (1.30)	1.63 (2.19)	1.66 (1.30)	1.66 (1.30)	0.205 (0.774)	0.000 (0.000)
Cost of care to managed care org. (\$)	6,303	[0; 124,176]	1,672.50	0	-220.12 (148.45)	-24.85 (122.00)	-151.49 (104.98)	-17.10 (86.83)	-38.15 (113.92)	-18.67 (53.67)	0.000 (0.000)
Impact on mean outcome					X	X	X	X	X	X	
Impact on median outcome										X	
Controls for baseline care utilization						X		X	X	X	
Data winsorized at 99th pctile							X	X			
Data winsorized at 99.9th pctile									X		
Rule-of-thumb outlier removal										X	

Notes: Table explores the robustness of the effect of being assigned to the 100% discount relative to no discount on health care utilization for the adult sample, as measured in the first 270 days after enrollment. Data comes from Medicaid claims. The 'days with at least one claim' outcome counts the cumulative number of days in which the participant had at least one claim in the first 270 days post-enrollment. The 'days covered by a prescription' outcome counts the cumulative number of days in the first 270 days post-enrollment in which the participant had a remaining dose from a filled prescription. The 'cost of care to managed care org' outcome measures the cumulative dollar amount of claims that providers have billed to the Allegheny County Medicaid behavioral health managed care organization. All specifications adjust for the following baseline covariates: Age (years), female (y/n), Black (y/n), more than high school education (y/n), currently employed (y/n), PRT trips taken last week (N), and lives within the PRT 7-day frequent service watershed (y/n). Columns (2) and (4) also adjust for the given outcome as measured in the 365 days prior to study enrollment. Column (4) corresponds to the estimates presented in Table 5 in the main text. Column (6) drops observations that exceed rule-of-thumb thresholds for certain regression statistics (further description available upon request). Column 'N' indicates the number of participants across the 100% discount and no-discount study arms that have non-missing data for the given outcome. The 'min/max response values (raw)' column reports the minimum and maximum value of the given outcome across the 0% and 100% discount groups, prior to any winsorization. The control group means and medians are also measured

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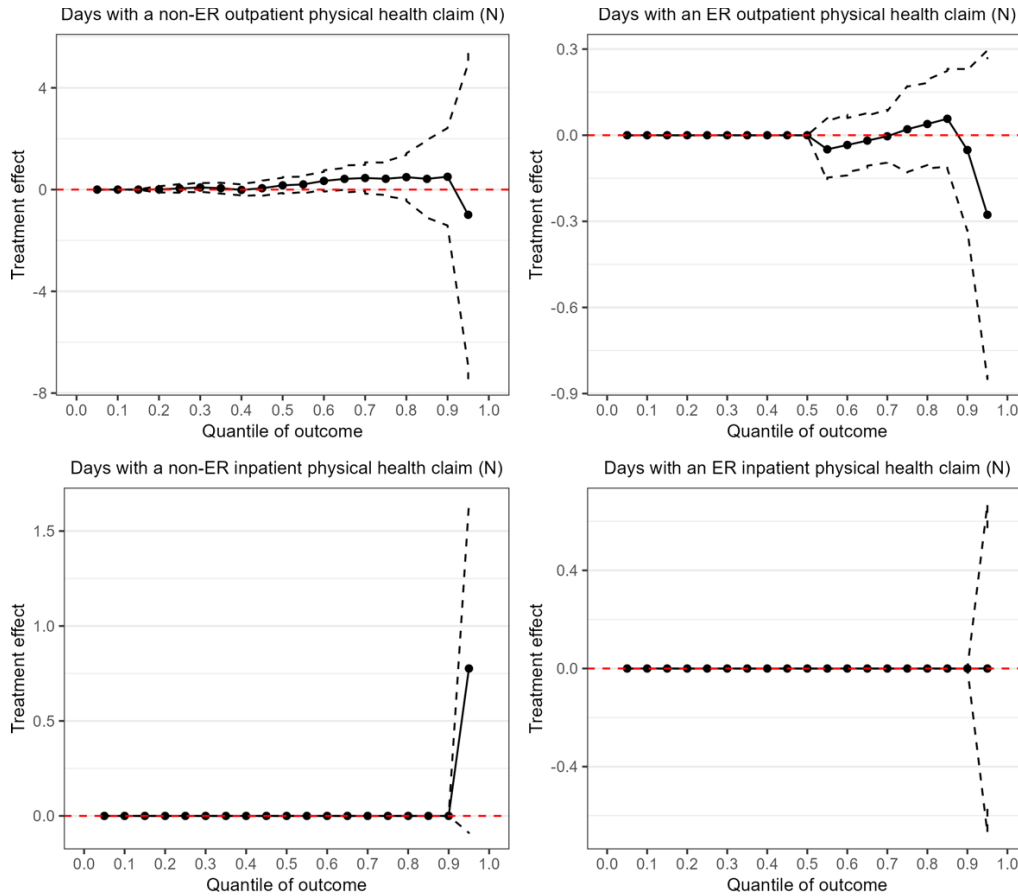
FIGURE 4: Impacts of 100% discount relative to no discount on quantiles of adults' mental health care utilization within the first 270 days after enrollment



Notes: Figure presents estimates of the effect of being assigned to the 100% discount relative to no discount on the quantiles of the distribution of mental health care utilization for the adult sample in the first 270 days after enrolling in the Pilot. Data comes from Medicaid claims. Estimates are from a quantile regression of the outcome on an indicator for receiving a 100% discount relative to no discount, adjusting for the following baseline covariates: Age (years), female (y/n), Black (y/n), more than high school education (y/n), currently employed (y/n), PRT trips taken last week (N), lives within the PRT 7-day frequent service walkshed (y/n), and the given outcome as measured in the 365 days prior to enrolling in the Pilot. Dotted lines represent 95% confidence intervals based on robust standard errors that are calculated using bootstrap.

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FIGURE 5: Impacts of 100% discount relative to no discount on quantiles of adults' physical health care utilization within the first 270 days after enrollment



Notes: Figure presents estimates of the effect of being assigned to the 100% discount relative to no discount on the quantiles of the distribution of physical health care utilization for the adult sample in the first 270 days after enrolling in the Pilot. Data comes from Medicaid claims. Estimates are from a quantile regression of the outcome on an indicator for receiving a 100% discount relative to no discount, adjusting for the following baseline covariates: Age (years), female (y/n), Black (y/n), more than high school education (y/n), currently employed (y/n), PRT trips taken last week (N), lives within the PRT 7-day frequent service walkshed (y/n), and the given outcome as measured in the 365 days prior to enrolling in the Pilot. Dotted lines represent 95% confidence intervals based on robust standard errors that are calculated using bootstrap.

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TABLE 17: Impacts on log values of health care utilization measures within the first 270 days after enrollment, only among adults with nonzero values of the outcome

OUTCOME	N (NON-ZEROES)	CONTROL MEAN (NON-ZEROES)	TREATMENT EFFECT		
			50% DISCOUNT	100% DISCOUNT	100% VS. 50% EFFECTS
Days with at least one claim (N)	8,319	29.79	-0.041 (0.027)	0.003 (0.027)	0.044 (0.027)
Panel A. Physical health care					
Days with at least one claim (N)					
- Non-ER outpatient	7,691	12.64	-0.003 (0.027)	0.032 (0.027)	0.035 (0.027)
- ER outpatient	4,385	2.57	0.017 (0.027)	0.026 (0.023)	0.009 (0.028)
- Non-ER inpatient	455	4.53	-0.144 (0.114)	0.056 (0.107)	0.200* (0.102)
- ER inpatient	435	6.76	0.108 (0.121)	0.154 (0.120)	0.045 (0.130)
Prescription fills (N)	7,294	12.34	-0.017 (0.031)	0.013 (0.030)	0.030 (0.030)
Days covered by a prescription (N)	7,402	152.09	0.022 (0.038)	0.052 (0.038)	0.030 (0.037)
Panel B. Behavioral health care					
Days with at least one claim (N)					
- Non-crisis	4,690	15.19	-0.000 (0.039)	-0.048 (0.039)	-0.047 (0.039)
- Crisis	2,316	3.01	0.019 (0.038)	0.073* (0.040)	0.053 (0.040)
- Substance use treatment	873	32.16	0.048 (0.149)	0.037 (0.158)	-0.011 (0.150)
Prescription fills (N)	2,725	6.90	-0.064 (0.046)	-0.007 (0.046)	0.057 (0.046)
Days covered by a prescription (N)	2,829	160.51	-0.005 (0.080)	0.130* (0.077)	0.135* (0.075)
Cost of care to managed care org. (\$)	2,654	5964.56	-0.043 (0.081)	0.004 (0.077)	0.047 (0.082)

Notes: Table presents estimates of the effect of being assigned to each treatment status (50% discount or 100% discount) on log-transformed continuous measures of health care utilization for the adult sample, as measured in the first 270 days post-enrollment. The sample in this table is limited to the participants with a non-zero value of the given outcome measure. Data comes from Medicaid claims. The 'days with at least one claim' outcome counts the cumulative number of days in which the participant had at least one claim in the first 270 days post-enrollment. The 'days covered by a prescription' outcome counts the cumulative number of days in the first 270 days post-enrollment in which the participant had a remaining dose from a filled prescription. The 'cost of care to managed care org' outcome measures the cumulative dollar amount of claims that providers have billed to the Allegheny County Medicaid behavioral health managed care organization. Estimates are from a regression of the log of the outcome on indicators for each treatment status, adjusting for the following baseline covariates: Age (years), female (y/n), Black (y/n), more than high school education (y/n), currently employed (y/n), PRT trips taken last week (N), lives within the PRT 7-day frequent service walkshed (y/n), and the given outcome as measured in the 365 days prior to Pilot enrollment. Column N indicates the total number of individuals across the three study arms that have a non-zero value of the given outcome. Robust standard errors are in parentheses. ***p < 0.01, **p < 0.05, *p < 0.1

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TABLE 18: Impacts on health care utilization within the first 270 days after enrollment, only among adults who received care in the 180 days prior to enrollment

OUTCOME	N	CONTROL MEAN	TREATMENT EFFECT		
			50% DISCOUNT	100% DISCOUNT	100% VS. 50% EFFECTS
Panel A. Days with at least one physical health care claim (N)					
ER outpatient	3,488	2.15	-0.015 (0.144)	0.032 (0.150)	0.047 (0.148)
Non-ER outpatient	6,927	13.39	-0.030 (0.934)	0.244 (0.960)	0.274 (0.953)
ER inpatient	294	2.61	0.830 (0.925)	-0.292 (0.605)	-1.12 (0.901)
Non-ER inpatient	342	1.44	0.241 (0.533)	2.40 (1.63)	2.16 (1.67)
Panel B. Days with at least one mental health care claim (N)					
Non-crisis	3,631	17.31	-3.34** (1.40)	-2.08 (1.49)	1.26 (1.31)
Crisis	1,580	2.35	-0.119 (0.328)	0.165 (0.359)	0.284 (0.379)
Substance use disorder	834	24.39	-0.532 (2.87)	-1.32 (3.00)	-0.793 (3.09)

Notes: Table presents estimates of the effect of being assigned to each treatment status (50% discount or 100% discount) on health care utilization for the adult sample, as measured in the first 270 days post-enrollment. The sample in this table is limited to the participants who received the given type of health care at some point in the 180 days prior to their study enrollment. Data comes from Medicaid claims. The care utilization outcome measure is defined as the cumulative number of days in the first 270 days post-enrollment in which the participant had at least one claim for the given type of care. Estimates are from a regression of the outcome on indicators for each treatment status, adjusting for the following baseline covariates: Age (years), female (y/n), Black (y/n), more than high school education (y/n), currently employed (y/n), PRT trips taken last week (N), and lives within the PRT 7-day frequent service walkshed (y/n). Column N indicates the total number of individuals across the three study arms that received the given type of health care in the 180 days prior to enrollment. Robust standard errors are in parentheses. ***p <0.01, **p <0.05, *p <0.1

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TABLE 19: Impacts on health care utilization within the first 270 days after enrollment, only among adults who took an MATP trip in the 180 days prior to enrollment

OUTCOME	N	CONTROL MEAN	TREATMENT EFFECT		
			50% DISCOUNT	100% DISCOUNT	100% VS. 50% EFFECTS
Panel A. Days with at least one physical health care claim (N)					
ER outpatient	888	2.50	-0.262 (0.463)	-0.528 (0.449)	-0.266 (0.389)
Non-ER outpatient	888	29.06	-2.37 (3.39)	-1.10 (3.82)	1.28 (3.66)
ER inpatient	888	1.14	-0.514** (0.258)	-0.194 (0.297)	0.320 (0.216)
Non-ER inpatient	888	0.466	-0.020 (0.134)	0.005 (0.147)	0.026 (0.131)
Panel B. Days with at least one mental health care claim (N)					
Non-crisis	888	20.24	-4.81 (4.13)	-6.09 (4.13)	-1.28 (3.51)
Crisis	888	2.04	-0.646 (0.441)	-0.448 (0.474)	0.199 (0.314)
Substance use disorder	888	13.27	-1.27 (2.28)	-3.17 (2.18)	-1.90 (2.02)

Notes: Table presents estimates of the effect of being assigned to each treatment status (50% discount or 100% discount) on health care utilization for the adult sample, as measured in the first 270 days post-enrollment. The sample in this table is limited to the participants who took at least one Medical Assistance Transportation Program (MATP) trip at some point in the 180 days prior to their study enrollment. Data comes from Medicaid claims and MATP administrative data. The care utilization outcome measure is defined as the cumulative number of days in the first 270 days post-enrollment in which the participant had at least one claim for the given type of care. Estimates are from a regression of the outcome on indicators for each treatment status, adjusting for the following baseline covariates: Age (years), female (y/n), Black (y/n), more than high school education (y/n), currently employed (y/n), PRT trips taken last week (N), lives within the PRT 7-day frequent service walkshed (y/n), and the given outcome as measured in the 365 days prior to Pilot enrollment. Column N indicates the total number of individuals across the three study arms that took at least one MATP trip in the 180 days prior to enrollment. Robust standard errors are in parentheses. ***p <0.01, **p <0.05, *p <0.1

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TABLE 20: Impacts on health care utilization within the first 270 days after enrollment, only among adults who lived in the Pittsburgh Regional Transit (PRT) seven-day frequent service walkshed at time of study enrollment

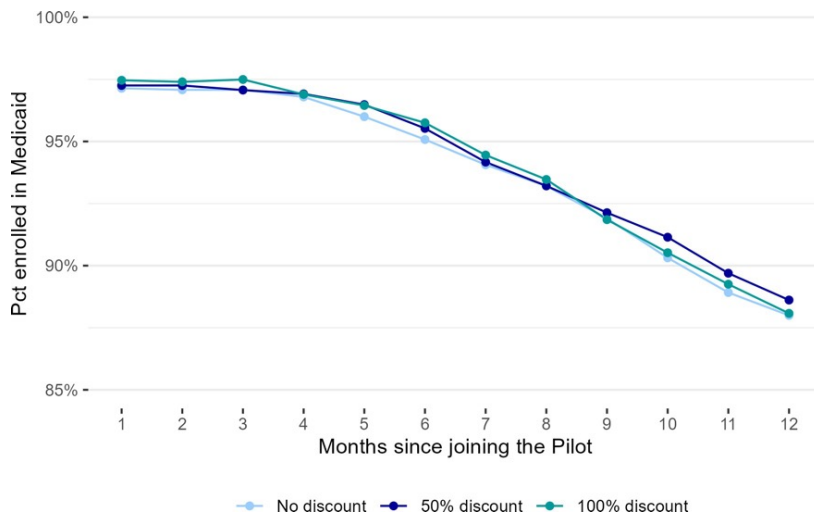
OUTCOME	N	CONTROL MEAN	TREATMENT EFFECT		
			50% DISCOUNT	100% DISCOUNT	100% VS. 50% EFFECTS
Panel A. Days with at least one physical health care claim (N)					
ER outpatient	3,422	1.28	-0.020 (0.077)	0.054 (0.080)	0.074 (0.077)
Non-ER outpatient	3,422	10.05	0.342 (0.523)	0.586 (0.560)	0.244 (0.584)
ER inpatient	3,422	0.350	0.040 (0.082)	0.172* (0.097)	0.132 (0.099)
Non-ER inpatient	3,422	0.186	0.044 (0.075)	0.072 (0.058)	0.028 (0.080)
Panel B. Days with at least one mental health care claim (N)					
Non-crisis	3,422	8.58	-0.159 (0.469)	-0.350 (0.445)	-0.191 (0.496)
Crisis	3,422	0.796	0.003 (0.095)	0.186** (0.094)	0.183* (0.105)
Substance use disorder	3,422	3.12	-0.078 (0.485)	-1.28*** (0.427)	-1.20*** (0.398)

Notes: Table presents estimates of the effect of being assigned to each treatment status (50% discount or 100% discount) on health care utilization for the adult sample, as measured in the first 270 days post-enrollment. The sample in this table is limited to the participants who lived in the Pittsburgh Regional Transit (PRT) seven-day frequent service walkshed at the time they enrolled in the study. Data comes from Medicaid claims for Allegheny County. The care utilization outcome measure is defined as the cumulative number of days in the first 270 days post-enrollment in which the participant had at least one claim for the given type of care. Estimates are from a regression of the outcome on indicators for each treatment status, adjusting for the following baseline covariates: Age (years), female (y/n), Black (y/n), more than high school education (y/n), currently employed (y/n), PRT trips taken last week (N), and the given outcome as measured in the 365 days prior to Pilot enrollment. Column N indicates the total number of individuals across the three study arms who lived in the seven-day frequent service walkshed at baseline. Robust standard errors are in parentheses.

***p < 0.01, **p < 0.05, *p < 0.1

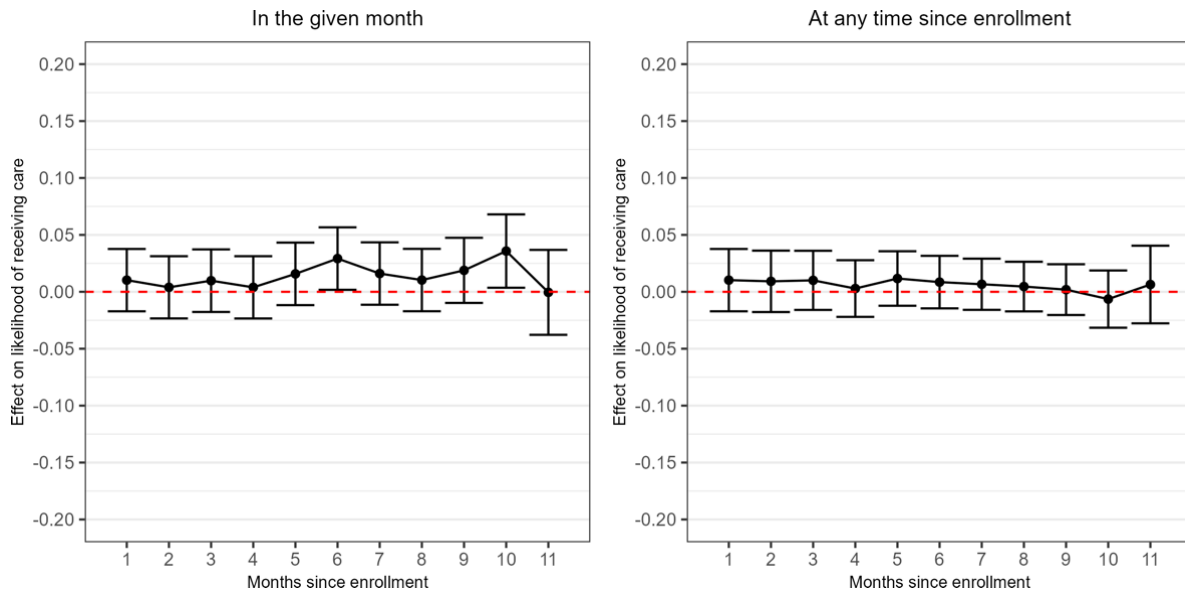
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FIGURE 6: Rates of Medicaid enrollment among adult participants, by month



Notes: Figure presents the percentage of adult participants in each fare discount group that were enrolled in Medicaid at some point in the given month, for each of the first 12 months after they joined the Pilot. Calculations are based on data from Allegheny County Medicaid enrollment records.

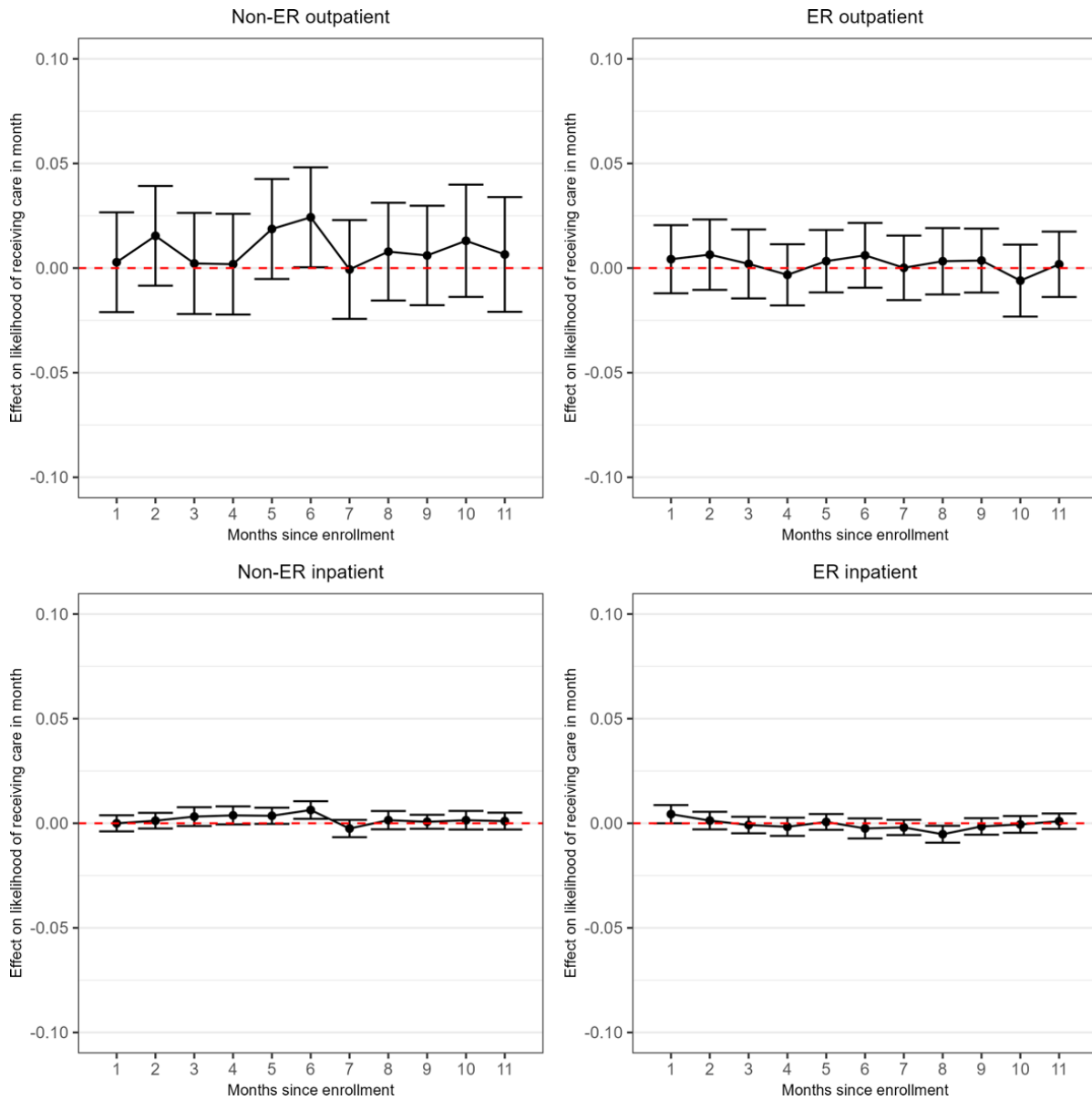
FIGURE 7: Impacts of 100% discount versus no discount on adults' likelihood of receiving any health care, by month



Notes: Figure presents estimates of the effect of being assigned to the 100% discount versus no discount on monthly health care utilization for the adult sample. Data comes from Medicaid claims. Health care utilization is measured as the likelihood of having at least one claim for any type of Medicaid-funded care. In the left panel, this outcome is measured within the given month. In the right panel, this outcome is measured cumulatively since the person enrolled in the study, as of the given month. Treatment effects are estimated by regressing the outcome on an indicator for being in the 100% discount group versus the no-discount group. The regression also controls for: female, Black, other race (not White or Black), Hispanic, calendar month of enrollment and the number of days on which the participant received care in the three months prior to enrollment. Each treatment effect comes from a separate regression. Error bars represent 95% confidence intervals using robust standard errors.

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FIGURE 8: Impacts of 100% discount versus no discount on adults' likelihood of receiving certain types of physical health care, by month



Notes: Figure presents estimates of the effect of being assigned to the 100% discount versus no discount on the adult sample's utilization of certain types of physical health care by month. Data come from Medicaid claims. Health care utilization is measured as the likelihood of having at least one claim for the given type of care in the given month. Treatment effects are estimated by regressing the outcome on an indicator for being in the 100% discount group versus the no-discount group. The regression also controls for: female, Black, other race (not White or Black), Hispanic, calendar month of enrollment and the number of days on which the participant received the given type of care in the three months prior to enrollment. Each treatment effect comes from a separate regression. Error bars represent 95% confidence intervals using robust standard errors.

APPENDIX

SURVEY RESPONSE RATES AND NON-RESPONSE BIAS

Midline survey

All adult study participants were invited to complete the midline survey, which took place six months after the participant enrolled in the study. The vast majority of questions in the survey did not force a response. The final question asked the participant to check a box that said “I have completed the survey.” We consider a participant to have completed the survey if they checked this box, regardless of how many questions they answered within the survey. Each participant was randomly offered either \$10 or \$20 for completing the survey. Those who completed the survey immediately received a digital Tango reward via email for the offered amount.

Table 21 presents the midline survey completion rates by fare discount and survey incentive amount. Overall, 34.5% of study participants completed the survey. Across the three discount arms, the \$20 incentive group was 4.1 percentage points more likely than the \$10 incentive group to complete the survey.

TABLE 21: Midline survey completion rates, by incentive amount

DISCOUNT GROUP	TOTAL	\$20 INCENTIVE	\$10 INCENTIVE	\$20 VERSUS \$10 DIFF.
0%	0.304	0.319	0.288	0.031* (0.016)
50%	0.347	0.367	0.328	0.039** (0.017)
100%	0.384	0.409	0.358	0.052*** (0.017)
Total	0.345	0.366	0.325	0.041*** (0.010)

*Notes: This table presents the midline (6-month follow-up) survey completion rates, disaggregated by fare discount group and the survey incentive amount that was offered to the participant. Participants were randomly offered either \$10 or \$20 for completing the survey. The vast majority of questions in the midline survey did not force a response. The final question in the survey asked participants to check a box to indicate that they have completed the survey. We consider a participant to have completed the survey if they checked this box, regardless of how many questions they answered within the survey. Robust standard errors are in parentheses. ***p <0.01, **p <0.05, *p <0.1*

Table 22 presents the differential response rates to certain questions within the survey. Across all questions shown in the table, the 50% discount group was more likely to provide a response than the control group, and the 100% discount group was more likely to provide a response than the 50% group. Response rates also varied across questions. Only 14.5% of the control group responded to the question about total monthly earnings, while 34.8% responded to the question that asked for a rating of your current health.

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TABLE 22: Midline survey response rates, by discount group

SURVEY QUESTION	TOTAL RESPONDENTS	CONTROL GROUP RESPONSE RATE	RESPONSE RATE DIFFERENCES		
			50% DISCOUNT VS. CONTROL	100% DISCOUNT VS. CONTROL	100% VS. 50% DISCOUNT
Panel A. Transportation questions					
PRT trips in past week (N)	3,819	0.346	0.056*** (0.012)	0.106*** (0.012)	0.050*** (0.012)
PRT spending in past week (\$)	3,366	0.301	0.054*** (0.012)	0.100*** (0.012)	0.047*** (0.012)
Panel B. Employment questions					
Currently employed	3,601	0.325	0.056*** (0.012)	0.100*** (0.012)	0.043*** (0.012)
Hourly wage at main job (\$)	1,621	0.153	0.015 (0.009)	0.035*** (0.009)	0.020** (0.010)
Weekly work hours (N)	1,617	0.153	0.017* (0.009)	0.033*** (0.009)	0.015 (0.010)
Total monthly earnings (\$)	1,526	0.145	0.017* (0.009)	0.028*** (0.009)	0.011 (0.009)
Panel C. Financial questions					
Cannot afford \$400 expense	3,434	0.312	0.054*** (0.012)	0.088*** (0.012)	0.035*** (0.012)
Behind with finances	3,838	0.348	0.056*** (0.012)	0.107*** (0.012)	0.051*** (0.012)
Monthly savings (\$)	3,348	0.304	0.051*** (0.012)	0.087*** (0.012)	0.036*** (0.012)
Panel D. Health and well-being questions					
Current health good or better	3,838	0.348	0.056*** (0.012)	0.107*** (0.012)	0.051*** (0.012)
Life satisfaction rating (0-10)	3,511	0.323	0.049*** (0.012)	0.086*** (0.012)	0.037*** (0.012)
Feeling anxious last 2 weeks	3,838	0.348	0.056*** (0.012)	0.107*** (0.012)	0.051*** (0.012)
I have finished the survey	3,296	0.304	0.043*** (0.012)	0.080*** (0.012)	0.037*** (0.012)

Notes: Table presents the response rates to various midline (6-month follow-up) survey questions by fare discount group. The 'total respondents' column reports the total number of adult participants who completed the given survey question across the three study arms. The vast majority of questions in the midline survey did not force a response. The final question in the survey asked participants to check a box to indicate that they have completed the survey. Robust standard errors are in parentheses. ***p <0.01, **p <0.05, *p <0.1

Table 23 explores the extent of selection into midline survey completion on observable baseline characteristics. Survey completers were 7.8 percentage points more likely to be female than the non-completers, 10 percentage points more likely to be White, and 14 percentage points more likely to have more than a high school degree. These differences, while generally modest in magnitude, provide evidence of selection bias (i.e., non-response bias) in the midline survey responses.

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TABLE 23: Selection into midline survey completion on baseline characteristics

	COMPLETERS	NON-COMPLETERS	DIFFERENCE
Panel A. Demographics			
Female	0.772	0.695	0.078*** (0.009)
Age group			
- 18-29	0.203	0.239	-0.037*** (0.009)
- 30-39	0.304	0.271	0.032*** (0.010)
- 40-49	0.206	0.171	0.035*** (0.009)
- 50-59	0.143	0.142	0.001 (0.008)
- 60-64	0.054	0.072	-0.018*** (0.005)
Race			
- Black	0.518	0.626	-0.108*** (0.011)
- White	0.403	0.303	0.100*** (0.010)
- Other	0.057	0.046	0.011** (0.005)
Hispanic	0.035	0.032	0.003 (0.004)
Children in household (N)	1.13	1.13	<0.001 (0.030)
Highest education			
- Less than high school	0.061	0.092	-0.031*** (0.006)
- High school	0.474	0.587	-0.113*** (0.011)
- More than high school	0.458	0.317	0.141*** (0.010)
Panel B. Transportation			
Owns a car	0.074	0.048	0.025*** (0.005)
PRT trips last week (N)	9.35	10.40	-1.05*** (0.267)
PRT spending last week (\$)	27.18	31.34	-4.17*** (0.650)
Panel C. Employment (from baseline survey)			
Employed past 12 months	0.612	0.600	0.013 (0.011)
Currently employed	0.434	0.423	0.010 (0.011)
Hours worked per week at main job (N)	30.21	31.05	-0.845** (0.362)
Hourly wage at main job (\$)	13.73	13.34	0.389*** (0.120)
Panel D. Employment in quarter prior to enrollment (from UI records)			
Total earnings (\$)	2,342.53	2,241.46	101.07 (70.99)
Received nonzero UI benefits	0.034	0.030	0.004 (0.004)
N	3,296	6,248	

Notes: This table compares the mean baseline characteristics between the adult participants who completed the midline survey and those who did not. The vast majority of questions in the midline survey did not force a response. The final question in the survey asked participants to check a box to indicate that they completed the survey. We consider a participant to have completed the survey if they checked this box, regardless of how many questions they answered within the survey. Robust standard errors are in parentheses. ***p < 0.01, **p < 0.05, *p < 0.1

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Table 24 explores whether the sample of midline survey respondents remains balanced across randomization arms on certain relevant baseline characteristics. Overall, the midline respondent sample does not demonstrate worse balance on baseline characteristics than the full study sample.

TABLE 24: Randomization balance among midline survey respondents

		0% DISCOUNT	50% DISCOUNT	100% DISCOUNT			
	N	MEAN	N	MEAN	N	MEAN	0% VS. 100% DIFF
Panel A. Demographics							
Female	958	0.770	1,126	0.780	1,212	0.767	0.004 (0.018)
Age group							
- 18-29	958	0.212	1,126	0.194	1,212	0.204	0.008 (0.018)
- 30-39	958	0.305	1,126	0.313	1,212	0.294	0.011 (0.020)
- 40-49	958	0.198	1,126	0.202	1,212	0.216	0.018 (0.017)
- 50-59	958	0.145	1,126	0.139	1,212	0.146	0.001 (0.015)
- 60-64	958	0.051	1,126	0.061	1,212	0.050	0.002 (0.009)
Race							
- Black	958	0.511	1,126	0.509	1,212	0.532	0.021 (0.022)
- White	958	0.412	1,126	0.411	1,212	0.388	0.025 (0.021)
- Other	958	0.059	1,126	0.053	1,212	0.059	<0.001 (0.010)
Hispanic	958	0.033	1,126	0.028	1,212	0.044	0.010 (0.008)
Children in household (N)	958	1.07	1,126	1.11	1,212	1.20	0.129** (0.059)
Highest education							
- Less than high school	958	0.040	1,126	0.067	1,212	0.072	0.032*** (0.010)
- High school	958	0.467	1,126	0.481	1,212	0.474	0.007 (0.022)
- More than high school	958	0.487	1,126	0.446	1,212	0.446	0.042* (0.022)
Panel B. Transportation							
Owns a car	958	0.081	1,126	0.065	1,212	0.076	0.006 (0.012)
PRT trips last week (N)	958	8.86	1,126	8.90	1,212	9.11	0.249 (0.402)
PRT spending last week (\$)	958	25.41	1,126	27.60	1,212	26.95	1.54 (1.11)
Panel C. Employment							
Employed past 12 months	958	0.640	1,126	0.607	1,212	0.595	0.045** (0.021)
Currently employed	958	0.459	1,126	0.429	1,212	0.417	0.042* (0.021)
Hours worked per week at main job (N)	440	28.77	483	30.35	506	31.33	2.57*** (0.722)
Hourly wage at main job (\$)	440	13.77	483	13.65	505	13.78	0.008 (0.241)
Panel D. Employment in quarter prior to enrollment (from UI records)							
Total earnings (\$)	947	2,340.18	1,109	2,329.19	1,200	2,346.09	5.91 (143.89)
Received nonzero UI benefits	947	0.032	1,109	0.038	1,200	0.032	<0.001 (0.008)
Total midline respondents	958		1,126		1,212		

Notes: Table presents mean baseline characteristics across study groups among the adult participants who completed the midline (6-month follow-up) survey. The vast majority of questions in the midline survey did not force a response. The final question in the survey asked participants to check a box to indicate that they have completed the survey. We consider a participant to have completed the survey if they checked this box, regardless of how many questions they answered within the survey. The characteristics in panels A, B and C come from the baseline survey. The characteristics in panel D come from Pennsylvania unemployment insurance (UI) records. Baseline survey items that permitted unbounded continuous-valued responses are winsorized at the 99th percentile. Robust standard errors are in parentheses. ***p < 0.01, **p < 0.05, *p < 0.1

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Table 25 reports intent-to-treat impacts on outcomes derived from the midline survey, with extreme value (i.e. “Manski”) bounds on the impact estimate. The upper bound assumes that all non-responders in the treatment group had the highest outcome that is observed across the two study arms being contrasted, and all non-responders in the comparison group had the lowest observed outcome across the two groups being contrasted. The lower bound assumes the opposite, meaning that all non-responders in the treatment group had the lowest observed outcome and all non-responders in the comparison group had the highest observed outcome. These bounds represent the worst case of item-level non-response bias in either direction, showing what the impact estimate would be if those who answered the question gave either maximally higher or maximally lower response values than those who did not answer the question. These bounds are most informative for the survey questions that take binary responses. The bounds are too wide to be informative for the questions that take continuous-valued responses, such as total monthly earnings and monthly savings.

TABLE 25: Impacts of fare discounts on various midline survey outcomes, with extreme value bounds

OUTCOME	N	CONTROL MEAN	TREATMENT EFFECT		
			50% DISCOUNT	100% DISCOUNT	100% VS. 50% EFFECTS
Panel A. Transportation outcomes					
PRT trips last week (N)	3,819	11.52	-2.06 [-654; 598]	-0.870 [-653; 550]	1.19** [-148; 138]
PRT spending last week (\$)	3,366	50.32	-25.76* [-5,243; 4,833]	-30.77* [-6,990; 5,988]	-5.00 [-6,450; 5,991]
Could not get to work or appointment	3,829	0.595	-0.099*** [-0.659; 0.590]	-0.262*** [-0.706; 0.495]	-0.162*** [-0.644; 0.501]
Panel B. Employment outcomes					
Employed	3,601	0.506	-0.007 [-0.652; 0.641]	-0.011 [-0.633; 0.618]	-0.004 [-0.599; 0.595]
Unemployed and seeking work	3,601	0.179	0.039** [-0.650; 0.643]	0.008 [-0.653; 0.598]	-0.031* [-0.621; 0.573]
Hourly wage at main job (\$)	1,621	16.30	-0.221 [-591; 580]	2.55 [-591; 567]	2.77 [-402; 394]
Weekly work hours (N)	1,617	33.93	-0.968 [-142; 140]	0.009 [-141; 138]	0.977 [-139; 137]
Total monthly earnings (\$)	1,526	1,674.06	-358.59 [-42,809; 41,864]	49.79 [-136,851; 132,492]	408.38 [-133,874; 132,500]
Panel C. Financial outcomes					
Cannot afford \$400 expense	3,434	0.567	0.016 [-0.652; 0.668]	-0.014 [-0.641; 0.647]	-0.030 [-0.622; 0.612]
Behind with finances	3,838	0.409	0.006 [-0.628; 0.620]	-0.021 [-0.620; 0.578]	-0.027 [-0.588; 0.554]
Monthly savings (\$)	3,348	125.45	-47.79 [-33,129; 30,747]	-22.82 [-33,092; 29,126]	24.97 [-22,837; 21,663]
Panel D. Health and well-being outcomes					
Current health good or better	3,838	0.523	-0.030 [-0.639; 0.608]	-0.042** [-0.621; 0.577]	-0.012 [-0.578; 0.565]
Life satisfaction rating (0-10)	3,511	5.60	0.042 [-6; 7]	0.242** [-6; 6]	0.200* [-6; 6]
Feeling anxious last 2 weeks	3,838	0.275	-0.009 [-0.643; 0.605]	-0.015 [-0.634; 0.564]	-0.006 [-0.588; 0.555]

Notes: Table presents extreme value bounds (also known as “Manski” bounds) for the estimates of the effect of being assigned to each treatment status (50% discount or 100% discount) on various self-reported outcomes for the adult sample. Data come from the midline survey, which took place six months after the participant enrolled in the study. Estimates are from a regression of the outcome on indicators for each treatment status, adjusting for the following baseline covariates: Age (years), female (y/n), Black (y/n), more than high school education (y/n), currently employed (y/n), PRT trips taken last week (N), and lives within the PRT 7-day frequent service walkshed (y/n). The extreme value bounds are in brackets below the estimates. The upper bound assumes that all non-responders in the treatment group had the highest outcome observed across the two groups being contrasted, and all non-responders in the comparison group had the lowest observed outcome across the two groups being contrasted. The lower bound assumes the opposite, meaning that all non-responders in the treatment group had the lowest observed outcome and all non-responders in the comparison group had the highest observed outcome. Column N indicates the number of individuals across the three study arms that have non-missing data for the given outcome. ***p <0.01, **p <0.05, *p <0.1

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Recent research has demonstrated that traditional methods for addressing survey non-response bias may not be adequate if the non-response is driven by subject characteristics that the researcher cannot observe, such as the subject’s potential answers to the questions in the survey (Coffman et al., 2019; Dutz et al., 2022). Our randomized midline survey incentive payments enabled us to test for these types of unobservable selection effects on the dimension of the incentive amount (i.e., the time value of money). Significant differences in response rates and response values between the two incentive groups would provide evidence of such selection effects.

The higher incentive group was significantly more likely than the lower incentive group to respond to each survey question shown in **Table 26**. The differences in item-level response rates ranged from 2.7 percentage points (total monthly earnings) to 4.7 percentage points (monthly savings). These significant differences in response rates raise the potential for selection bias in the survey results on the dimension of the incentive amount.

TABLE 26: Midline survey response rates for high- and low-incentive groups

	HIGH INCENTIVE (\$20)		LOW INCENTIVE (\$10)		\$20 VS. \$10 DIFF.
	NUMBER INVITED	RESPONSE RATE	NUMBER INVITED	RESPONSE RATE	
Panel A. Transportation questions					
PRT trips last week (N)	4,775	0.419	4,776	0.381	0.038*** (0.010)
PRT spending last week (\$)	4,775	0.372	4,776	0.333	0.039*** (0.010)
Could not get to work or appointment	4,775	0.419	4,776	0.382	0.037*** (0.010)
Panel B. Employment questions					
Employed	4,775	0.395	4,776	0.359	0.035*** (0.010)
Unemployed and seeking work	4,775	0.395	4,776	0.359	0.035*** (0.010)
Hourly wage at main job (\$)	4,775	0.184	4,776	0.155	0.029*** (0.008)
Weekly work hours (N)	4,775	0.183	4,776	0.155	0.028*** (0.008)
Total monthly earnings (\$)	4,775	0.173	4,776	0.146	0.027*** (0.007)
Panel C. Financial questions					
Cannot afford \$400 expense	4,775	0.381	4,776	0.338	0.043*** (0.010)
Behind with finances	4,775	0.421	4,776	0.383	0.038*** (0.010)
Monthly savings (\$)	4,775	0.374	4,776	0.327	0.047*** (0.010)
Panel D. Health and well-being questions					
Current health good or better	4,775	0.421	4,776	0.383	0.038*** (0.010)
Life satisfaction rating (0-10)	4,775	0.388	4,776	0.348	0.040*** (0.010)
Feeling anxious last 2 weeks	4,775	0.421	4,776	0.383	0.038*** (0.010)
I have finished the survey	4,775	0.366	4,776	0.325	0.041*** (0.010)

Notes: This table compares midline (6-month follow-up) survey response rates between the high (\$20) and low (\$10) incentive groups. Participants were randomly offered either \$10 or \$20 to complete the survey. The vast majority of questions in the midline survey did not force a response. Participants were thus able to respond to some questions but not others. Robust standard errors are in parentheses. ***p <0.01, **p <0.05, *p <0.1

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Finally, we tested for selection bias by comparing mean response values to certain survey questions between the two incentive groups. **Table 27** compares the mean answers in the low and high incentive groups and tests whether the difference is zero. Respondents in the high incentive group reported a \$2.41 higher hourly wage than the respondents in the low incentive group. The high incentive respondents were also 3.5 percentage points more likely to report being behind on their finances and 3.1 percentage points more likely to report feeling anxious in the last two weeks.

Some of the non-significant differences in other response values are arguably substantial in magnitude, such as the \$175 difference in monthly earnings. Given this, the four right-most columns of **Table 27** explore the study’s statistical power to detect meaningfully-sized differences in response values. While the relative sizes of the 95% confidence intervals and minimum detectable effects (2.8 × standard error) are open to interpretation, we consider these values to be small enough to preclude substantial selection effects on the time value of money. The final two columns in the table use a back-of-the-envelope ex post power calculation ($n = \left\lceil \frac{4\sigma^2(z_{1-\alpha/2} + z_{1-\beta})^2}{D^2} \right\rceil$) to explore the minimum sample size that our study would require to detect a difference of five percentage points for the binary outcomes and other differences for the continuous outcomes.

From this exercise, we conclude that the study is relatively well-powered to rule out substantively meaningful levels of selection bias on the sorts of unobservable traits that are probed in the survey. The small differences in item-level response rates shown in **Table 26** provide further reassurance on this point. Doubling the \$10 incentive to \$20 only increased response rates by three to five percent, depending on the survey question. Such small increases suggest there is not much room for selection on unobservables having to do with the time value of money.

TABLE 27: Comparing midline survey response values of low- and high-incentive groups

	HIGH INCENTIVE (\$20)		LOW INCENTIVE (\$10)		\$20 VS. \$10 DIFFERENCE	95% CI OF DIFFERENCE	MDE	REQUIRED MINIMUM SAMPLE SIZE FOR DIFF. OF SIZE D	
	NUMBER OF RESPONDENTS	MEAN	NUMBER OF RESPONDENTS	MEAN				D	SAMPLE SIZE
Panel A. Transportation questions									
PRT trips last week (N)	2,001	10.33	1,818	11.32	-0.990 (0.746)	[-2.45, 0.473]	2.09	1 trip	26,260
PRT spending last week (\$)	1,777	32.48	1,589	37.59	-5.11 (9.34)	[-23.41, 13.20]	26.14	\$20	5,832
Could not get to work or appointment	2,003	0.473	1,826	0.461	0.012 (0.016)	[-0.020, 0.043]	0.045	5 pp	3,122
Panel B. Employment questions									
Employed	1,885	0.503	1,716	0.478	0.024 (0.017)	[-0.008, 0.057]	0.047	5 pp	3,136
Unemployed and seeking work	1,885	0.198	1,716	0.194	0.004 (0.013)	[-0.022, 0.030]	0.037	5 pp	1,965

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	HIGH INCENTIVE (\$20)		LOW INCENTIVE (\$10)		\$20 VS. \$10 DIFFERENCE	95% CI OF DIFFERENCE	MDE	REQUIRED MINIMUM SAMPLE SIZE FOR DIFF. OF SIZE D	
	NUMBER OF RESPONDENTS	MEAN	NUMBER OF RESPONDENTS	MEAN				D	SAMPLE SIZE
Hourly wage at main job (\$)	880	16.65	741	14.23	2.41** (1.12)	[0.216, 4.61]	3.14	\$2	343
Weekly work hours (N)	876	33.95	741	33.83	0.114 (0.853)	[-1.56, 1.79]	2.39	0.5 hours	31,232
Total monthly earnings (\$)	827	1,804.67	699	1,628.82	175.85 (335.38)	[-481.49, 833.20]	939.07	\$100	136,160
Panel C. Financial questions									
Cannot afford \$400 expense	1,820	0.569	1,614	0.571	-0.002 (0.017)	[-0.035, 0.031]	0.047	5 pp	3,079
Behind with finances	2,010	0.417	1,828	0.382	0.035** (0.016)	[0.004, 0.066]	0.044	5 pp	2,966
Monthly savings (\$)	1,785	120.28	1,563	68.10	52.18 (33.26)	[-13.01, 117.37]	93.12	\$50	338
Panel D. Health and well-being questions									
Current health good or better	2,010	0.499	1,828	0.478	0.021 (0.016)	[-0.011, 0.053]	0.045	5 pp	3,135
Life satisfaction rating (0-10)	1,851	5.70	1,660	5.66	0.041 (0.096)	[-0.147, 0.230]	0.269	0.25 rating pts	4,075
Feeling anxious last 2 weeks	2,010	0.275	1,828	0.245	0.031** (0.014)	[0.003, 0.058]	0.040	5 pp	2,321

Notes: This table compares respondents' answers to certain midline (6-month follow-up) survey questions between the high (\$20) and low (\$10) incentive groups. The vast majority of questions in the midline survey did not force a response. Participants were thus able to respond to some questions but not others. The 'MDE' column reports the ex-post minimum detectable effect size, which is 2.8 × the observed standard error of the mean difference. The right-most two columns report the minimum sample size that would be required to detect a certain difference in mean response values (denoted as 'D') as significant at the .05 level. To calculate the minimum sample size, we use the back-of-the-envelope power calculation ($n = \frac{4\sigma^2(z_{1-\alpha/2} + z_{1-\beta})^2}{D^2}$). We set α to 0.1, β to 0.2, and σ to the standard deviation of the \$10 incentive group's response values. D is the given difference in mean response values between the low and high incentive groups. Robust standard errors are in parentheses. ***p < 0.01, **p < 0.05, *p < 0.1

Travel diaries

All adult study participants received a text message three days after they enrolled in the study that invited them to participate in the travel diary survey task. This message included a randomized offer of either a \$1 or \$2 payment for each completed diary. Eighty-seven study participants were not invited to the task because they listed the same phone number on their application as another participant and thus could not be uniquely identified in the Allegheny County Department of Human Services text messaging system.

Those who opted into the task received a 14-month stream of text message travel diary surveys. They received a survey every three days for the first two months of their study enrollment, then once per month for the next ten months, then once per week for the next two months.

As with the follow-up surveys, our travel diary surveys used randomized incentive payments. Participants were randomly assigned to one of two incentive offers: the low incentive group was offered \$1 for each completed

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diary, and the high incentive group was offered \$2 per completed diary. Participants received payment for their completed diaries on a monthly basis in the first two months of their study enrollment. Then they received one payment at the end of their twelfth month of enrollment that covered all diaries completed in months three through 12. Then they received payments on a monthly basis again for the final two months of the task.

Table 28 presents the text message travel diary task opt-in rates, disaggregated by fare discount group and the offered incentive amount. The group that was offered \$2 per diary had a 4.6 percentage point higher opt-in rate than the \$1 group overall.

TABLE 28: Travel diary task opt-in rates

DISCOUNT GROUP	TOTAL	\$2 INCENTIVE	\$1 INCENTIVE	\$2 VERSUS \$1 DIFF.
0%	0.565	0.587	0.542	0.045** (0.018)
50%	0.633	0.664	0.603	0.061*** (0.017)
100%	0.673	0.688	0.657	0.032* (0.017)
Total	0.624	0.646	0.601	0.046*** (0.010)
Number of invited individuals	9,464	4,755	4,709	

Notes: This table presents the text message travel diary task opt-in rates, disaggregated by fare discount group and the amount of the task incentive. All adult study participants received a text message 3 days after they enrolled in the study that invited them to participate in the travel diary survey task. This message included a randomized offer of either a \$1 or \$2 payment for each completed diary. Those who opted into the task then began receiving the stream of text message-based travel diary surveys. Eighty-seven study participants were not invited to the task because they listed the same phone number on their application as another participant and thus could not be uniquely identified in the text messaging system. The statistical significance of the difference in opt-in rates between the \$2 and \$1 incentive groups is calculated by regressing a binary opt-in indicator on a dummy variable that equals 1 if the participant was offered the \$2 incentive amount. Robust standard errors are in parentheses. ***p <0.01, **p <0.05, *p <0.1

Table 29 presents the travel diary completion rates among the study participants who opted into the task. We consider a participant to have completed a diary if they answered all five questions in the diary. The denominator of the completion rate for a given participant is the total number of diaries that they have received so far, and the numerator is the number that they actually completed. Overall, participants have completed 55.3% of the diaries that they have received so far. The completion rate is 2.4 percentage points higher in the \$2 incentive group than in the \$1 group.

TABLE 29: Travel diary completion rates among those who opted into the task

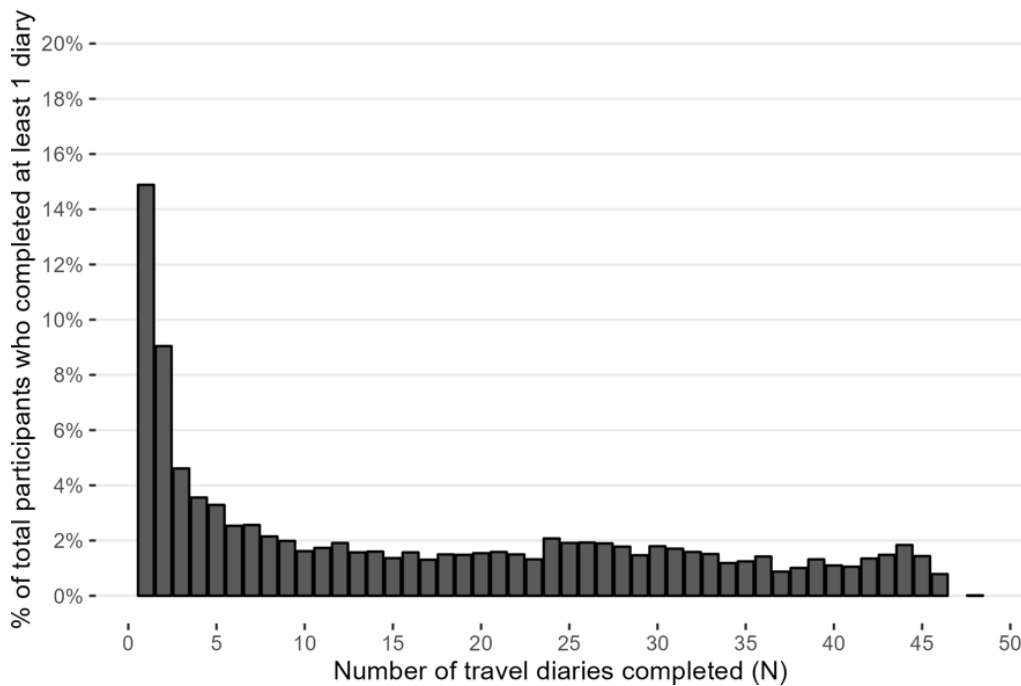
DISCOUNT GROUP	TOTAL	\$2 INCENTIVE	\$1 INCENTIVE	\$2 VERSUS \$1 DIFF.
0%	0.520	0.539	0.498	0.041*** (0.005)
50%	0.554	0.567	0.539	0.028*** (0.004)
100%	0.579	0.583	0.575	0.008** (0.004)
Total	0.553	0.564	0.540	0.024*** (0.002)
Number that completed at least 1 diary	5,745	2,994	2,752	

Notes: This table presents the travel diary survey completion rates, disaggregated by fare discount group and the amount of the survey incentive. This analysis only includes the study participants who opted into the travel diary task, meaning they received at least one text message travel diary to complete. Participants who opted in to the task received a travel diary every three days for the first two months of the study, followed by one diary per month for the next 10 months, followed by one diary per week for the next two months. We consider a participant to have completed a diary if they responded to all five questions in the diary. The statistical significance of the difference in completion rates between the \$2 and \$1 incentive groups is calculated by regressing a binary response indicator on a dummy variable that equals 1 if the participant was offered the \$2 incentive amount. Robust standard errors are in parentheses. ***p <0.01, **p <0.05, *p <0.1

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Figure 9 presents the distribution of diary completions per person, among the participants who completed at least one diary. The modal respondent completed only one diary. The median number of diaries completed was 13 and the mean was 16.4.

FIGURE 9: Distribution of the number of travel diaries completed per person, among those who completed at least one diary



Notes: This figure presents the distribution of the number of travel diaries completed per person, among the study participants who completed at least one diary. A diary completion is defined as answering all five questions in the diary.

Table 30 compares the baseline characteristics of subjects who responded to at least one travel diary with the characteristics of subjects who did not respond to any diaries. Those who completed at least one diary are 10.9 percentage points more likely than the non-completers to be female, 5.1 percentage points more likely to be White, and 10.9 percentage points more likely to have some post-high school education.

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TABLE 30: Selection into travel diary surveys on baseline characteristics

	COMPLETED A DIARY	DID NOT COMPLETE A DIARY	DIFFERENCE
Panel A. Demographics			
Female	0.766	0.657	0.109*** (0.010)
Age group			
- 18-29	0.219	0.240	-0.020** (0.009)
- 30-39	0.299	0.257	0.042*** (0.009)
- 40-49	0.191	0.172	0.019** (0.008)
- 50-59	0.138	0.148	-0.010 (0.007)
- 60-64	0.056	0.079	-0.023*** (0.005)
Race			
- Black	0.568	0.625	-0.057*** (0.010)
- White	0.356	0.305	0.051*** (0.010)
- Other	0.052	0.046	0.007 (0.005)
Hispanic	0.037	0.027	0.009** (0.004)
Children in household (N)	1.19	1.06	0.126*** (0.029)
Highest education			
- Less than high school	0.070	0.097	-0.027*** (0.006)
- High school	0.515	0.598	-0.083*** (0.010)
- More than high school	0.409	0.302	0.107*** (0.010)
Panel B. Transportation			
Owns a car	0.062	0.050	0.012*** (0.005)
PRT trips last week (N)	9.99	10.03	-0.038 (0.281)
PRT spending last week (\$)	28.94	31.33	-2.39*** (0.692)
Panel C. Employment (from baseline survey)			
Employed past 12 months	0.629	0.570	0.059*** (0.010)
Currently employed	0.447	0.400	0.047*** (0.010)
Hours worked per week at main job (N)	30.63	31.01	-0.385 (0.361)
Hourly wage at main job (\$)	13.62	13.25	0.378*** (0.119)
Panel D. Employment in quarter prior to enrollment (from UI records)			
Total earnings (\$)	2,393.08	2,127.28	265.80*** (68.84)
Received nonzero UI benefits	0.031	0.031	<0.001 (0.004)
N	5,780	3,675	

Notes: This table compares the mean baseline characteristics between the participants who completed at least one travel diary and those who did not complete any diaries. We consider a participant to have completed a diary if they responded to all five questions in the diary. The statistical significance of the difference in mean characteristics between the diary completers and non-completers is calculated by regressing the characteristic on a dummy variable that equals 1 if the participant completed at least one diary. Robust standard errors are in parentheses. ***p < 0.01, **p < 0.05, *p < 0.1

We further test for selection bias by comparing mean differences in respondents' answers to the diary questions between the \$1 and \$2 incentive groups. Table 31 compares the mean answers in the low and high incentive groups and tests whether the difference is zero.

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Respondents in the high incentive group were at least two percentage points more likely than the low incentive group to report taking a car trip or a Pittsburgh Regional Transit trip yesterday (the previous day). The high incentive group was also 2.8 percentage points more likely to report leaving the house to go to work and 3.1 percentage points more likely to report leaving the house to buy groceries.

TABLE 31: Comparing travel diary responses of low and high incentive groups

	HIGH INCENTIVE (\$2)		LOW INCENTIVE (\$1)		\$2 VS \$1 MEAN DIFF.
	N	MEAN	N	MEAN	
Number of places visited yesterday	49,250	2.83	43,576	2.73	0.099*** (0.037)
Did you use the following mode for any trips yesterday?					
Car	50,525	0.396	44,852	0.374	0.022*** (0.003)
Pittsburgh Regional Transit	50,057	0.564	44,360	0.544	0.020*** (0.003)
Walk or bike	49,874	0.433	44,170	0.426	0.007** (0.003)
Reason for leaving house yesterday					
For work	49,434	0.374	43,729	0.347	0.028*** (0.003)
For school	49,434	0.104	43,729	0.095	0.009*** (0.002)
For groceries	49,434	0.444	43,729	0.414	0.031*** (0.003)
For health care	49,434	0.144	43,729	0.138	0.006*** (0.002)
For leisure	49,434	0.257	43,729	0.249	0.008*** (0.003)
For social services	49,434	0.062	43,729	0.060	0.002 (0.002)
For other reason	49,434	0.327	43,729	0.307	0.019*** (0.003)
Did not leave house yesterday	49,434	0.169	43,729	0.191	-0.021*** (0.003)

Notes: This table compares respondents' answers to the travel diary survey questions between the high (\$2) and low (\$1) incentive groups. Sample sizes vary across survey questions because not all respondents answered every question in every diary. The statistical significance of the difference in mean response values is calculated by regressing the response value on a dummy variable that equals 1 if the respondent was offered the high (\$2) incentive. Robust standard errors are in parentheses. ***p < 0.01, **p < 0.05, *p < 0.1